

Determining the Financing Mix

Learning Objectives

 1 Distinguish between business and financial risk.	Understanding the Difference Between Business and Financial Risk
 2 Use break-even analysis.	Break-even Analysis
 3 Understand the relationships between operating, financial, and combined leverage.	Sources of Operating Leverage
 4 Discuss the concept of an optimal capital structure.	Capital Structure Theory
 5 Use the basic tools of capital structure management.	The Basic Tools of Capital Structure Management

What do telecom giant AT&T (T) and Heineken (HINKY.PK) (one of the world's largest brewers of beer) share in common? In the spring of 2012 they both borrowed a lot of money by issuing bonds in the public markets. AT&T raised \$3 billion in April 2012 by issuing bonds while Heineken raised a paltry \$750 million. The decision to issue debt was in both instances a choice made by the firm's respective management team and board of directors. Why corporate bonds; why not common or preferred stock? These are the questions we address in this chapter.

When a firm needs funds to support its investment plans, it typically raises them internally by reinvesting all or part of its earnings. This process of reinvesting firm earnings is tantamount to increasing the investment of the firm's common shareholders in the firm because the earnings represent what is left for the common stockholders after everyone else has been paid. However, occasionally firms find that they need to raise funds externally from the capital markets either because they do not have sufficient earnings to reinvest or they want to rebalance their capital structures. Historically, when firms tried to raise external sources of funds, they had to go to the public capital market where they sold bonds or stocks with the help of investment bankers to a diverse group of investors. However, today private equity firms are a growing source of external capital.

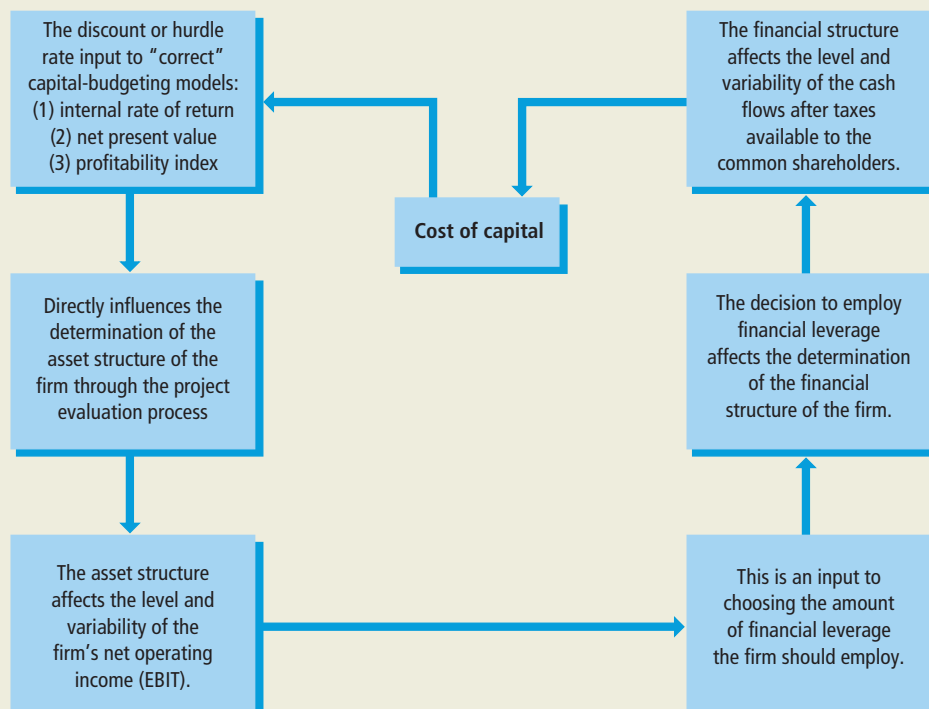
Earlier chapters allowed us to develop an understanding of how financial assets are valued in the marketplace. Drawing on the tenets of valuation theory, we presented various approaches to measuring the cost of funds to the business organization. This chapter presents concepts that relate to the valuation process and the cost of capital; it also discusses the crucial problem of planning the firm's financing mix.

The cost of capital provides a direct link between the formulation of the firm's asset structure and its financial structure. This is illustrated in Figure 12-1. Recall that the cost of capital is a basic input to the time-adjusted, capital-budgeting models. Therefore, it affects the capital-budgeting, or asset-selection, process. The cost of capital is affected, in turn, by the composition of the right-hand side of the firm's balance sheet—that is, its financial structure.

This chapter examines tools that can be useful aids to the financial manager in determining the firm's proper financial structure. First, we review the notion of risk from the perspective of the firm's shareholders as it relates to the potential volatility in shareholder earnings. Corporate CEOs and boards of directors are very sensitive to the earnings numbers they report to Wall Street, so it behooves the financial manager to understand fully how the firm's capital structure affects the variability of earnings.



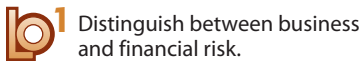
FIGURE 12-1 The Cost of Capital as a Link Between a Firm's Asset Structure and Financial Structure



Next, we turn to a discussion of capital structure theory and the basic tools of capital structure management. Actual capital structure practices are also placed in perspective.

What is it about the nature of business that causes changes in sales revenues to translate into larger variations in net income and, finally, the earnings available to the common shareholders? It would be a good planning tool for management to be able to decompose such fluctuations into those policies associated with the operating side of the business and those policies associated with the financing side of the business.

If you understand the material and analytical processes in this chapter, you will be able to make positive contributions to company strategies that deal with the firm's financing mix. You will be able to formulate a defensible answer to the question: "Should we finance our next capital project with a new issue of bonds or a new issue of common stock?" You can also help a lot of firms avoid making serious financial errors, the consequences of which can last for many years.



1 Distinguish between business and financial risk.

Understanding the Difference Between Business and Financial Risk

If investors are surprised by lower-than-expected corporate earnings, this can lead to a downward revision in their expectations of the firm's future prospects and, consequently, reduce the firm's common stock price. Thus, corporate executives and their boards of directors pay close attention to the earnings that they report to Wall Street. For this reason the financial analyst needs to understand the sources of volatility in firm earnings per share.

In this section we separate the variation in the firm's income stream into one of three sources:

1. **Choice of business line**—the variation in firm earnings that arises out of the natural volatility in revenues attributable to the industry in which it operates. For example, if the firm operates in a highly volatile industry in which revenues fluctuate with the business cycle, then the firm's earnings will be more volatile than another firm that operates in an industry that is less sensitive to the business cycle. We will refer to this source of variation in firm earnings as **business risk**.
2. **Choice of an operating cost structure**—the volatility in the firm's operating earnings that results from the firm's cost structure,¹ that is, the mix of fixed and variable operating costs the firm pays to do business. Greater fixed operating costs (versus variable costs) increase the variability in operating earnings in response to changes in revenues. The firm's mixture of fixed versus variable operating costs is largely determined by the industry in which the firm operates. For example, automobile manufacturing requires that large investments be made in plant and equipment. This results in high fixed operating costs regardless of the level of plant operations. We will refer to this source of variation in the firm earnings as **operating risk**.
3. **Choice of a capital structure**—the source of variation in the firm's earnings that results from its use of sources of financing that require a fixed return, such as debt financing. We will refer to this source of variation in earnings as **financial risk**.

We now spend some time developing an understanding of all three of these sources of volatility in firm earnings.

Business Risk

The amount of business risk the firm decides to take on is most critical at the time the business is started. However, because business risk can affect the volatility of a firm's revenues, it can

business risk the risk of the firm's future earnings that is a direct result of the particular line of business chosen by the firm.

operating risk risk driven by the mix of fixed versus variable costs the firm incurs to do business.

financial risk risk driven by the presence of fixed finance costs in the firm's capital structure (as opposed to variable finance costs such as dividends declared and paid).

¹Recall that the term EBIT is the acronym for earnings before interest and taxes. If what accountants call *other income* and *other expenses* are equal to zero, then EBIT is equal to net operating income. For our purposes we use these two terms interchangeably.

affect the firm's earnings per share. Thus, it behooves us to spend a little time discussing the sources of business risk. We identify four basic determinants of a firm's business risk:

1. **The stability of the domestic economy.** Firms that operate in more volatile economies, such as those of developing nations, are subject to swings in revenue that is much more severe than those that operate within developed countries. For example, a chain of clothing stores operating within the United States faces a less volatile revenue stream than, say, a chain located in Nigeria or even Brazil.
2. **The exposure to, and stability of, foreign economies.** In today's global economy, more and more firms produce and sell their products in multiple countries. This means that it is not only the natural volatility of the firm's home country that drives the volatility of the firm's revenues but also that of the countries in which its goods and services are produced and sold.
3. **Sensitivity to the business cycle.** Some industries are more sensitive to the business cycle than others. For example, the sales of consumer durable goods such as automobiles, housing, and appliances tend to be more sensitive to swings in the business cycle than necessities such as food and clothing.
4. **Competitive pressures in the firm's industry.** Here we refer to the forces of other firms within the firm's marketplace that provide the same (or close substitute) products and services. Greater competitive pressures will force the firm to make price concessions sooner and deeper than would otherwise be the case.

Although business risk is obviously a critical determinant of earnings volatility, for the balance of this chapter we will assume that the firm's business risk is fixed, or given. This will allow us to focus on operating and financial risks, over which managers have more control.

Operating Risk

Operating risk increases when the firm incurs more fixed versus variable costs. Fixed costs do not vary with the firm's revenues, but variable costs, as the name implies, do rise and fall with revenues. A key tool for evaluating operating risk is break-even analysis. Therefore, we open our discussion of operating risk by defining the break-even chart.

Concept Check

1. Why do managers care about the volatility of their firms' earnings?
2. What are the three determinants of the volatility of a firm's earnings?
3. Describe the sources of business risk.
4. What is the determinant of a firm's operating risk?

Break-Even Analysis

Both small and large organizations utilize the break-even analysis tool for two reasons: It is based on straightforward assumptions, and companies have found that the information gained from the break-even model is beneficial in decision-making situations. A break-even analysis is used to determine the **break-even quantity** of the firm's output. What is meant by the break-even quantity of output? It is that quantity of output, denominated in units, that results in operating income (or EBIT) equal to zero. In other words, a break-even analysis enables the analyst (1) to determine the quantity of output that must be sold to cover all operating costs, as distinct from financial costs and (2) to calculate the EBIT that will be achieved at various output levels.

Essential Elements of the Break-Even Model

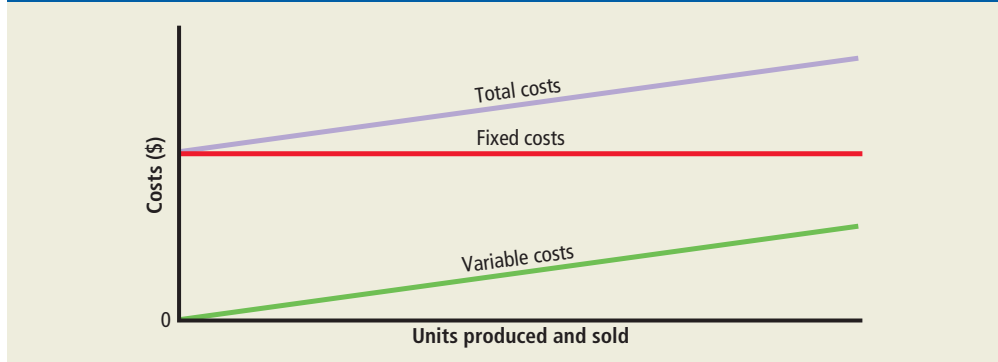
To implement the break-even model, we must separate the production costs of the company into two mutually exclusive categories: fixed costs and variable costs. You will recall from your study of basic economics that in the long run all costs are variable. The break-even analysis, therefore, is a short-run concept.



Use break-even analysis.

break-even quantity the number of units a firm must sell before it starts to earn a profit.

FIGURE 12-2 The Behavior of Total, Fixed, and Variable Costs Over a Relevant Range of Output



fixed costs costs that do not vary in total dollar amount as sales volume or quantity of output changes. Also called **indirect costs**.

indirect costs see **fixed costs**.

Fixed Costs Fixed costs, also referred to as **indirect costs**, *do not vary with either the firm's sales or output*. As the production volume increases, the fixed cost *per unit* of product falls, because the firm's total fixed costs are spread over larger and larger quantities of output. Figure 12-2 graphs the behavior of total fixed costs with respect to the company's relevant range of units produced and sold. This total is shown to be unaffected by the quantity of product that is manufactured and sold. Over some other output range, the amount of total fixed costs might be higher or lower for the same company.

In a manufacturing setting, some specific examples of fixed costs are

1. Administrative salaries
2. Depreciation
3. Insurance
4. Lump sums spent on intermittent advertising programs
5. Property taxes
6. Rent

variable costs expenses that vary in total as output changes. Also called **direct costs**.

direct costs see **variable costs**.

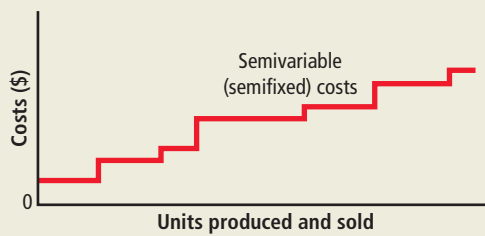
Variable Costs Variable costs are sometimes referred to as **direct costs**. Variable costs *per unit vary as output changes*. Total variable costs are computed by taking the variable cost per unit and multiplying it by the total quantity produced and sold. The break-even model assumes proportionality between total variable costs and sales. Thus, if sales rise by 10 percent, it is assumed that variable costs will rise by 10 percent. Notice that if zero units of the product are manufactured, then variable costs are zero, but fixed costs are greater than zero. This implies that some contribution to the coverage of fixed costs occurs as long as the selling price per unit exceeds the variable costs per unit. This helps explain why some firms will operate a plant even when sales are temporarily depressed—that is, to try to cover fixed costs.

Some examples of variable costs include

1. Direct labor
2. Direct materials
3. Energy costs (fuel, electricity, natural gas) associated with production
4. Freight costs for products leaving the plant
5. Packaging
6. Sales commissions

Figure 12-2 also graphs total costs with respect to the company's relevant range of output. Total cost is simply the sum of the firm's fixed and variable costs.

More on the Behavior of Costs No one really believes that *all* costs behave as neatly as we have illustrated the fixed and variable costs in Figure 12-2. Nor does any law or accounting principle dictate that a certain element of the firm's total costs always will be classified as fixed or variable. This depends on each firm's specific circumstances. In

FIGURE 12-3 Semivariable Cost Behavior Over a Relevant Range of Output

one firm, energy costs may be predominantly fixed, whereas in another they may vary with output.²

Furthermore, some costs may be fixed for a while, then rise sharply to a higher level as a higher output is reached, remain fixed, and then rise again with further increases in production. Such costs may be termed either *semivariable* or *semifixed*. The label is your choice because both are used in practice. An example might be the salaries paid to production supervisors. Should output be cut back by 15 percent for a short period, the organization is not likely to lay off 15 percent of its supervisors. Similarly, the percentage commissions paid to salespeople are often incrementally stepped up the more they sell. This sort of cost behavior is shown in Figure 12-3.

To implement the break-even model and deal with such a complex cost structure, the financial manager must (1) identify the most relevant output range for planning purposes and then (2) approximate the cost effect of semivariable items over this range by segregating a portion of them to fixed costs and a portion to variable costs. In the actual business setting this procedure is not fun. It is not unusual for the analyst who deals with the figures to spend considerably more time allocating costs to fixed and variable categories than doing the actual break-even calculations.

Total Revenue and Volume of Output Besides fixed and variable costs, the essential elements of the break-even model include total revenue from sales and volume of output. **Total revenue** means *total sales dollars* and is equal to the selling price per unit multiplied by the quantity sold. The **volume of output** refers to the *firm's level of operations* and may be indicated either as a unit quantity or as sales dollars.

total revenue total sales dollars.

volume of output the number of units produced and sold for a particular period of time.

Finding the Break-Even Point

Finding the break-even point in terms of units of production can be accomplished in several ways. All approaches require the essential elements of the break-even model just described. The break-even model is a simple adaptation of the firm's income statement expressed in the following analytical format:

$$\text{Sales} - (\text{total variable cost} + \text{total fixed cost}) = \text{profit} \quad (12-1)$$

On a units-of-production basis, it is necessary to introduce (1) the price at which each unit is sold and (2) the variable cost per unit of output. Because the profit item studied in a break-even analysis is EBIT, we use this acronym instead of the word *profit*. In terms of units, the income statement shown in equation (12-1) becomes the break-even model by setting EBIT equal to zero:

$$\left(\begin{array}{c} \text{Sales price} \\ \text{per unit} \end{array} \right) \times \left(\begin{array}{c} \text{units} \\ \text{sold} \end{array} \right) - \left[\left(\begin{array}{c} \text{variable cost} \\ \text{per unit} \end{array} \right) \times \left(\begin{array}{c} \text{units} \\ \text{sold} \end{array} \right) + \left(\begin{array}{c} \text{total fixed} \\ \text{cost} \end{array} \right) \right] = \text{EBIT} = \$0 \quad (12-2)$$

²In a greenhouse operation, in which plants are grown (manufactured) under strictly controlled temperatures, heat costs will tend to be fixed whether the building is full or only half-full of seedlings. In a metal stamping operation, in which levers are being produced, there is no need to heat the plant to as high a temperature when the machines are stopped and the workers are not there. In this latter case, the heat costs will tend to be variable.

Our task now becomes finding the number of units that must be produced and sold in order to satisfy equation (12-2)—that is, to arrive at $\text{EBIT} = \$0$. This can be done by simply solving equation (12-2) for the number of units sold that make $\text{EBIT} = 0$.

Specifically, the break-even number of units sold is found to equal:

$$\text{Break-even level of units} = \frac{\text{total fixed cost}}{\left(\begin{array}{c} \text{sales price} \\ \text{per unit} \end{array} - \begin{array}{c} \text{variable cost} \\ \text{per unit} \end{array} \right)} \quad (12-3)$$

EXAMPLE 12.1

Calculating the break-even level of units

Even though Pierce Grain Company manufactures several different products, it has observed over a lengthy period that its product mix is rather constant. This allows management to conduct its financial planning by using a “normal” sales price per unit and a “normal” variable cost per unit. The “normal” sales price and variable cost per unit are calculated from the constant product mix. It is like assuming that the product mix is one big product. The selling price is \$10 and the variable cost is \$6. Total fixed costs for the firm are \$100,000 per year. What is the break-even point in units produced and sold for the company during the coming year?

STEP 1: FORMULATE A SOLUTION STRATEGY

We are interested in knowing the number of the product mix Pierce Grain Company must sell before all its costs are covered. That is, EBIT (profit) will be equal to zero. Equation (12-3), which was derived from this general idea, is again shown below:

$$\text{Break-even} = \frac{\text{total fixed costs}}{(\text{sales price per unit} - \text{variable cost per unit})}$$

Comparing what we know from the question and this equation, we know:

1. Total fixed costs = \$100,000
2. Sales prices per unit = \$10
3. Variable cost per unit = \$6

STEP 2: CRUNCH THE NUMBERS

Substituting this information into equation (12-3) yields:

$$\begin{aligned} \text{Break-even} &= \frac{\$100,000}{(10 - 6) \text{ \$/unit}} \\ \text{Break-even} &= 25,000 \text{ units} \end{aligned}$$

STEP 3: ANALYZE YOUR RESULTS

Thus, Pierce Grain must sell 25,000 units in the coming year to cover only its fixed costs. In essence, after selling 25,000 units, Pierce Grain will have covered the costs it incurred to produce the 25,000 units and $\text{EBIT} = 0$.

$$\text{Break-even} = \frac{\text{total fixed costs}}{\left(1 - \frac{\text{variable costs}}{\text{revenues}} \right)}$$

The Break-Even Point in Sales Dollars

For the multiproduct firm, it is convenient to compute the break-even point in terms of sales dollars rather than units sold. Sales, in effect, become a common denominator associated with

CAN YOU DO IT?
ANALYZING THE BREAK-EVEN SALES LEVEL

Creighton Manufacturing Company assembles brake controllers used to upgrade the brake systems of vintage automobiles that are being restored. The firm’s revenues for the past year were \$20 million, on which the firm had earnings before interest and taxes (EBIT) of \$10 million. Fixed expenses were \$2 million. Variable costs were of \$8 million, or 40 percent of the firm’s revenues. What do you estimate the firms break-even level of revenues to be based on its current cost structure? (The solution can be found on page 388.)

a particular product mix. Furthermore, an outside analyst might not have access to internal unit cost data. He or she may, however, be able to obtain annual reports for the firm. If the analyst can separate the firm’s total costs as identified from its annual reports into their fixed and variable components, he or she can calculate a general break-even point in sales dollars.

We illustrate this procedure using Pierce Grain Company’s cost structure. Suppose that the reported financial information is arranged in the format shown in Table 12-1. If we are aware of the simple mathematical relationships on which cost-volume-profit analysis is based, we can use Table 12-1 to find the break-even point in sales dollars for Pierce Grain Company.

We can solve for the break-even level of revenues (as opposed to units sold) using equation (12-4) as follows:

Break-even level of revenues = $\frac{\text{total fixed costs}}{\left(1 - \frac{\text{variable costs}}{\text{revenues}}\right)}$ (12-4)

In the Pierce Grain Company example the ratio of the firm’s variable costs (\$180,000) to revenues (\$300,000) is \$180,000/\$300,000, or 0.60, and is assumed to be constant for all revenue levels. Consequently, we can use equation (12-4) to solve for Pierce’s break-even level of revenues as follows:

Break-even level of revenues = $\frac{\$100,000}{\left(1 - \frac{\$180,000}{\$300,000}\right)} = \$250,000$

TABLE 12-1 Income Statement for Pierce Grain Company	
Sales	\$300,000
Less: Total variable costs	180,000
Revenue before fixed costs	\$120,000
Less: Total fixed costs	100,000
EBIT	\$ 20,000

FINANCIAL DECISION TOOLS		
Name of Tool	Formula	What It Tells You
Break-even level of revenues	Break-even level of revenues = $\frac{\text{total fixed costs}}{\left(1 - \frac{\text{variable costs}}{\text{revenues}}\right)}$	• The dollar amount of firm revenues needed for the firm to cover its fixed and variable costs • To get break-even units divide break-even revenue level by the product price.

DID YOU GET IT?

ANALYZING THE BREAK-EVEN SALES LEVEL

Creighton Manufacturing Company has fixed operating costs of \$2 million and pays variable costs equal to \$8 million/\$20 million = 40 percent. Therefore, using equation (12-4), we can solve for the firm's break-even sales level as follows:

$$\text{Break-even level of revenues} = \frac{\$2,000,000}{\left(1 - \frac{\$8,000,000}{\$20,000,000}\right)} = \$3,333,333$$

Concept Check

1. Distinguish among fixed costs, variable costs, and semivariable costs.
2. When is it useful or sometimes necessary to compute the break-even point in terms of sales dollars rather than units of output?



Understand the relationship between operating leverage, financial leverage, and combined leverage.

operating leverage results from operating costs that are fixed and do not vary with the level of firm sales.

Sources of Operating Leverage

When a firm has fixed operating costs, then it is subject to the effects of **operating leverage**. Moreover, the operating leverage increases the sensitivity of the firm's operating income to changes in sales.

For example, highly leveraged firms will see their incomes rise sharply when their sales rise. By contrast, firms with less leverage will see less-sharp rises in their incomes when their sales rise. To illustrate how this works, consider the Pierce Grain Company example. The firm's current sales are equal to \$300,000, as found in Table 12-2. If Pierce's sales were to rise by 20 percent, up to \$360,000, we calculate that the firm's EBIT would rise from \$20,000 to \$44,000. Note in the last column of Table 12-2 that we calculate the percent change in both revenues and EBIT. Revenues increase by just 20 percent, but the EBIT

TABLE 12-2 How Operating Leverage Affects EBIT: An Increase in Pierce Grain Company's Sales

Item	Base Sales Level, t	Forecast Sales Level, $t + 1$	Percentage Change
Sales	\$300,000	\$360,000	+20%
Less: Total variable costs	<u>180,000</u>	<u>216,000</u>	
Revenue before fixed costs	\$120,000	\$144,000	
Less: Total fixed costs	<u>100,000</u>	<u>100,000</u>	
EBIT	<u>\$ 20,000</u>	<u>\$ 44,000</u>	+120%

CAN YOU DO IT?

ANALYZING THE EFFECTS OF OPERATING LEVERAGE

JGC Electronics operates in a very cyclical business environment such that it is not uncommon for the firm's sales to increase or decrease by 20 percent or more from year to year. Moreover, the firm has made a substantial investment in plant and equipment. The company's high fixed operating expenses associated with the plant and equipment make the firm's earnings before interest and taxes (EBIT) very sensitive to changes in revenues. In fact, if revenues were to rise by 20 percent, the firm's managers estimate that EBIT would rise by 40 percent. If JGC's revenues were to fall by 20 percent from their current level of \$10 million, what percentage decline in EBIT would you anticipate for the firm?

(The solution can be found on page 389.)

DID YOU GET IT?

ANALYZING THE EFFECTS OF OPERATING LEVERAGE

At its current level of sales, JGC anticipates that any percentage change in revenues will result in double that percentage change in EBIT. Thus, a decline in revenues by 20 percent would be expected to result in a decline in EBIT of 40 percent. Recall, however, that this relationship between percentage changes in revenues and EBIT changes as the level of revenue changes.

increases by a whopping 120 percent. The reason for this difference is the effect of operating leverage. If Pierce had no operating leverage (that is, all of its operating costs were variable), then the increase in EBIT would have been 20 percent, just like revenues. Note also that if Pierce had experienced a 20 percent decline in revenues, it would have experienced a 120 percent decline in EBIT, as the numbers in Table 12-3 illustrate. Clearly, a higher operating leverage means higher volatility in EBIT!

So, what does this all mean for the management team at Pierce Grain? Is there something they can or should do in response to having high operating leverage? Yes, there is. Recognizing that firm operating earnings will be very sensitive to changes in firm revenues should make management very wary about using lots of financial leverage that carries with it fixed principal and interest payments. Moreover, with highly variable operating earnings, Pierce's management will probably want to hold a safety net of cash and marketable securities to help the firm weather any periods when revenue falls below the break-even level.

Before we complete this discussion of operating leverage and move on to the subject of financial leverage, ask yourself, "Which type of leverage is more under the control of management?" You will probably (and correctly) come to the conclusion that the firm's managers have less control over the operating cost structure and almost complete control over its financial structure. What the firm actually produces, for example, will determine to a significant degree the division between fixed and variable costs. However, there is more room for substitution among the various sources of financial capital than there is among the labor and real capital inputs that enable the firm to meet its production requirements. Thus, you can anticipate more arguments over the choice of the firm's financial structure than operating structure.

TABLE 12-3 How Operating Leverage Affects EBIT: A Decrease in Pierce Grain Company's Sales

Item	Base Sales Level, t	Forecast Sales Level, $t + 1$	Percentage Change
Sales	\$300,000	\$240,000	-20%
Less: Total variable costs	<u>180,000</u>	<u>144,000</u>	
Revenue before fixed costs	\$120,000	\$ 96,000	
Less: Total fixed costs	<u>100,000</u>	<u>100,000</u>	
EBIT	<u>\$ 20,000</u>	<u>\$-4,000</u>	-120%

CAN YOU DO IT?

ANALYZING THE EFFECTS OF FINANCIAL LEVERAGE

JGC Electronics currently uses no financial leverage in its capital structure. Should the firm's earnings before interest and taxes (EBIT) increase by 20 percent, what percentage change would you expect in JGC's earnings per share? (The solution can be found on page 390.)

DID YOU GET IT?

ANALYZING THE EFFECTS OF FINANCIAL LEVERAGE

Because JGC uses no financial leverage, there is *no* magnification effect of the percent change in EBIT on earnings per share. Therefore, a 20 percent increase in EBIT would lead to an equal 20 percent increase in the firm's earnings per share.

financial leverage results from the firm's use of sources of financing that require a fixed rate of return. The primary example of such a form of financing is fixed interest rate debt whereby the firm must pay predetermined interest and principal on specified dates.

Financial Leverage

Financial leverage arises from *financing a portion of the firm's assets with securities bearing a fixed (limited) rate of return* in hopes of increasing the ultimate return to the common stockholders. The decision to use debt or preferred stock in the financial structure of the corporation means that those who own the common shares of the firm are exposed to financial risk. Any given level of variability in EBIT is magnified by the firm's use of financial leverage, and such additional variability is embodied in the variability of earnings available to the common stockholder and earnings per share.

Let's now focus on the responsiveness of the company's earnings per share to changes in its EBIT. (We are *not* saying that earnings per share is the appropriate criterion for all financing decisions. In fact, the weakness of such a contention is examined later. Rather, the use of financial leverage produces a certain type of *effect* on earnings per share.)

Let us assume that Pierce Grain Company is in the process of getting started as a going concern. The firm's potential owners have estimated that \$200,000 is needed to purchase the necessary assets to conduct the business. Three possible financing plans have been identified for raising the \$200,000; they are presented in Table 12-4. In plan A no financial risk is assumed: The entire \$200,000 is raised by selling 2,000 common shares for \$100 per share. In plan B a moderate amount of financial risk is assumed: 25 percent of the assets are financed with a debt issue that carries an 8 percent annual interest rate. Plan C would use the most financial leverage: 40 percent of the assets would be financed with a debt issue costing 8 percent.

Table 12-5 presents an analysis of the impact of financial leverage on earnings per share. If EBIT should increase from \$20,000 to \$40,000, then earnings per share would rise by 100 percent under plan A. The same change in EBIT would result in an earnings-per-share rise of 125 percent under plan B and 147 percent under plan C. In plans B and C, the 100 percent increase in EBIT (from \$20,000 to \$40,000) is magnified to a greater-than-100-percent

TABLE 12-4 Possible Capital Structures for Pierce Grain Company

PLAN A: 0% DEBT			
		Total debt	\$ 0
		Common equity	200,000 ^a
Total assets	<u>\$200,000</u>	Total liabilities and equity	<u>\$200,000</u>
PLAN B: 25% DEBT AT 8% INTEREST RATE			
		Total debt	\$ 50,000
		Common equity	150,000 ^b
Total assets	<u>\$200,000</u>	Total liabilities and equity	<u>\$200,000</u>
PLAN C: 40% DEBT AT 8% INTEREST RATE			
		Total debt	\$ 80,000
		Common equity	120,000 ^c
Total assets	<u>\$200,000</u>	Total liabilities and equity	<u>\$200,000</u>

^a2,000 common shares outstanding. ^b1,500 common shares outstanding. ^c1,200 common shares outstanding.

TABLE 12-5 An Analysis of Financial Leverage at Different EBIT Levels: Pierce Grain Company

(1)	(2)	(3) = (1) – (2)	(4) = (3) × 0.5	(5) = (3) – (4)	(6)
EBIT	Interest	EBT	Taxes	Net Income to Common Shareholders	Earnings Per Share
PLAN A: 0% DEBT; \$200,000 COMMON EQUITY; 2,000 SHARES					
\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
100% { 20,000	0	20,000	10,000	10,000	5.00
40,000	0	40,000	20,000	20,000	10.00
60,000	0	60,000	30,000	30,000	15.00
80,000	0	80,000	40,000	40,000	20.00
PLAN B: 25% DEBT; 8% INTEREST RATE; \$150,000 COMMON EQUITY; 1,500 SHARES					
\$ 0	\$4,000	\$ (4,000)	\$ (2,000) ^a	\$ (2,000)	\$ (1.33)
100% { 20,000	4,000	16,000	8,000	8,000	5.33
40,000	4,000	36,000	18,000	18,000	12.00
60,000	4,000	56,000	28,000	28,000	18.67
80,000	4,000	76,000	38,000	38,000	25.33
PLAN C: 40% DEBT; 8% INTEREST RATE; \$120,000 COMMON EQUITY; 1,200 SHARES					
\$ 0	\$6,400	\$ (6,400)	\$ (3,200) ^a	\$ (3,200)	\$ (2.67)
100% { 20,000	6,400	13,600	6,800	6,800	5.67
40,000	6,400	33,600	16,800	16,800	14.00
60,000	6,400	53,600	26,800	26,800	22.33
80,000	6,400	73,600	36,800	36,800	30.67

^aThe negative tax bill recognizes the credit arising from the carryback and carryforward provision of the tax code.

increase in earnings per share. The firm is employing financial leverage and exposing its owners to financial risk when the following situation exists:

$$\frac{\text{percentage change in earnings per share}}{\text{percentage change in EBIT}} > 1.00$$

As we have illustrated using the Pierce Grain Company example, the greater the firm's use of financial leverage, the greater will be the ratio of the percent change in earnings per share divided by the corresponding percent change in EBIT. To reiterate, this means that the use of financial leverage *magnifies* the effect of changes in EBIT on earnings per share. If, for example, the aforementioned ratio were 2, then a 20 percent change in EBIT (either positive or negative) would lead to a 40 percent change in earnings per share. For a firm that had even more financial leverage in its capital structure, the ratio might be 3, such that a 20 percent change in EBIT would lead to a 60 percent change in earnings per share.

Combining Operating and Financial Leverage

Operating leverage causes changes in sales revenues to lead to even greater changes in EBIT. Additionally, changes in EBIT due to financial leverage translate into larger variations in both earnings per share (EPS) and the net income available to the common shareholders (NI), if the firm chooses to use financial leverage. It should be no surprise, then, to find out that combining operating and financial leverage causes rather large variations in earnings per share. This entire process is visually displayed in Figure 12-4.

Because the risk associated with possible earnings per share is affected by the use of **combined, or total, leverage**, it is useful to quantify the effect. To illustrate, we refer once more to Pierce Grain Company. The cost structure identified for Pierce Grain in our discussion of break-even analysis still holds. Furthermore, assume that plan B, which carried

combined, or total, leverage the result of the combined effects of both operating and financial leverage.

CAN YOU DO IT?

ANALYZING THE COMBINED EFFECTS OF OPERATING AND FINANCIAL LEVERAGE

Peterson Timber Company operates sawmills throughout the redwood areas of the Pacific Northwest. The firm's current level of revenues, EBIT, and earnings per share are \$10 million, \$4 million, and \$1.00 per share, respectively. Peterson's CFO recently forecasted the firm's revenues and profits for next year and estimated that total revenues will grow to \$12 million, EBIT will rise to \$5.2 million, and earnings per share will be \$1.60 a share. Analyze the effects of operating, financial, and combined leverage for Peterson. (The solution can be found on page 392.)

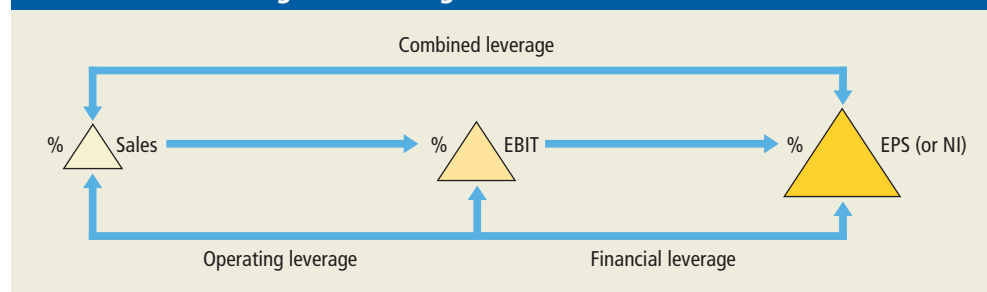
a 25 percent debt ratio, was chosen to finance the company's assets. Turn your attention to Table 12-6 to see how the effects of operating and financial leverage are combined.

In Table 12-6 an increase in output for Pierce Grain from 30,000 to 36,000 units is analyzed. This increase represents a 20 percent rise in sales revenues. From our earlier discussion of operating leverage and from the data in Table 12-6, we can see that this 20 percent increase in sales is magnified into a 120 percent rise in EBIT. Moreover, the 120 percent rise in EBIT induces a change in earnings per share and earnings available to the common shareholders of 150 percent. The upshot of the analysis is that the modest 20 percent rise in sales has been magnified to produce a 150 percent change in earnings per share.

Pierce Grain's use of both operating and financial leverage will cause any percentage change in sales (from the specific base level) to be magnified by a factor of 7.50 when the effect on earnings per share is computed. A 10 percent change in sales, for example, will result in a 75 percent change in earnings per share.

The total risk exposure the firm assumes can be managed by combining operating and financial leverage in different degrees. Knowing the various leverage measures will help you determine the proper level of overall risk that should be accepted. For example, if a high degree of business risk is inherent in the specific line of commercial activity, then a low amount of financial risk will minimize additional earnings fluctuations stemming from changes in the firm's sales. Conversely, the firm that by its very nature incurs a low level of

FIGURE 12-4 Leverage and Earnings Fluctuations



DID YOU GET IT?

ANALYZING THE COMBINED EFFECTS OF OPERATING AND FINANCIAL LEVERAGE

Peterson's CFO estimates that firm's revenues will increase by 20 percent, EBIT will increase by 30 percent, and earnings per share will rise 60 percent. Consequently, Peterson's operating leverage produces an increase in EBIT that is 1.5 times the 20 percent increase in sales, and an earnings per share increase by 60 percent, which is twice the percent change in EBIT that is 30 percent. Once again, we see that operating and financial leverage interact in a multiplicative fashion. That is, the percent increase in earnings per share is 2 times the increase in EBIT, which is 1.5 times the increase in sales. The net result is that the percent increase in earnings per share is equal to $1.5 \times 2 = 3$ times the percent increase in sales. Consequently, the 20 percent increase in sales results in a 3×20 percent = 60 percent increase in earnings per share.

TABLE 12-6 The Combined-Leverage Effect on Pierce Grain Company's Earnings per Share

Item	Base Sales Level, t	Forecast Sales Level, $t + 1$	Percentage Change
Sales	\$300,000	\$360,000	+20%
Less: Total variable costs	180,000	216,000	
Revenue before fixed costs	\$120,000	\$144,000	
Less: Total fixed costs	100,000	100,000	
EBIT	\$ 20,000	\$ 44,000	+120%
Less: Interest expense	4,000	4,000	
Earnings before taxes (EBT)	\$ 16,000	\$ 40,000	
Less: Taxes at 50%	8,000	20,000	
Net income	\$ 8,000	\$ 20,000	+150%
Less: Preferred dividends	0	0	
Earnings available to common shareholders (EAC)	\$ 8,000	\$ 20,000	+150%
Number of common shares	1,500	1,500	
Earnings per share (EPS)	\$5.33	\$13.33	+150%

FINANCE AT WORK

WHEN FINANCIAL LEVERAGE PROVES TO BE TOO MUCH TO HANDLE

The financial crisis that began in 2007 and the ensuing economic slowdown had a heavy toll on U.S. automakers. General Motors (GM), once the largest automaker in the world, found itself drowning in more debt than it could afford. So, facing the prospect of not being able to honor its financial obligations the company approached its creditors with an offer to restructure its debt. The offer included the following for each dollar of debt owed: \$0.08 in cash, \$0.16 in unsecured debt, plus a 90% stake in the automaker. With about \$28 billion in debt to

bondholders, the GM offer translated into \$2.2 billion in cash and \$4.3 billion in unsecured debt plus a stake in the restructured firm. Although the terms may sound extreme for the firm's bondholders, they were even harsher on the current stockholders, who went from owning 100% of the firm's equity down to only 10%! Of course, if the firm were to declare bankruptcy, the common stockholders would likely be wiped out completely.

Source: Reuters UK, <http://uk.reuters.com/article/businessNews/idUKTRE52T6ZZ20090331>, accessed April 2, 2009.

fixed operating costs might choose to use a high degree of financial leverage in the hope of increasing earnings per share and the rate of return on its common equity.

Concept Check

1. When is operating leverage present in the firm's cost structure? What condition is necessary for operating leverage not to be present in the firm's cost structure?
2. What is the effect of operating leverage on the volatility of a firm's EBIT?
3. What creates financial leverage in a firm's capital structure?
4. How does financial leverage affect the volatility of firm earnings in response to changes in EBIT?
5. If the ratio of the percent change in earnings per share to the corresponding percent change in EBIT were 2, what percent change in earnings would you expect to follow a 15 percent decline in EBIT?
6. How do operating and financial leverage interact to affect the volatility of a firm's earnings per share?

Capital Structure Theory

It is now time to consider the determination of the appropriate financing mix for the firm. A complete listing of the sources of financing a firm has used to finance its assets is found in the right-hand side of the firm's balance sheet. We will refer to this list of all sources of

b4 Discuss the concept of an optimal capital structure.

TABLE 12-7 Distinguishing Between a Firm's Financial Structure and Its Capital Structure

Current assets	\$ 100	Accounts payable	\$ 10	Financial structure	
Fixed assets	200	Accrued expenses	15		
Total assets	<u>\$ 300</u>	Short-term debt	50		
		Current portion of long-term debt	5		
		Current liabilities	<u>\$ 80</u>		
		Long-term debt	70	Capital structure	
		Preferred equity	50		
		Common equity	<u>100</u>		
		Total liabilities and owners' equity	<u>\$300</u>		

financial structure the mix of all sources of fundings that appears on the right-hand side of the balance sheet.

financing as the firm's **financial structure**. For example, in Table 12-7 we see a balance sheet for a firm that has \$300 in assets that have been financed using a mixture of sources of financing that consists of \$80 in current liabilities (debts that must be repaid within a period of 1 year or less), \$70 in long-term debt, \$50 in preferred stock, and finally \$100 in common equity.

Note that some of the firm's current liabilities arise naturally as the firm carries out its day-to-day operations. We are referring to accounts payable and accrued expenses. For example, when the firm orders additional items of inventory its suppliers automatically extend credit to the firm, which appears on the balance sheet as accounts payable. Moreover, the firm accrues interest and other expenses continually over time but pays it only periodically (for example, semiannually). These accrued expenses then represent a liability of the firm that also arises naturally as the firm carries out its day-to-day business. Since accounts payable and accrued expense items arise automatically in response to the events that create them, these liabilities are not the ones we are directly concerned about in this chapter. Specifically, we are interested in that part of the firm's financial structure that requires the discretionary management by the firm. We refer to this as the firm's **capital structure**. In Table 12-7 the financial structure consists of all \$300 of liabilities and owners' equity found on the right-hand side of the balance sheet, whereas the capital structure excludes accounts payable and accrued expenses and totals \$275.

capital structure the mix of interest-bearing short- and long-term debt plus equity funds used by the firm.

The relationship between a firm's financial structure and capital structure can be expressed in equation form as follows:

$$\text{Financial structure} = \left(\begin{array}{c} \text{non-interest-} \\ \text{bearing liabilities} \end{array} \right) + \left(\begin{array}{c} \text{capital} \\ \text{structure} \end{array} \right) \quad (12-5)$$



accounts payable
accrued expenses



short-term debt
long-term debt
preferred stock
common equity

Note that we refer to accounts payable and accrued expenses as non-interest-bearing liabilities. The reason for this is that there is no explicit interest expense associated with these liabilities. An explicit interest expense would be something like the interest you pay on a bank loan. When a firm purchases items of inventory on credit, the credit terms simply say that the amount of the purchase must be paid within a specific time interval, such as 30 days. Consequently, the supplier is providing 30 days of credit to the firm without specifying a rate of interest. The supplier is aware of the fact that it is supplying credit and surely will incorporate some interest cost in the price terms for the items. The important point, however, is that this interest is hidden and not explicitly stated, so accounts payable and accrued expenses do not give rise to interest expense to the firm.

CAUTIONARY TALE

FORGETTING PRINCIPLE 3: RISK REQUIRES A REWARD

In 2008, we learned that when faced with a severe economic downturn, even the smartest of the Wall Street investment bankers can be done in. As 2008 dawned, there were five major independent investment banks. Now, there are only two (Goldman Sachs and Morgan Stanley). So what did the others in? The answer, very simply, is the excessive use of financial leverage.

Leverage can be a double-edged sword. In booming times, using leverage helped the investment banks increase their rates of return significantly. Of course, higher returns entail higher risk. And these banks—Bear Stearns, Lehman Brothers, and Merrill Lynch—were in effect exposing themselves to two types of risk: First, they were faced with the risk that their investments might not earn more than the costs to finance them. For example, if the rate of return the banks earned on their assets dropped below the rate they were paying for financing, then

the shortfall in earnings came out of the stockholders' return. Second, the investment banks were borrowing funds using short-term loans called commercial paper and then investing this borrowed money in long-term investments. This meant that they continuously faced a refinancing risk as they needed to continually issue and re-issue commercial paper.

When the commercial paper market shut down as a result of the financial crisis in 2008, this left the investment banks without a source of financing, forcing them to sell their long-term investments at distressed prices. The result was that Bear Stearns, Lehman Brothers, and Merrill Lynch all found themselves unable to continue their operations. Merrill Lynch was bought by Bank of America, Bear Stearns was purchased by JPMorgan, and Lehman declared bankruptcy, and the British investment banking firm Barclays purchased many of its assets.

The design of a prudent capital structure requires that we address two questions:

1. **Debt maturity composition**—what mix of short-term and long-term debt should the firm use?
2. **Debt–equity composition**—what mix of debt and equity should the firm use?

The primary influence on the debt maturity composition of the firm's capital structure (short- versus long-term debt) is the nature of the assets owned by the firm. Firms that are heavily committed to investments in fixed assets that are expected to produce cash flow over many years generally favor long-term debt to the extent that they borrow. Firms that tend to invest more heavily in assets that produce relatively short-lived cash flows tend to finance more heavily using short-term debt.

The focus of this chapter is on the debt–equity composition or what is usually called *capital structure management*. A firm's capital structure should mix the permanent sources of funds used by the firm in a manner that will maximize the company's common stock price or, put differently, *minimize the firm's composite cost of capital*. We can call this proper mix of fund sources the **optimal capital structure**.

Table 12-7 looks at equation (12-5) in terms of a balance sheet. It helps us visualize the over-riding problem of capital structure management. The sources of funds that give rise to financing fixed costs (long-term debt and preferred equity) must be combined with common equity in the proportions most suitable to the investment marketplace. If that mix can be found, then holding all other factors constant, the firm's common stock price will be maximized.

Obviously, taking on excessive financial risk can put the firm into bankruptcy proceedings. But using too little financial leverage results in an undervaluation of the firm's shares. The financial manager must know how to find the area of optimum financial leverage use—this will enhance share value, all other considerations being held constant.

The rest of this chapter covers three main areas. First, we briefly discuss the theory of capital structure. Second, we examine the basic tools of capital structure management. We conclude with a real-world look at actual capital structure management.

debt maturity composition the mix of short- and long-term debt used by the firm.

debt–equity composition the mix of debt and equity used by the firm in its capital structure.

optimal capital structure the capital structure that minimizes the firm's composite cost of capital (maximizes the common stock price) for raising a given amount of funds.

A Quick Look at Capital Structure Theory

In this section of the chapter we address the theoretical underpinnings as to why a firm's capital structure is important to the firm's common stockholders. To do this we first discuss a world in which capital structure is unimportant—that is, where the particular mix of debt and equity in the firm's capital structure has no effect on the value of the firm or its cost

of capital (Chapter 9). The reason we do this is to make it very clear why capital structure matters and to help us make prudent decisions about its composition. The heart of the argument about the importance of capital structure is found in the following question:

Can the Firm Affect Its Overall Cost of Funds, Either Favorably or Unfavorably, by Varying the Mixture of Financing Sources Used?

This controversy has taken many elegant forms in the finance literature and tends to appeal more to academics than financial practitioners. To emphasize the ingredients of capital structure theory that have practical applications for business financial management, we will pursue an intuitive, or nonmathematical, approach to reach a better understanding of the underpinnings of this cost of capital, or capital structure, argument.

The Importance of Capital Structure

It makes economic sense for the firm to strive to minimize the cost of using financial capital. Both capital costs and other costs, such as manufacturing costs, share a common characteristic in that they potentially reduce the size of the cash dividend that could be paid to common stockholders.

Independence Position

Two Nobel Prize–winning financial economists, Franco Modigliani and Merton Miller (hereafter MM), analyzed the importance of the capital structure decision within the context of a very restrictive set of assumptions about the world in which businesses operate. Specifically, MM assumed that a firm’s investment policies (that is, the set of investments it would undertake) and dividend policy (the amount of the firm’s earnings paid to stockholders in dividends) were fixed such that they are not influenced by the firm’s capital structure decision. They then demonstrated, under a set of assumptions, that the firm’s capital structure mix did not affect the firm’s cost of capital or the value of the firm’s common equity. This position is sometimes referred to as capital structure independence since the value of the firm is independent of how it has been financed (that is, its capital structure). Some of the key assumptions underlying the MM independence proposition include the following:

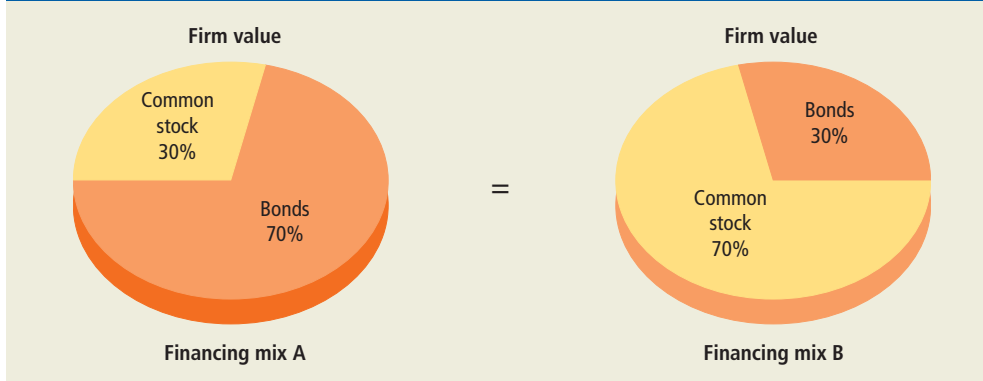
1. Corporate income is not subject to taxation.
2. Capital structures consist only of stocks and bonds.
3. Investors make homogeneous forecasts of net operating income (what we earlier called EBIT).
4. Stocks and bonds are traded in perfect or efficient markets.

In this market setting, the answer to the question, “Can the firm affect its overall cost of funds, either favorably or unfavorably, by varying the mixture of financing sources used?” is no.

To summarize, the Modigliani and Miller hypothesis, or the MM view, puts forth that within the perfect economic world previously described, the total market value of the firm’s outstanding securities will be *unaffected* by the manner in which the right-hand side of the balance sheet is arranged. This means the sum of the market value of outstanding common stock plus outstanding debt will always be the same regardless of how much or how little debt is actually used by the company. This MM view is sometimes called the *independence hypothesis*, as firm value is independent of capital structure design.

The crux of this position on financing choice is illustrated in Figure 12-5. Here the firm’s asset mix (the left-hand side of the balance sheet) is held constant. All that is different is the way the assets are financed. Under financing mix A, the firm funds 30 percent of its assets with common stock and the other 70 percent with bonds. Under financing mix B, the firm reverses this mix and funds 70 percent of the assets with common stock and only 30 percent with bonds. From our earlier discussions we know that financing mix A is the more heavily leveraged plan.

Notice, however, that the size of the “pies” in Figure 12-5 are exactly the same. The pie represents firm value—the total market value of the firm’s outstanding securities. Thus, the total firm value associated with financing mix A equals that associated with financing mix B. Firm value is *independent* of the actual financing mix that has been chosen.

FIGURE 12-5 Firm Value and Capital Structure Design

This implication is taken further in Figure 12-6 where we see that the firm's overall cost of capital, k_{wacc} , is unaffected by an increased use of financial leverage. If more debt is used with a cost of k_d in the capital structure, the cost of common equity, k_{cs} , will rise at the same rate additional earnings are generated. This will keep the composite cost of capital to the corporation unchanged. Furthermore, because the overall cost of capital does not change with leverage use, neither will the firm's common stock price.

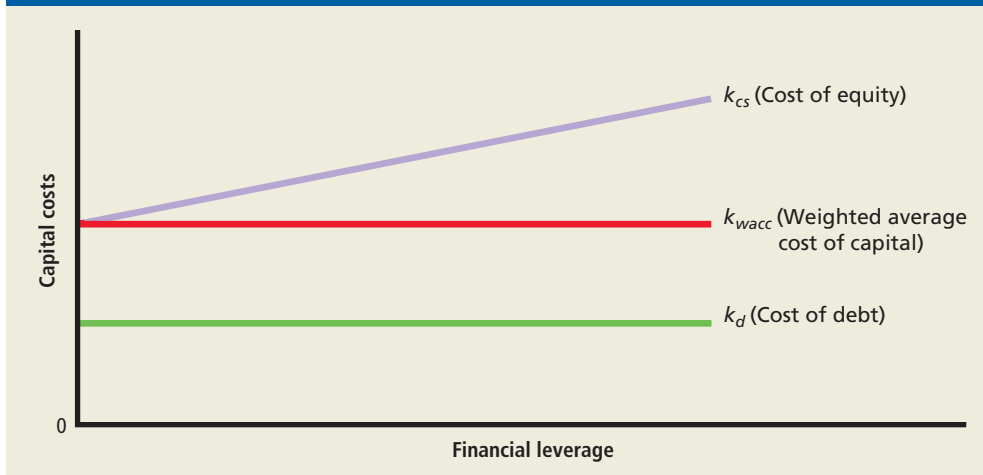
The lesson of this view on financing choices is that debt financing is not as cheap as it first appears to be because the composite cost of funds or the firm's weighted average cost of capital is constant over the full range of financial leverage use. *The stark implication for financial officers is that one capital structure is just as good as any other.*

Recall, though, the strict assumptions used to define the economic world in which this theory was developed. We next turn to a market and legal environment that relaxes these extreme assumptions.

The Moderate Position

We turn now to a more moderate description of the relationship between the firm's cost of capital and its capital structure that has wide appeal to both business practitioners and academics. This moderate view is based on the relaxation of two of the very restrictive assumptions underlying the MM independence theory:

1. **Interest expense is tax deductible**—when a firm incurs debt on which it pays interest that interest is tax deductible, which reduces the cost of debt to the firm by an amount

FIGURE 12-6 Capital Costs and Financial Leverage: No Taxes—Independence Hypothesis

equal to the reduced taxes the firm must pay. This constitutes an advantage of using debt financing rather than equity since the dividends paid to stockholders are not tax deductible.

2. **Debt financing increases the risk of default**—since the interest and principal payments associated with borrowing must be paid in accordance with the debt contract, the firm faces the risk of being forced into bankruptcy if it fails to meet its contractual interest and principal payment obligations. This constitutes a disadvantage of using debt financing, for using more debt leads to an increased likelihood of financial distress. Financial distress, in turn, forces the firm to incur added costs and may even lead to bankruptcy, which could result in the total destruction of the value of the common shares of the firm.

Combining the plus of interest tax deductibility with the minus of added risk of financial distress provides the conceptual basis for designing a prudent capital structure.

The Benefits of Financial Leverage—Interest Tax Savings Table 12-8 illustrates this important element of the U.S. system of corporate taxation. We assume that Skip's Camper Manufacturing Company has an expected level of earnings before interest and taxes (EBIT) of \$2 million and faces a corporate tax rate (made simple for example purposes) of 50 percent. Two financing plans are analyzed. The first is an unleveraged capital structure. The other assumes that Skip's Camper has \$8 million of bonds outstanding that carry an interest rate of 6 percent per year.

Notice that if corporate income were *not* taxed, then earnings before taxes of \$2 million per year could be paid to shareholders in the form of cash dividends or to bond investors in the form of interest payments, or any combination of the two. This means that the *sum* of the cash flows that Skip's Camper could pay to its contributors of debt or equity is *not* affected by its financing mix.

When corporate income is taxed by the government, and bond interest is a tax-deductible expense, the sum of the cash flows earned for all contributors of financial capital is affected by the firm's financing mix. Table 12-8 illustrates this point.

If Skip's Camper chooses the leveraged capital structure, the total payments to equity and debt holders will be \$240,000 *greater* than under the all-common-equity capitalization. Where does this \$240,000 come from? The answer is that the government's take, through taxes collected, is lower by that amount. This *difference, which flows to Skip's Camper security holders*, is called the **tax shield** on debt. In general, it may be calculated by equation (12-6), where r_d is the interest rate paid or interest tax savings on the debt, M is the principal amount of the debt, and T_c is the firm's marginal tax rate:

$$\text{Tax shield} = r_d(M)(T_c) \quad (12-6)$$

The moderate position on the importance of capital structure presumes that the tax shield must have value in the marketplace. Accordingly, this tax benefit will increase the total market value of the firm's outstanding securities relative to the all-equity financing mix. Note that in this case financial leverage does affect firm value. Because the cost of capital is just the other side of the valuation coin, financial leverage also affects the firm's composite cost of capital. Can the firm increase firm value indefinitely and lower its cost of capital continuously by using more and more financial leverage? Common sense would tell us no!

tax shield the reduction in taxes due to the tax deductibility of interest expense.

TABLE 12-8 Skip's Camper Cash Flows to All Investors—The Case of Taxes

	Unleveraged Capital Structure	Leveraged Capital Structure
Expected level of net operating income	\$2,000,000	\$2,000,000
Less: Interest expense	0	480,000
Earnings before taxes	\$2,000,000	\$1,520,000
Less: Taxes at 50%	1,000,000	760,000
Earnings available to common stockholders	\$1,000,000	\$ 760,000
Interest paid to creditors	0	480,000
Expected payments to all security holders	\$1,000,000	\$1,240,000

So would most financial managers and academicians. The acknowledgment of bankruptcy costs provides one possible rationale.

The Likelihood of Firm Failure The probability that the firm will be unable to meet the financial obligations identified in its debt contracts increases as more debt is employed. The highest costs would be incurred if the firm actually went into bankruptcy proceedings. Here, assets would be liquidated and often at distressed sale prices. If these assets do sell for something less than their perceived market values, both equity investors and debt holders could suffer losses. Other problems accompany bankruptcy proceedings. Additional lawyers and accountants have to be hired and paid. Managers must spend time preparing lengthy reports for those involved in the legal action. Moreover, all this distracts the firm's management from the efficient running of the business, and this causes missed opportunities and lost value.

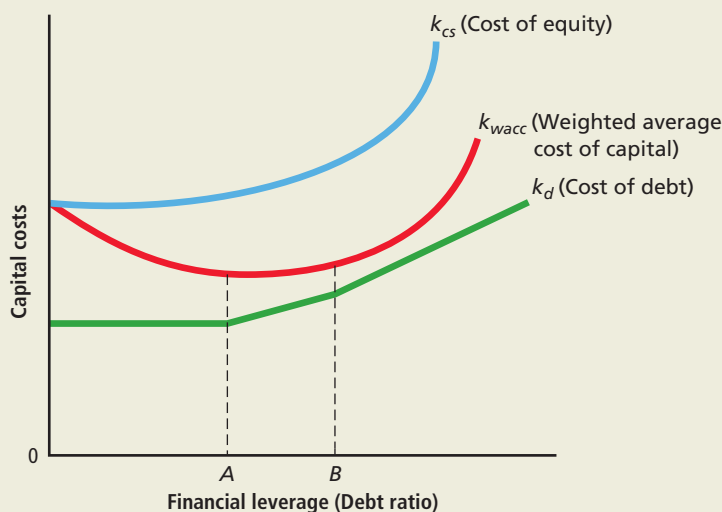
Milder forms of financial distress also have their costs, as we have discussed. As the firm's financial condition weakens, creditors may take action to restrict normal business activity. Suppliers may not deliver materials on credit. Profitable capital investments may have to be forgone, and dividend payments may even be interrupted. At some point the expected cost of default will be large enough to outweigh the tax shield advantage of debt financing. The firm will turn to other sources of financing, mainly common equity (retained earnings).

The Saucer-Shaped Cost-of-Capital Curve This moderate view of the relationship between financing mix and the firm's cost of capital is depicted in Figure 12-7. The result is a saucer-shaped (or U-shaped) weighted-average-cost-of-capital curve, k_{wacc} . The firm's average cost of equity, k_{cs} , is seen to rise as the firm uses more debt financing. For a while the firm can borrow funds at a relatively low after-tax cost of debt, k_d . Even though the cost of equity is rising, it does not rise at a fast enough rate to offset the use of the less-expensive debt financing. Thus, between points 0 and *A* on the financial-leverage axis, the average cost of capital declines and stock price rises.

Eventually, however, the threat of financial distress causes the cost of debt to rise. In Figure 12-7 this increase in the cost of debt shows up in the after-tax average-cost-of-debt curve, k_d , at point *A*. Between points *A* and *B*, mixing debt and equity funds produces an average cost of capital that is (relatively) flat. The firm's **optimal range of financial leverage** lies between points *A* and *B*. *All capital structures between these two points are optimal because they produce the lowest composite cost of capital.* As we said earlier in this chapter, finding this optimal range of financing mixes is the objective of capital structure management.

optimal range of financial leverage the range of debt use in the firm's capital structure that yields the lowest overall cost of capital for the firm.

FIGURE 12-7 Capital Costs and Financial Leverage: The Moderate View, Considering Taxes and Financial Distress



debt capacity the maximum amount of debt that the firm can include in its capital structure and still maintain its current credit rating.

Point *B* signifies the firm's debt capacity. **Debt capacity** is the *maximum amount of debt the firm can include in its capital structure and still maintain its current credit rating*. Beyond point *B*, additional fixed-charge capital can be attracted only at very costly interest rates. At the same time, this excessive use of financial leverage would cause the firm's cost of equity to rise at a faster rate than it did previously. The composite cost of capital would then rise quite rapidly, and the firm's stock price would decline.

Firm Value and Agency Costs

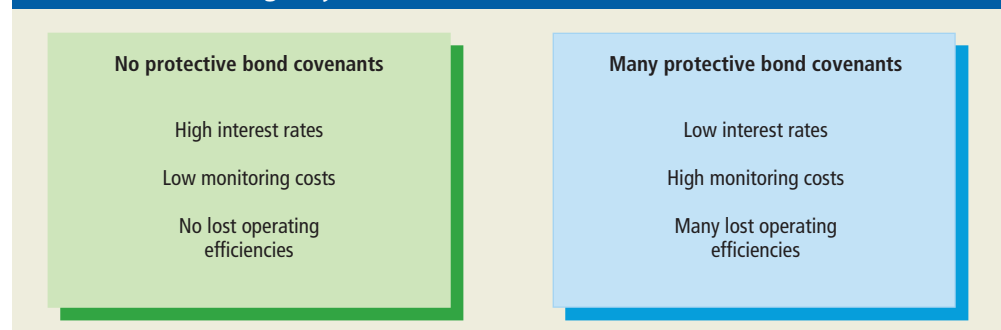
In Chapter 1 we mentioned the notion of agency problems. Recall that agency problems give rise to agency costs, which tend to occur in business organizations because the owners of the firm do not run the business, managers do. Thus, the firm's managers can properly be thought of as agents of the firm's stockholders. To ensure that agent-managers act in the stockholders' best interests requires that (1) they have proper incentives to do so and (2) their decisions are monitored. The incentives usually take the form of executive compensation plans and perquisites (or "perks"). The perquisites, though, might be a bloated support staff, country club memberships, luxurious corporate planes, or other amenities. Monitoring this requires that certain costs be borne by the stockholders, such as (1) bonding the managers, (2) auditing financial statements, (3) structuring the organization in unique ways that limit managerial decisions, and (4) reviewing the costs and benefits of management perquisites. This list is indicative, not exhaustive. The main point is that monitoring costs are ultimately covered by the owners of the company—its common stockholders.

Capital structure management also gives rise to agency costs. Agency problems stem from conflicts of interest, and capital structure management gives rise to a natural conflict between stockholders and bondholders. For example, if acting in the stockholders' best interests causes managers to invest in extremely risky projects, existing investors in the firm's bonds could logically take a dim view of such an investment policy. This is because changing the risk structure of the firm's assets would change the business-risk exposure of the firm. This could lead to a downward revision of the bond rating the firm currently enjoys. A lowered bond rating, in turn, would lower the current market value of the firm's bonds. Clearly, bondholders would be unhappy with this result.

To reduce this conflict of interest, the creditors (bond investors) and stockholders may agree to include several protective covenants in the bond contract. These bond covenants were discussed in more detail in Chapter 7, but essentially they may be thought of as restrictions on managerial decision making. Typical covenants restrict the payment of cash dividends on common stock, limit the acquisition or sale of assets, or limit further debt financing. To make sure managers comply with the protective covenants means that monitoring costs are incurred. Like all monitoring costs, they are borne by common stockholders. Furthermore, like many costs, they involve the analysis of an important trade-off.

Figure 12-8 displays some of the trade-offs involved with the use of protective bond covenants. Note (in the left panel of Figure 12-8) that the firm might be able to sell bonds that carry no protective covenants only by incurring very high interest rates. With no protective covenants, there are no associated monitoring costs. Also, there are no lost operating efficiencies, such as being able to move quickly to acquire a particular company in the

FIGURE 12-8 The Agency Costs of Debt: Trade-Offs



acquisitions market. Conversely, restrictive covenants could reduce the explicit cost of the debt contract, but this would involve incurring significant monitoring costs and losing some operating efficiencies (which also translates into higher costs). When the debt issue is first sold, then a trade-off will be made.

Next, we have to consider the presence of monitoring costs at low and higher levels of leverage. When the firm operates at a low debt-to-equity ratio, there is little need for creditors to insist on a long list of bond covenants. The financial risk is not sufficient to require that type of activity. The firm will likewise benefit from low explicit interest rates when leverage is low. When the debt-to-equity ratio is high, however, it is logical for creditors to demand a great deal of monitoring. This increase in agency costs will raise the implicit cost (the true total cost) of debt financing. It seems logical, then, to suggest that monitoring costs will rise as the firm's use of financial leverage increases. Just as the likelihood of firm failure (financial distress) raises a company's overall cost of capital (k_{wacc}), so do agency costs. On the other side of the coin, this means that total firm value (the total market value of the firm's securities) will be *lower* because of agency costs. Taken together, the agency costs and the costs associated with financial distress argue in favor of the concept of an *optimal* capital structure for the individual firm.

Agency Costs, Free Cash Flow, and Capital Structure

In 1986, Professor Michael C. Jensen further extended the concept of agency costs into the area of capital structure management. The contribution revolves around a concept that Jensen labels “free cash flow,” which he defines as follows:

Free cash flow is cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital.³

Jensen then proposed that substantial free cash flow can lead to misbehavior by managers and poor decisions that are not in the best interests of the firm's common stockholders. In other words, managers have an incentive to hold onto the free cash flow and have “fun” with it, rather than “disgorge” it, say, in the form of higher cash dividend payments.

But all is not lost. This leads to what Jensen calls his “Control hypothesis” for using debt. This means that by leveraging up (taking on debt), the firm's shareholders will enjoy increased control over their management team. For example, if the firm issues new debt and uses the proceeds to retire outstanding common stock, then managers are obligated to pay out cash to service the debt—this simultaneously reduces the amount of free cash flow available to them to have fun with.

We can also refer to this motive for financial leverage use as the “threat hypothesis.” Managers work under the threat of financial failure; therefore, according to the “free cash flow theory of capital structure,” they work more efficiently. This is supposed to reduce the agency costs of free cash flow, which will in turn be recognized by the marketplace in the form of greater returns on the common stock.

Note that the free cash flow theory of capital structure does not give a theoretical solution to the question of just how much financial leverage is enough. Nor does it suggest how much leverage is too much. It is a way of thinking about why shareholders and their boards of directors might use more debt to control managerial behavior and decisions. The basic decision tools of capital structure management still have to be utilized. They are presented later in this chapter.



REMEMBER YOUR PRINCIPLES

Principle The discussions on agency costs, free cash flow, and the control hypothesis for debt creation return us to **Principle 5: Conflicts of Interest Cause Agency Problems**. The control hypothesis put forth by Jensen suggests that managers will work harder for shareholder interests when they have to “sweat it out” to meet contractual interest payments on debt securities. But we also learned that managers and bond investors can have a conflict that leads to agency costs associated with using debt capital. Thus, the theoretical benefits that flow from minimizing the agency costs of free cash flow by using more debt will cease when the rising agency costs of debt exactly offset those benefits. You can see how very difficult it is, then, for financial managers to identify precisely their true optimal capital structure.

³“Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers” by Michael C. Jensen, from *American Economic Review* 76 (May 1986).

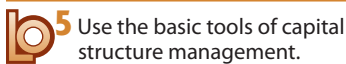
Managerial Implications

Where does our examination of capital structure theory leave us? The upshot is that determining the firm's financing mix is centrally important to the financial manager because the firm's stockholders are affected by capital structure decisions. At the very least, and before bankruptcy costs and agency costs become detrimental, the tax shield effect will cause the shares of a leveraged firm to sell at a higher price than they would if the company had avoided debt financing. Because both the risk of failure and agency costs accompany the excessive use of leverage, the financial manager must exercise caution in the use of fixed-charge capital. This problem of searching for the optimal range of financial leverage is our next task.

You have now developed a workable knowledge of capital structure theory. This makes you better equipped to search for your firm's optimal capital structure. Several tools are available to help you in this search process and simultaneously help you make prudent financing choices. These tools are decision oriented. They help us answer the question, "The next time we need \$20 million, should we issue common stock or sell long-term bonds?"

Concept Check

1. What is the objective of capital structure management?
2. What is the basic controversy surrounding capital structure theory?
3. Explain the independence hypothesis as it relates to capital structure management.
4. Explain the moderate view of the relationship between a firm's financing mix and its average cost of capital.
5. How do agency costs and free cash flow relate to capital structure management?



The Basic Tools of Capital Structure Management

We will review two basic tools that are commonly used in the evaluation of capital structure decisions. The first is the EBIT-EPS chart, which provides a way to visualize the effects of alternative capital structures on both the level and volatility of the firm's earnings per share (EPS). The second tool we review entails the analysis of the capital structures of comparable firms through the use of financial leverage ratios. Here we use ratios to standardize capital structure information as we did when we discussed financial ratios in Chapter 4 so that we can compare the capital structures of similar firms.

EBIT-EPS Analysis

Before we launch into an analysis of the relationship between earnings per share (EPS) and EBIT for alternative capital structures, we need to remind ourselves why this is important. Specifically, in light of our discussions of capital structure theory you might ask, "Why should the firm's owners care about the effects of the capital structure on earnings per share (EPS)?" One possible response to this question is that corporate CEOs and boards of directors are very sensitive to the earnings numbers they report to Wall Street. The reason we offered earlier for this sensitivity relates to the perception of investors that the level of a firm's reported EPS signals important information about the firm's future prospects. For example, when a firm announces that its earnings will fall short of analyst expectations, this often triggers a revision in investor expectations regarding the future earnings prospects for the firm. This downward revision, in turn, results in a drop in the firm's stock price. Thus, corporate executives are very aware of the importance investors attach to earnings and take this information into account when considering the design of the firm's capital structure.

EXAMPLE 12.2 EBIT-EPS analysis

Assume that plan B presented earlier in Table 12-4 is the existing capital structure for the Pierce Grain Company. Furthermore, the asset structure of the firm is such that EBIT is expected to be \$20,000 per year for a very long time. A capital investment is available to Pierce Grain that will cost \$50,000. Acquisition of this asset is expected to raise the projected EBIT level to \$30,000 permanently. The firm can raise the needed cash by one of two ways:

1. Selling 500 shares of common stock at \$100 each
2. Selling the new bonds that will net the firm \$50,000 and carry an interest rate of 8.5 percent.

These capital structures and corresponding EPS amounts are summarized in Table 12-9.

At the projected EBIT level of \$30,000 the EPS for the common stock and debt alternatives are \$6.50 and \$7.25, respectively. Both are considerably above the \$5.33 that would occur if the new project were rejected and the new capital were not raised. Based on a criterion of selecting the financing plan that will provide the highest EPS, the bond alternative is favored. But what if the basic business risk to which the firm is exposed causes the EBIT to vary over a considerable range? Can we be sure that the bond alternative will always have the higher EPS associated with it?

STEP 1: FORMULATE A SOLUTION STRATEGY

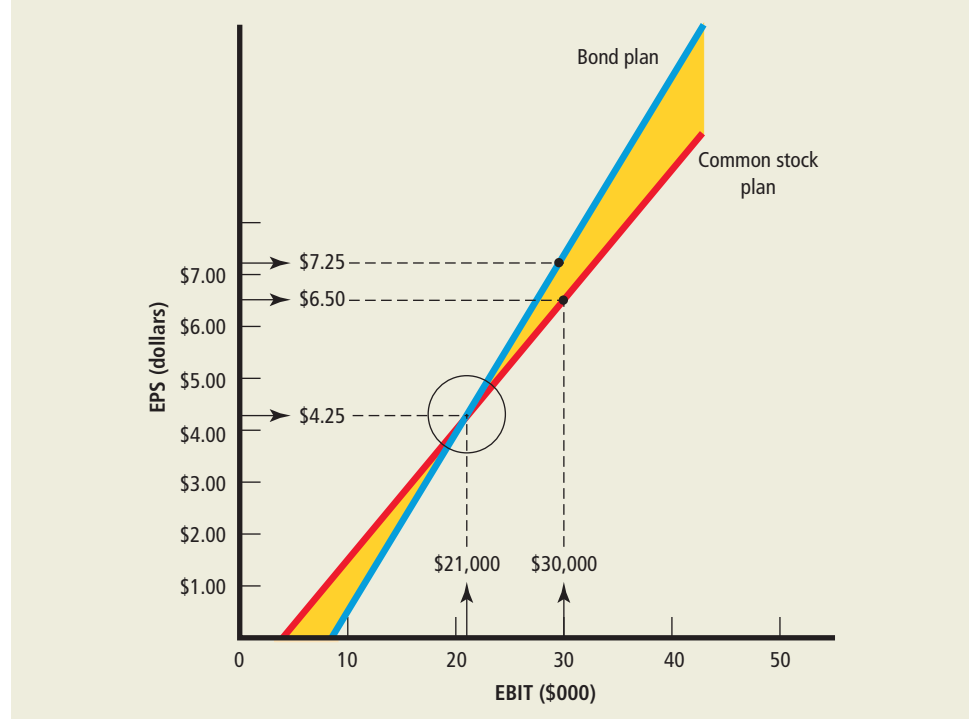
The best way to address this issue will be to use graphic analysis of earnings per share and earnings before interest and taxes for the proposed alternatives (that is, an EBIT-EPS chart). EBIT is plotted on the horizontal axis and EPS is plotted on the vertical axis. The intercepts on the horizontal (EBIT) axis represent the before-tax equivalent financing charges related to each plan. The straight lines for each plan tell us the EPS amounts that will occur at different EBIT amounts.

STEP 2: CRUNCH THE NUMBERS

A review of the EBIT-EPS chart found in Figure 12-9 reveals that the answer to this question is no. That is, the bond alternative will *not* always have the higher EPS. Creating the

TABLE 12-9 Analyzing Pierce Grain Company's Financing Choices

PART A: CAPITAL STRUCTURES					
Existing Capital Structure		With New Common Stock Financing		With New Debt Financing	
Long-term debt at 8%	\$ 50,000	Long-term debt at 8%	\$ 50,000	Long-term debt at 8.5%	\$ 50,000
Common stock	150,000	Common stock	200,000	Common stock	150,000
Total liabilities and equity	\$200,000	Total liabilities and equity	\$250,000	Total liabilities and equity	\$250,000
Common shares outstanding	1,500	Common shares outstanding	2,000	Common shares outstanding	1,500
PART B: PROJECTED EPS LEVELS					
	Existing Capital Structure	With New Common Stock Financing	With New Debt Financing		
EBIT	\$20,000	\$30,000	\$30,000		
Less: Interest expense	4,000	4,000	8,250		
Earnings before taxes (EBT)	\$16,000	\$26,000	\$21,750		
Less: Taxes at 50%	8,000	13,000	10,875		
Net income	\$ 8,000	\$13,000	\$10,875		
Less: Preferred dividends	0	0	0		
Earnings available to common shareholders	\$ 8,000	\$13,000	\$10,875		
EPS	\$ 5.33	\$ 6.50	\$ 7.25		

FIGURE 12-9 EBIT-EPS Analysis Chart for Pierce Grain Company

EBIT-EPS analysis chart allows the decision maker to visualize the impact of different financing plans on the EPS over a range of EBIT levels.

Note that using the data on the common stock plan at an EBIT of \$4,000 this financing plan provides an EPS of zero. EPS is zero with the debt plan where EBIT is equal to \$8,250. Note that \$8,250 for the debt plan consists of the current interest expense of \$4,000 plus the new interest cost of \$4,250.

The bond plan financing option has a steeper slope than the common stock financing plan. This tells us that the bond plan's EPS is more sensitive to changes in EPS than the common stock financing plan. This is due to the financial leverage employed. Another observation is that the lines intersect. At that point, EPS is exactly the same for both financing plans. Above the intersection point, the EPS for the plan with greater leverage will exceed that for the plan with lesser leverage. The intersection point, circled in Figure 12-9, occurs at an EBIT level of \$21,000. This intersection of the two capital structure options is at an EPS of \$4.25. For all levels of EBIT above \$21,000 the debt plan provides higher EPS, and for levels of EBIT below \$21,000 the equity option offers the higher EPS.

STEP 3: ANALYZE YOUR RESULTS

The EBIT-EPS analysis tells the analyst the level of EPS for a given EBIT. However, since the firm's EBIT is uncertain and can never be known with certainty in advance, the capital structure that produces the highest level of EPS cannot be known for certain.

EBIT-EPS indifference point the level of earnings before interest and taxes (EBIT) that will equate earnings per share (EPS) between two different financing plans.

Computing Indifference Points The point of intersection in Figure 12-9 is called the **EBIT-EPS indifference point**. It identifies the *EBIT level at which the EPS will be the same regardless of the financing plan chosen by the financial manager*. This indifference point, sometimes called the break-even point, has major implications for financial planning. At EBIT amounts in excess of the EBIT indifference level, the more heavily leveraged financing plan will generate a higher EPS. At EBIT amounts below the EBIT indifference level, the

financing plan involving less leverage will generate a higher EPS. It is important, then, to know the EBIT indifference level.

We can find it graphically, as in Figure 12-9. At times it may be more efficient, though, to calculate the indifference point directly. This can be done by using the following equation:

$$\frac{\text{EPS: STOCK PLAN}}{(\text{EBIT} - I_s)(1 - T_c) - P} = \frac{\text{EPS: BOND PLAN}}{(\text{EBIT} - I_b)(1 - T_c) - P} \quad (12-7)$$

where S_s and S_b are the numbers of common shares outstanding under the stock and bond plans, respectively; I is interest expense; T_c is the firm's income tax rate; and P is preferred dividends paid. In the present case, P is zero because there is no preferred stock outstanding. If preferred stock is associated with one of the financing alternatives, keep in mind that the preferred dividends, P , are not tax deductible. Equation (12-7) does take this fact into consideration.

For the present example, we calculate the indifference level of EBIT as

$$\frac{(\text{EBIT} - \$4,000)(1 - 0.5) - 0}{2,000} = \frac{(\text{EBIT} - \$8,250)(1 - 0.5) - 0}{1,500}$$

When the expression above is solved for EBIT, we obtain \$21,000. If EBIT turns out to be \$21,000, then EPS will be \$4.25 under both plans.

A Word of Caution Okay, now we know that using more financial leverage *may* provide higher firm earnings if EBIT is above the break-even point. But this is not all that we need to take away from this analysis. For example, assume that EBIT is expected to be above the break-even point 99.9 percent of the time for two alternative capital structure policies. Does this mean that we should automatically select the higher leverage option? The answer, as you might have suspected, is no, and here's the logic for this answer. The higher the firm's use of financial leverage, the steeper the slope of the EBIT-EPS line, which means the firm will experience larger swings in EPS for any given change in EBIT. CEOs and corporate boards care about these swings for the reason we noted earlier. That is, if the firm fails to meet its earnings expectations, investors may revise their expectations for the firm's future earnings prospects downward, at which point the share price might suffer. So, higher financial leverage increases the likelihood that an unanticipated swing in the firm's EBIT might have a very detrimental effect on the reported EPS, and this is a real source of concern.

How then are we to interpret and use the EBIT-EPS chart to analyze capital structure design issues? The answer, like many tools of financial analysis, entails the use of managerial judgment. The EBIT-EPS chart is simply a tool that can be used to learn about the consequences of using more or less financial leverage. The decision as to whether to use more or less financial leverage must be made after weighing all the factors that impinge on a firm's capital structure decision. For example, in the next section we look at the use of comparative financial ratios, which indicate the degree of similarity of the firm's capital structure to others in its same industry, or peer group.

Comparative Leverage Ratios

In Chapter 4 we explored the overall usefulness of financial ratio analysis. Leverage ratios, one of the categories of financial ratios, are identified in that chapter. We emphasize here that the computation of leverage ratios is one of the basic tools of capital structure management.

Two types of leverage ratios must be computed when a financing decision faces the firm. We call these **balance-sheet leverage ratios** and **coverage ratios**. The firm's balance sheet supplies inputs for computing the balance-sheet leverage ratios. In various forms these balance-sheet metrics compare the firm's use of funds supplied by creditors with those supplied by owners.

balance-sheet leverage ratios ratios of a firm's use of financial leverage or debt capital to either the firm's total capital or equity. Since the needed information for computing these ratios is found in the balance sheet we refer to them as balance sheet leverage ratios.

coverage ratios ratios of the firm's earnings to the interest and principal related to a firm's borrowing.

Inputs to the coverage ratios generally come from the firm's income statement. At times the analyst may have to refer to balance-sheet information to construct some of these needed estimates. Regardless of the source of data, coverage ratios provide estimates of the firm's ability to service its financing contracts. High coverage ratios, compared with a standard, imply unused debt capacity.

In reality, we know that EBIT might be expected to vary over a considerable range of outcomes. For this reason the coverage ratios should be calculated several times, each at a different level of EBIT. If this is accomplished over all possible values of EBIT, a probability distribution for each coverage ratio can be constructed. This provides the financial manager with much more information than simply calculating the coverage ratios based on the expected value of EBIT.

Industry Norms

The comparative leverage ratios have utility only if they can be compared with some standard. Generally, corporate financial analysts, investment bankers, commercial bank loan officers, and bond-rating agencies rely on industry classes to compute "normal" ratios. Although industry groupings may actually contain firms whose basic business-risk exposure differs widely, the practice is entrenched in American business behavior. At the very least, then, the financial officer must be interested in industry standards because almost everybody else is.

Capital structure ratios tend to differ among industry classes. For example, random samplings of the common equity ratios of large retail firms seem to differ statistically from those of major steel producers. The major steel producers use financial leverage to a lesser degree than do the large retail organizations. On the whole, firms operating in the *same* industry tend to exhibit capital structure ratios that cluster around a central value that we call a norm. The degree of business risk varies from industry to industry as well. As a consequence, the capital structure norms vary from industry to industry.

This is not to say that all companies in the industry will maintain leverage ratios "close" to the norm. For instance, firms that are very profitable might display high coverage ratios and high balance-sheet leverage ratios. The moderately profitable firm, though, might find such a posture unduly risky. Here the usefulness of industry-normal leverage ratios is clear. If the firm chooses to deviate substantially from the accepted values for the key ratios, it must have a sound reason.

A Glance at Actual Capital Structure Management

We now examine some opinions and practices of financial executives that reinforce the importance of capital structure management. A survey of 392 corporate executives revealed the importance of a variety of factors that are believed to be either important or very important in deciding whether to use debt in their firm's capital structure.⁴

The 10 factors provide some practical guidance to the financial manager who is wrestling with capital structure design and management issues. Let's briefly consider each factor to see why it is relevant.

Financial Flexibility When a firm needs to raise additional funds, its bargaining position is better if it has options or choices. For example, firms that have used very little debt in the past will find it easier to borrow or sell new shares of stock than firms that have borrowed heavily.

Credit Rating Dropping a notch in the rating system leads to an increase in the firm's borrowing costs, so managers like to avoid this if at all possible.⁵ Moreover, sometimes firms have contractual provisions inserted into some of their other debt agreements that require the firm to maintain a particular credit rating. For example,

⁴John Graham and Campbell Harvey, "How do CFOs make capital budgeting and capital structure decisions?," *Journal of Applied Corporate Finance*, Volume 15, Number 1, Spring 2002, 8–23.

⁵We discussed bond ratings in Chapter 7.

Enron's bankruptcy was triggered by the firm dropping one credit rating, which put the firm below investment-grade status. The firm had billions of dollars in outstanding debt that contained a covenant requiring them to maintain a BBB or higher rating.

Insufficient Internal Funds It has long been known that firms tend to follow a priority list when raising new funds that has been referred to as a “pecking order.” The order in which firms typically finance their operations begins with internally generated profits, followed by debt financing, and, finally, by issuing new equity.

Level of Interest Rates Other things being the same, firms prefer to borrow when they feel interest rates are low relative to their expectations. For example, when interest rates are historically very low, a CFO may feel more inclined to enter into long-term debt agreements. However, there is little evidence that a CFO, or anyone for that matter, has any talent for knowing when rates are low and about to rise or high and about to fall. Nonetheless, all that is required for this factor to be considered important is a strong opinion about the future path of interest rates.

Interest Tax Savings Interest expense, unlike dividends paid to shareholders, is a tax-deductible expense. This tax-savings feature serves as a subsidy to corporate borrowing and makes debt appear cheap relative to alternative sources of financing.

Transaction Costs and Fees When a firm chooses between debt and equity, it faces very different costs of issuing the two types of securities. For example, debt holders receive interest and principal payments as prescribed in the debt contract (indenture). This type of security is relatively straightforward, and its value hinges on the creditworthiness of the firm. However, when a firm issues equity, there are no rules prescribing how much will be paid back to the buyers of the stock. This means that it can be much more costly to entice investors to become stockholders

FINANCE AT WORK

CAPITAL STRUCTURES AROUND THE WORLD

The use of debt financing by firms is influenced by many factors, and one of them apparently is the home country of the firm. To illustrate, consider the listing of median leverage ratios (total debt divided by the market value of the firm) by country provided below.*

COUNTRY	LEVERAGE RATIO
South Korea	70%
Pakistan	49%
Brazil	47%
Thailand	46%
India	40%
Japan	33%
China	33%
France	28%
Belgium	26%
Mexico	26%
Chile	21%
Germany	17%
United Kingdom	16%
United States	16%
Greece	10%

The highest leverage ratio is observed in South Korea where the leverage ratio is close to 70%, while the lowest is only 10%, observed in Greece. The median leverage ratio in the United States is only 16%, which may seem quite low. However, this is the result of the fact that these ratios are based on the market values of the firms rather than their book value.

What kind of factors might encourage the use of debt in different countries? One factor that researchers found is that firms that operate in countries where the legal systems provide better protection for financial claimants tend to use less total debt, and the debt they use tends to be of a longer-term maturity. In addition, as you might expect, the tax policy of the country that the firm operates within also plays a role in the level of debt that a firm uses.

*The market value of the firm is defined to be the market value of common equity plus the book values of preferred stock and total debt.

Source: Joseph P. H. Fan, Sheridan Titman, and Garry J. Twite, “An International Comparison of Capital Structure and Debt Maturity Choices” (October 2008). AFA 2005 Philadelphia Meetings available at SSRN: <http://ssrn.com/abstract=423483>.

than to entice them to loan money to the firm. Thus, the differentially higher costs of issuing equity make it less attractive as a source of financing.

Equity Undervaluation/Overvaluation Earlier we mentioned that CFOs often try to time their debt offerings to take advantage of abnormally low interest rates. The same holds true for equity offerings. For example, if the CFO thinks that the firm's shares of stock are undervalued, he or she will want to borrow money rather than sell new shares and risk the price of the shares falling further. Once again, there is no evidence that corporate executives are any better at forecasting their own share prices than they are at predicting the future of interest rates, but they only have to think they are good at it to believe it is an important factor.

Comparable Firm Debt Levels Firms in similar businesses tend to have similar capital structures. This is made doubly important by virtue of the fact that lenders and credit-rating agencies often compare a firm's debt ratios to those of comparable firms when deciding credit terms and ratings.

Bankruptcy/Distress Costs The more debt a firm has used in the past, the higher the likelihood is that the firm will at some point face financial distress and possibly fail. This risk forms the basis for the firm's credit rating.

Customer/Supplier Discomfort An important source of financial distress brought on by the use of debt financing comes in the form of pressures from both the firm's customers (who fear that financial distress may interrupt their source of supply) and the firm's suppliers (who fear that financial distress may interrupt an important source of demand for their goods and services). The latter is compounded further if the supplier has provided the firm with trade credit, which is at risk if the firm fails.

After reading through the discussion of each of the 10 factors, you are probably beginning to think that capital structure management is more art than science. In other words, there simply is no magic formula that you can use to solve for the optimal capital structure. However, you should be gaining an appreciation for the basic considerations that go into the judgment call that the CFOs ultimately must make and that drives the capital structure of firms. Furthermore, selected comments from financial executives point to the widespread use of target debt ratios.

Concept Check

1. Explain the meaning of the EBIT-EPS indifference point.
2. How are various leverage ratios and industry norms used in capital structure management?
3. Identify several factors that influence the decision to issue debt.
4. Why is capital structure design both an art and a science?

Chapter Summaries



Distinguish between business and financial risk. (pgs. 382–383)

SUMMARY: A firm's business risk arises out of the competitive environment in which the firm operates. The risk results in fluctuations in firm sales in response to changes in the overall economy and the conditions within the specific industry or industries in which the firm operates. Firms can make further choices that can amplify this volatility even more if, for example, they choose to purchase plant and equipment rather than rent it. In the former case, the firm will incur the fixed costs of the plant and equipment even if it produces nothing and this adds risk to the firm. Moreover, firms can choose to use sources of capital in their financial structure that entail a fixed financial obligation such as interest and principal payments on the debt. The effects of business, operating, and financial risk work in concert to determine the riskiness of the firm's future earnings streams.

KEY TERMS

Business risk, page 382 The risk of the firm's future earnings that is a direct result of the particular line of business chosen by the firm.

Operating risk, page 382 Risk driven by the mix of fixed versus variable costs the firm incurs to do business. For example, the greater the firm's fixed operating costs, other things remaining the same, the more volatile will be the firm's earnings in response to changes in firm sales.

Financial risk, page 382 Risk driven by the presence of fixed finance costs in the firm's capital structure (as opposed to variable finance costs such as dividends declared and paid). The net effect of financial leverage (which corresponds to the firm's use of debt financing that entails the payment of predetermined interest and principal payments) is to make firm earnings more volatile.

Use break-even analysis. (pgs. 383–388)

SUMMARY: A key number in any business's operations is the break-even quantity or sales level. Breakeven is key because it tells the firm's managers the minimum sales (dollars or units sold) that are needed to pay the firm's short-term liabilities.

KEY TERMS

Break-even quantity, page 383 The number of units a firm must sell before it starts to earn a profit.

Fixed costs, page 384 The expenses of the firm that do not vary with the level of firm sales. An example would be salaries paid to the firm's management team.

Indirect costs, page 384 costs that do not vary in total dollar amount as sales volume or quantity of output changes.

Variable costs, page 384 Expenses that move up and down with the level of firm sales.

Direct costs, page 384 Expenses that vary in total as output changes.

Total revenue, page 385 The total dollar sales for a particular period of time.

Volume of output, page 385 The number of units produced and sold for a particular period of time.

KEY EQUATION

$$\text{Break-even level of revenues} = \frac{\text{total fixed costs}}{1 - \frac{\text{variable costs}}{\text{revenues}}}$$

Understand the relationships between operating, financial, and combined leverage. (pgs. 388–393)

SUMMARY: The volatility of a firm's reported earnings over time is an important piece of information to investors and thus it is important that the firm's management understand what causes this volatility. It turns out that the volatility of earnings over time is largely driven by choices the firm's management has made. These choices relate to the type of business the firm runs; the operating decisions the firm has made, which, in turn, determine its fixed versus operating costs; and financing decisions regarding the use of borrowed money. The combination of the firm's choice of type of business, operating models (fixed versus variable operating expenses), and financial risk (fixed versus variable financial expenses) dictates just how the firm's earnings will change in response to changing economic conditions. For example, should the economy swing into a period of rapid growth, then firms that sell products people want in periods of expansion (expensive cars, boats, and consumer durable goods) will experience an abnormally large upswing in sales. If these same firms were to experience a downturn in the economy their sales would drop disproportionately when compared to firms selling more essential goods and services such as food and clothing. The net result would be that the earnings of firms selling consumer durable and luxury goods will experience a large decline in earnings.

KEY TERMS

Operating leverage, page 388 Results from operating costs that are fixed (rather than those that vary up and down with the level of output or sales).

Financial leverage, page 390 Results from the firm's use of sources of financing that require a fixed rate of return. The primary example of such a form of financing is fixed interest rate debt whereby the firm must pay

pre-determined interest and principal on specified dates.

Combined, or total, leverage, page 391 The result of the combined effects of both operating and financial leverage. Operating and financial leverage tend to magnify one another such that combining lots of operating and financial leverage will make the total leverage of the firm much greater.


4 Discuss the concept of an optimal capital structure. (pgs. 393–402)

SUMMARY: A firm's capital structure is defined by the mix of sources of financing the firm has used to raise money in the past. The cost of each of the component sources then determines the overall cost of capital to the firm, which, in Chapter 9, we defined to be the weighted average cost of capital. The idea of an optimal capital structure is simply a particular mix of financing sources that results in the lowest possible weighted average cost of capital.

Many theories of capital structure have been developed that attempt to explain how a firm's cost of capital changes as the mix of financing sources is changed. Early theories used very restrictive sets of assumptions about investor behavior to argue that a firm's capital structure did not vary with the particular mix of financing sources the firm used. This result, however, ignored the tax bias built into the corporate tax code whereby the interest expense paid for debt is tax deductible to the corporation, whereas dividends paid to preferred or common stockholders are not tax deductible. This meant that using more debt was, other things being the same, advantageous to the firm. At this juncture it seemed that the best thing a firm could do with its capital structure was to borrow as much as it could. Alas, there are costs to becoming too highly leveraged. Having too much debt means that the firm could, in very bad economic circumstances, find itself unable to pay its interest and principle and default on its debt. The net result of such a default is that the firm's common stockholders would lose all they had invested in the firm, as the firm's creditors would take over in bankruptcy. Thus, most practicing managers believe that there is a trade-off between the "good" that comes with debt (tax deductibility of interest) and the "bad" (increasing risk of default), which forms the basis for believing there is indeed an optimal capital structure where these costs and benefits are just equal.

KEY TERMS

Financial structure, page 394 The mix of all sources of funding that appears on the right-hand side of the firm's balance sheet.

Capital structure, page 394 The mix of interest-bearing short- and long-term debt plus equity funds used by the firm.

Debt maturity composition, page 395 The mix of short- and long-term debt used by the firm.

Debt–equity composition, page 395 The mix of debt and equity used by the firm in its capital structure.

Optimal capital structure, page 395 The capital structure that minimizes the firm's

composite cost of capital for raising a given amount of funds.

Tax shield, page 398 The reduction in taxes due to the tax deductibility of interest expense.

Optimal range of financial leverage, page 399 The range of debt use in the firm's capital structure that yields the lowest overall cost of capital for the firm.

Debt capacity, page 400 The maximum amount of debt that a firm can include in its capital structure and still maintain its current credit rating.


5 Use the basic tools of capital structure management. (pgs. 402–408)

SUMMARY: Although there are many theories concerning the existence of an optimal capital structure, it is difficult to analyze what this optimal structure might be. As a result, it is common practice for managers to begin their analysis of capital structure by looking at other firms and

analyzing what they have done. In other words, they first emulate other, similar firms and then analyze the consequences of deviating from the practices of what they feel are comparable firms. Managers also analyze the effect of different capital structure choices on the volatility of the firm's reported earnings. The idea here is that using more debt results in more volatile firm earnings and investors typically dislike uncertainty.

KEY TERMS

EBIT-EPS indifference point, page 404 The level of earnings before interest and taxes (EBT) that will equate earnings per share (EPS) between two different financing plans.

Balance-sheet leverage ratios, page 405 Ratios of a firm's use of financial leverage or debt capital to either the firm's

total capital or equity. Since the needed information for computing these ratios is found in the balance sheet we refer to them as balance sheet leverage ratios.

Coverage ratios, page 405 Ratios of the firm's earnings to the interest and principal related to a firm's borrowing.

KEY EQUATIONS

Earnings per share (Equity plan) = Earnings per share (Debt plan)

$$\frac{(\text{EBIT} - I_s)(1 - T_c)}{S_s} = \frac{(\text{EBIT} - I_b)(1 - T_c)}{S_b}$$

where

EBIT = earnings before interest and taxes

I = interest expense

T_c = tax rate

S = number of common shares

and the s and b subscripts refer to the equity and bond or debt financing plan, respectively.

Review Questions

All Review Questions are available in [MyFinanceLab](#).

12-1. In the chapter introduction we learned that AT&T (T) borrowed \$3 billion by issuing bonds in the public bond market. Although this may sound like a lot of money, AT&T owed almost \$65 billion in corporate debt at the end of 2011. The company had over \$270 billion in total assets in 2011. How much will the new bond issue increase AT&T's debt-to-total-assets ratio?

12-2. Distinguish between business risk and financial risk. What gives rise to, or causes, each type of risk?

12-3. Define the term *financial leverage*. Does the firm use financial leverage if preferred stock is present in its capital structure?

12-4. Define the term *operating leverage*. What type of effect occurs when the firm uses operating leverage?

12-5. A manager in your firm decides to employ a break-even analysis. Of what shortcomings should this manager be aware?

12-6. A break-even analysis assumes linear revenue and cost functions. In reality, these linear functions deviate over large output and sales levels. Why?

12-7. Define the following terms:

- Financial structure
- Capital structure
- Optimal capital structure
- Debt capacity

12-8. What is the primary weakness of using EBIT-EPS analysis as a financing decision tool?

12-9. What is the objective of capital structure management?

12-10. Why might firms whose sales levels change drastically over time choose to use debt only sparingly in their capital structures?

12-11. What does the term *independence hypothesis* mean as it applies to capital structure theory?

12-12. Many CFOs believe that the firm's composite cost of capital is saucer-shaped or U-shaped. What does this mean?

12-13. Define the EBIT-EPS indifference point.

12-14. Explain how industry norms might be used by the financial manager in the design of the company's financing mix.

Study Problems

All Study Problems are available in [MyFinanceLab](#).



12-1. (Business and financial risk) Which of the following sources of new earnings volatility represents the effect of business versus financial risk (discuss the rationale for your decisions):

- Amos Gooding Real Estate Company recently constructed a new office building and borrowed 100 percent of the money needed to fund the project.
- Clearing House Outsourcing has historically paid a printer to prepare all of its printed documents. However, last year the firm acquired its own printing press (paying cash).
- Smithers Enterprises has been a specialty retail shop that sold outdoor camping equipment. The firm recently decided to purchase a golf course.



12-2. (Break-even analysis) You have developed the following income statement for the Hugo Boss Corporation. It represents the most recent year's operations, which ended yesterday.

Sales	\$ 50,439,375
Variable costs	(25,137,000)
Revenue before fixed costs	\$ 25,302,375
Fixed costs	(10,143,000)
EBIT	\$ 15,159,375
Interest expense	(1,488,375)
Earnings before taxes	\$ 13,671,000
Taxes at 50%	(6,835,500)
Net income	\$ 6,835,500

Your supervisor in the controller's office has just handed you a memorandum asking for written responses to the following questions:

- What is the firm's break-even point in sales dollars?
- If sales should increase by 30 percent, by what percent would earnings before taxes (and net income) increase?

12-3. (Break-even point and selling price) Parks Castings Inc. will manufacture and sell 200,000 units next year. Fixed costs will total \$300,000, and variable costs will be 60 percent of sales.

- The firm wants to achieve a level of earnings before interest and taxes of \$250,000. What selling price per unit is necessary to achieve this result?
- Set up an analytical income statement to verify your solution to part (a).



12-4. (Break-even point and operating leverage) Footwear Inc. manufactures a complete line of men's and women's dress shoes for independent merchants. The average selling price of its finished product is \$85 per pair. The variable cost for this same pair of shoes is \$58. Footwear Inc. incurs fixed costs of \$170,000 per year.

- What is the break-even point in pairs of shoes for the company?
- What is the dollar sales volume the firm must achieve to reach the break-even point?
- What would be the firm's profit or loss at the following units of production sold: 7,000 pairs of shoes? 9,000 pairs of shoes? 15,000 pairs of shoes?

12-5. (Operating leverage) Rocky Mount Metals Company manufactures an assortment of wood-burning stoves. The average selling price for the various units is \$500. The associated variable cost is \$350 per unit. Fixed costs for the firm average \$180,000 annually.

- What is the break-even point in units for the company?
- What is the dollar sales volume the firm must achieve to reach the break-even point?
- What is the degree of operating leverage for a production and sales level of 5,000 units for the firm? (Calculate to three decimal places.)
- What will be the projected effect on earnings before interest and taxes if the firm's sales level should increase by 20 percent from the volume noted in part (c)?

12-6. (Capital structure theory) Match each of the following definitions to the appropriate terms:



TERMS	DEFINITIONS
Independence theory—with corporate taxes	The cost of capital is unaffected by the firm's choice of debt and equity financing.
Independence theory—no taxes	The cost of capital decreases as the firm initially uses debt to substitute for equity financing but eventually begins to increase as extreme levels of debt are used.
Saucer-shaped cost of capital curve	The cost of capital decreases continuously as the firm increases its reliance on debt financing.

12-7. (Capital structure theory) Which of the following statements most appropriately describes how agency costs affect a firm's choice of capital structure (explain)?

- When firm owners borrow money they have an incentive to engage in excessive risk taking (that is, investing in very risky projects) since they are managing someone else's money.
- When firms have very limited investment opportunities and little debt financing combined with healthy profits that provide them with free cash flow, their management team might squander the firm's earnings on questionable investments.

12-8. (EBIT-EPS analysis) Two inventive entrepreneurs have interested a group of venture capitalists in backing a new business project. The proposed plan would consist of a series of international retail outlets to distribute and service a full line of ingenious home garden tools. The stores would be located in high-traffic cities in Latin America such as Panama City, Bogotá, São Paulo, and Buenos Aires. Two financing plans have been proposed by the entrepreneurs. Plan A is an all common-equity structure. Five million dollars would be raised by selling 160,000 shares of common stock. Plan B would involve the use of long-term debt financing. Three million dollars would be raised by marketing bonds with an effective interest rate of 14 percent. Under the alternative, another \$2 million would be raised by selling 64,000 shares of common stock. With both plans, \$5 million is needed to launch the new firm's operations. The debt funds raised under plan B are considered to have no fixed maturity date, because this portion of financial leverage is thought to be a permanent part of the company's capital structure. The two promising entrepreneurs have decided to use a 35 percent tax rate in their analysis, and they have hired you on a consulting basis to do the following:



- Find the EBIT indifference level associated with the two financing proposals.
- Prepare income statements for the two plans that prove EPS will be the same regardless of the plan chosen at the EBIT level found in part (a).

12-9. (EBIT-EPS analysis) A group of retired college professors has decided to form a small manufacturing corporation. The company will produce a full line of traditional office furniture. Two financing plans have been proposed by the investors. Plan A is an all-common-equity alternative. Under this agreement, 1 million common shares will be sold to net the firm \$20 per share. Plan B involves the use of financial leverage. A debt issue with a 20-year maturity period will be privately placed. The debt issue will carry an interest rate of 10 percent, and the principal borrowed will amount to \$6 million. The corporate tax rate is 50 percent.

- Find the EBIT indifference level associated with the two financing proposals.
- Prepare an analytical income statement that proves EPS will be the same regardless of the plan chosen at the EBIT level found in part (a).
- Prepare an EBIT-EPS analysis chart for this situation.
- If a detailed financial analysis projects that long-term EBIT will always be close to \$2.4 million annually, which plan will provide for the higher EPS?

12-10. (*Assessing leverage use*) Some financial data for three corporations are displayed here.

MEASURE	FIRM A	FIRM B	FIRM C	INDUSTRY NORM
Debt ratio	20%	25%	40%	20%
Times interest covered	8 times	10 times	7 times	9 times
Price/earnings ratio	9 times	11 times	6 times	10 times

- Which firm appears to be excessively leveraged?
- Which firm appears to be employing financial leverage to the most appropriate degree?
- What explanation can you provide for the higher price/earnings ratio enjoyed by firm B as compared with firm A?

Mini Cases

These Mini Cases are available in [MyFinanceLab](#).

1. Imagine that you were hired recently as a financial analyst for a relatively new, highly leveraged ski manufacturer located in the foothills of Colorado's Rocky Mountains. Your firm manufactures only one product, a state-of-the-art snow ski. The company has been operating up to this point without much quantitative knowledge of the business and financial risks it faces.

Ski season just ended, however, so the president of the company has started to focus more on the financial aspects of managing the business. He has set up a meeting for next week with the CFO, Maria Sanchez, to discuss matters such as the business and financial risks faced by the company.

Accordingly, Maria has asked you to prepare an analysis to assist her in her discussions with the president. As a first step in your work, you compiled the following information regarding the cost structure of the company:

Output level	80,000 units
Operating assets	\$4,000,000
Operating asset turnover	8 times
Return on operating assets	32%
Degree of operating leverage	6 times
Interest expense	\$600,000
Tax rate	35%

As the next step, you need to determine the break-even point in units of output for the company. One of your strong points has been that you always prepare supporting work papers, which show how you arrived at your conclusions. You know Maria would like to see these work papers to facilitate her review of your work. Therefore, you will have the information you require to prepare an analytical income statement for the company. You are sure that Maria would also like to see this statement. In addition, you know that you need it to be able to answer the following questions. You also know Maria expects you to prepare, in a format that is presentable to the president, answers to the following questions to serve as a basis for her discussions with the president:

- What is the firm's break-even point in sales dollars?
- If sales should increase by 30 percent (as the president expects), by what percentage would EBT (earnings before taxes) and net income increase?
- Prepare another income statement, this time to verify the calculations from part (b).

2. Camping USA Inc. has been operating for only 2 years in the outskirts of Albuquerque, New Mexico, and is a new manufacturer of a top-of-the-line camping tent. You are starting an internship as assistant to the chief financial officer of the company, and the owner and CEO, Tom Charles, has decided that this is the right time to know more about the business and financial risks his company must deal with. For this, the CFO has asked you to prepare an analysis to support him in his next meeting with Tom Charles a week from today.

To make the required calculations, you have put together the following data regarding the cost structure of the company:

Output level	120,000 units
Operating assets	\$6,000,000
Operating asset turnover	12 times
Return on operating assets	48%
Degree of operating leverage	10 times
Interest expense	\$720,000
Tax rate	42%

The CFO has instructed you to first determine the break-even point in units of output for the company. He requires that you prepare supporting documents, which demonstrate how you arrived at your conclusion and can facilitate his review of your work. Accordingly, you are required to have the information needed to prepare an analytical income statement for the company to be presented to the CFO. In a format that is acceptable for a meeting discussion with the CEO, you also need to prepare answers to the following questions:

- What is the firm's break-even point in sales dollars?
- If sales should increase by 40 percent, by what percentage would EBT (earnings before taxes) and net income increase?
- Prepare another income statement, this time to verify the calculations from part (b).