

# Fundamentals of **Financial Management**

13th Edition

James C. Van Horne  
John M. Wachowicz, Jr.

# Fundamentals of Financial Management

thirteenth edition

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## 1

# The Role of Financial Management

## Contents

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## Objectives

**After studying Chapter 1, you should be able to:**

- Explain why the role of the financial manager today is so important.
- Describe “financial management” in terms of the three major decision areas that confront the financial manager.
- Identify the goal of the firm and understand why shareholders’ wealth maximization is preferred over other goals.
- Understand the potential problems arising when management of the corporation and ownership are separated (i.e., agency problems).
- Demonstrate an understanding of corporate governance.
- Discuss the issues underlying social responsibility of the firm.
- Understand the basic responsibilities of financial managers and the differences between a “treasurer” and a “controller.”

*Increasing shareholder value over time is the bottom line of every  
move we make.*

—ROBERTO GOIZUETA  
*Former CEO, The Coca-Cola Company*

## Introduction

The financial manager plays a dynamic role in a modern company's development. This has not always been the case. Until around the first half of the 1900s financial managers primarily raised funds and managed their firms' cash positions – and that was pretty much it. In the 1950s, the increasing acceptance of present value concepts encouraged financial managers to expand their responsibilities and to become concerned with the selection of capital investment projects.

Today, external factors have an increasing impact on the financial manager. Heightened corporate competition, technological change, volatility in inflation and interest rates, worldwide economic uncertainty, fluctuating exchange rates, tax law changes, environmental issues, and ethical concerns over certain financial dealings must be dealt with almost daily. As a result, finance is required to play an ever more vital strategic role within the corporation. The financial manager has emerged as a team player in the overall effort of a company to create value. The “old ways of doing things” simply are not good enough in a world where old ways quickly become obsolete. Thus today's financial manager must have the flexibility to adapt to the changing external environment if his or her firm is to survive.

The successful financial manager of tomorrow will need to supplement the traditional metrics of performance with new methods that encourage a greater role for uncertainty and multiple assumptions. These new methods will seek to value the flexibility inherent in initiatives – that is, the way in which taking one step offers you the option to stop or continue down one or more paths. In short, a correct decision may involve doing something today that in itself has small value, but gives you the option to do something of greater value in the future.

If you become a financial manager, your ability to adapt to change, raise funds, invest in assets, and manage wisely will affect the success of your firm and, ultimately, the overall economy as well. To the extent that funds are misallocated, the growth of the economy will be slowed. When economic wants are unfulfilled, this misallocation of funds may work to the detriment of society. In an economy, efficient allocation of resources is vital to optimal growth in that economy; it is also vital to ensuring that individuals obtain satisfaction of their highest levels of personal wants. Thus, through efficiently acquiring, financing, and managing assets, the financial manager contributes to the firm and to the vitality and growth of the economy as a whole.

## What Is Financial Management?

### **Financial management**

Concerns the acquisition, financing, and management of assets with some overall goal in mind.

**Financial management** is concerned with the acquisition, financing, and management of assets with some overall goal in mind. Thus the decision function of financial management can be broken down into three major areas: the investment, financing, and asset management decisions.

### ● ● ● Investment Decision

The investment decision is the most important of the firm's three major decisions when it comes to value creation. It begins with a determination of the total amount of assets needed to be held by the firm. Picture the firm's balance sheet in your mind for a moment. Imagine liabilities and owners' equity being listed on the right side of the balance sheet and its assets on the left. The financial manager needs to determine the dollar amount that appears above the double lines on the left-hand side of the balance sheet – that is, the size of the firm. Even when this number is known, the composition of the assets must still be decided. For example, how much of the firm's total assets should be devoted to cash or to inventory? Also, the flip

side of investment – disinvestment – must not be ignored. Assets that can no longer be economically justified may need to be reduced, eliminated, or replaced.

### ● ● ● Financing Decision

The second major decision of the firm is the financing decision. Here the financial manager is concerned with the makeup of the right-hand side of the balance sheet. If you look at the mix of financing for firms across industries, you will see marked differences. Some firms have relatively large amounts of debt, whereas others are almost debt free. Does the type of financing employed make a difference? If so, why? And, in some sense, can a certain mix of financing be thought of as best?

In addition, dividend policy must be viewed as an integral part of the firm's financing decision. The **dividend-payout ratio** determines the amount of earnings that can be retained in the firm. Retaining a greater amount of current earnings in the firm means that fewer dollars will be available for current dividend payments. The value of the dividends paid to stockholders must therefore be balanced against the opportunity cost of retained earnings lost as a means of equity financing.

Once the mix of financing has been decided, the financial manager must still determine how best to physically acquire the needed funds. The mechanics of getting a short-term loan, entering into a long-term lease arrangement, or negotiating a sale of bonds or stock must be understood.

### ● ● ● Asset Management Decision

The third important decision of the firm is the asset management decision. Once assets have been acquired and appropriate financing provided, these assets must still be managed efficiently. The financial manager is charged with varying degrees of operating responsibility over existing assets. These responsibilities require that the financial manager be more concerned with the management of current assets than with that of fixed assets. A large share of the responsibility for the management of fixed assets would reside with the operating managers who employ these assets.

**Dividend-payout ratio**  
Annual cash dividends divided by annual earnings; or, alternatively, dividends per share divided by earnings per share. The ratio indicates the percentage of a company's earnings that is paid out to shareholders in cash.

## The Goal of the Firm

Efficient financial management requires the existence of some objective or goal, because judgment as to whether or not a financial decision is efficient must be made in light of some standard. Although various objectives are possible, we assume in this book that the goal of the firm is to maximize the wealth of the firm's present owners.

Shares of common stock give evidence of ownership in a corporation. Shareholder wealth is represented by the market price per share of the firm's common stock, which, in turn, is a reflection of the firm's investment, financing, and asset management decisions. The idea is that the success of a business decision should be judged by the effect that it ultimately has on share price.

### ● ● ● Value Creation

Frequently, **profit maximization** is offered as the proper objective of the firm. However, under this goal a manager could continue to show profit increases by merely issuing stock and using the proceeds to invest in Treasury bills. For most firms, this would result in a decrease in each owner's share of profits – that is, **earnings per share** would fall. Maximizing earnings per share, therefore, is often advocated as an improved version of profit maximization. However, maximization of earnings per share is not a fully appropriate goal because it does

**Profit maximization**  
Maximizing a firm's earnings after taxes (EAT).

**Earnings per share (EPS)** Earnings after taxes (EAT) divided by the number of common shares outstanding.

## What Companies Say About Their Corporate Goal

“Creating superior shareholder value is our top priority.”

*Source: Associated Banc-Corp 2006 Annual Report.*

“The Board and Senior Management recognize their responsibility to represent the interests of all shareholders and to maximize shareholder value.”

*Source: CLP Holdings Limited, the parent company of the China Light & Power Group, Annual Report 2006.*

“FedEx’s main responsibility is to create shareholder value.”

*Source: FedEx Corporation, SEC Form Def 14A for the period ending 9/25/2006.*

“... we [the Board of Directors] are united in our goal to ensure McDonald’s strives to enhance shareholder value.”

*Source: McDonald’s Corporation 2006 Annual Report.*

“The desire to increase shareholder value is what drives our actions.”

*Source: Philips Annual Report 2006.*

“... the Board of Directors plays a central role in the Company’s corporate governance system; it has the power (and the duty) to direct Company business, pursuing and fulfilling its primary and ultimate objective of creating shareholder value.”

*Source: Pirelli & C. SpA. Milan Annual Report 2006.*

not specify the timing or duration of expected returns. Is the investment project that will produce a \$100,000 return five years from now more valuable than the project that will produce annual returns of \$15,000 in each of the next five years? An answer to this question depends on the time value of money to the firm and to investors at the margin. Few existing stockholders would think favorably of a project that promised its first return in 100 years, no matter how large this return. Therefore our analysis must take into account the time pattern of returns.

Another shortcoming of the objective of maximizing earnings per share – a shortcoming shared by other traditional return measures, such as return on investment – is that risk is not considered. Some investment projects are far more risky than others. As a result, the prospective stream of earnings per share would be more risky if these projects were undertaken. In addition, a company will be more or less risky depending on the amount of debt in relation to equity in its capital structure. This financial risk also contributes to the overall risk to the investor. Two companies may have the same expected earnings per share, but if the earnings stream of one is subject to considerably more risk than the earnings stream of the other, the market price per share of its stock may well be less.

Finally, this objective does not allow for the effect of dividend policy on the market price of the stock. If the only objective were to maximize earnings per share, the firm would never pay a dividend. It could always improve earnings per share by retaining earnings and investing them at any positive rate of return, however small. To the extent that the payment of dividends can affect the value of the stock, the maximization of earnings per share will not be a satisfactory objective by itself.

For the reasons just given, an objective of maximizing earnings per share may not be the same as maximizing market price per share. The market price of a firm’s stock represents the focal judgment of all market participants as to the value of the particular firm. It takes into account present and expected future earnings per share; the timing, duration, and risk of these earnings; the dividend policy of the firm; and other factors that bear on the market price of the stock. The market price serves as a barometer for business performance; it indicates how well management is doing on behalf of its shareholders.

Management is under continuous review. Shareholders who are dissatisfied with management performance may sell their shares and invest in another company. This action, if taken by other dissatisfied shareholders, will put downward pressure on market price per share. Thus management must focus on creating value for shareholders. This requires management to judge alternative investment, financing, and asset management strategies in terms of their effect on shareholder value (share price). In addition, management should pursue product-market strategies, such as building market share or increasing customer satisfaction, only if they too will increase shareholder value.

## ● ● ● Agency Problems

It has long been recognized that the separation of ownership and control in the modern corporation results in potential conflicts between owners and managers. In particular, the objectives of management may differ from those of the firm's shareholders. In a large corporation, stock may be so widely held that shareholders cannot even make known their objectives, much less control or influence management. Thus this separation of ownership from management creates a situation in which management may act in its own best interests rather than those of the shareholders.

**Agent(s)** Individual(s) authorized by another person, called the principal, to act on the latter's behalf.

### Agency (theory)

A branch of economics relating to the behavior of principals (such as owners) and their agents (such as managers).

We may think of management as the **agents** of the owners. Shareholders, hoping that the agents will act in the shareholders' best interests, delegate decision-making authority to them. Jensen and Meckling were the first to develop a comprehensive theory of the firm under **agency** arrangements.<sup>1</sup> They showed that the principals, in our case the shareholders, can assure themselves that the agents (management) will make optimal decisions only if appropriate incentives are given and only if the agents are monitored. Incentives include stock options, bonuses, and perquisites ("perks," such as company automobiles and expensive offices), and these must be directly related to how close management decisions come to the interests of the shareholders. Monitoring is done by bonding the agent, systematically reviewing management perquisites, auditing financial statements, and limiting management decisions. These monitoring activities necessarily involve costs, an inevitable result of the separation of ownership and control of a corporation. The less the ownership percentage of the managers, the less the likelihood that they will behave in a manner consistent with maximizing shareholder wealth and the greater the need for outside shareholders to monitor their activities.

Some people suggest that the primary monitoring of managers comes not from the owners but from the managerial labor market. They argue that efficient capital markets provide signals about the value of a company's securities, and thus about the performance of its managers. Managers with good performance records should have an easier time finding other employment (if they need to) than managers with poor performance records. Thus, if the managerial labor market is competitive both within and outside the firm, it will tend to discipline managers. In that situation, the signals given by changes in the total market value of the firm's securities become very important.

### Corporate social

**responsibility (CSR)** A business outlook that acknowledges a firm's responsibilities to its stakeholders and the natural environment.

**Stakeholders** All constituencies with a stake in the fortunes of the company. They include shareholders, creditors, customers, employees, suppliers, and local and international communities in which the firm operates.

### Sustainability

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

## ● ● ● Corporate Social Responsibility (CSR)

Maximizing shareholder wealth does not mean that management should ignore **corporate social responsibility (CSR)**, such as protecting the consumer, paying fair wages to employees, maintaining fair hiring practices and safe working conditions, supporting education, and becoming involved in such environmental issues as clean air and water. It is appropriate for management to consider the interests of **stakeholders** other than shareholders. These stakeholders include creditors, employees, customers, suppliers, communities in which a company operates, and others. Only through attention to the legitimate concerns of the firm's various stakeholders can the firm attain its ultimate goal of maximizing shareholder wealth.

Over the last few decades **sustainability** has become a growing focus of many corporate social responsibility efforts. In a sense, corporations have always been concerned with their ability to be productive, or sustainable, in the long term. However, the concept of sustainability has evolved to such an extent that it is now viewed by many businesses to mean meeting the needs of the present without compromising the ability of future generations to meet their own needs. Therefore, more and more companies are being proactive and taking steps to address issues such as climate change, oil depletion, and energy usage.

<sup>1</sup>Michael C. Jensen and William H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics* 3 (October 1976), 305–360.

## Virtue Rewarded



**Companies are suddenly discovering the profit potential of social responsibility.**

When Al Gore, the former US vice president, shows up at Wal-Mart headquarters, you have to wonder what's going on. As it turns out, Gore was invited to visit the retailer in July to introduce a screening of his documentary about global warming, *An Inconvenient Truth*. An odd-couple pairing – Gore and a company known for its giant parking lots? Certainly. But also one of the many recent signs that “corporate social responsibility”, once seen as the purview of the hippie fringe, has gone mainstream.

In the 1970s and 1980s, companies like Ben & Jerry's and The Body Shop pushed fair-labor practices and environmental awareness as avidly and effectively as Cherry Garcia ice cream and cocoa-butter hand cream. They were widely admired but rarely imitated.

Today, more than 1,000 companies in 60 countries have published sustainability reports proclaiming their concern for the environment, their employees, and their local communities. Giant corporations from BP to General Electric have launched marketing campaigns emphasizing their focus on alternative energy. Wal-Mart, too, has announced new environmental goals – hence the Gore visit. The retailer has pledged to increase the efficiency of its vehicle fleet by 25% over the next three years, cut the amount of energy used in its stores by at least 25%, and reduce solid waste from US stores by the same amount.

### Changing expectations

The sudden burst of idealism can be traced to several sources. First among them: the wave of corporate scandals. “Enron was sort of the tipping point for many CEOs and boards. They realized that they were going to

continue to be the subject of activist, consumer, and shareholder focus for a long time,” says Andrew Savitz, author of *The Triple Bottom Line* and a former partner in PricewaterhouseCoopers's sustainability practice. “People are now very interested in corporate behavior of all kinds.”

Second, thanks to the internet, everyone has rapid access to information about that behavior. Word of an oil spill or a discrimination lawsuit can spread worldwide nearly instantly. “If you had a supplier using child labor or dumping waste into a local river, that used to be pretty well hidden,” says Andrew Winston, director of the Corporate Environmental Strategy project at Yale University and co-author of *Green to Gold*. “Now, someone walks by with a camera and blogs about it.”

Real concerns about resource constraints, driven by the rising costs of such crucial commodities as steel and oil, are a third factor spurring executives to action. Wal-Mart chief Lee Scott has said he discovered that by packaging just one of the company's own products in smaller boxes, he could dramatically cut down its distribution and shipping costs, reducing energy use at the same time. Such realizations have driven the company's re-examination of its packaging and fleet efficiency.

Critics of corporate social responsibility, or CSR, have long held that the business of business is strictly to increase profits, a view set forth most famously by the economist Milton Friedman. Indeed, in a recent survey of senior executives about the role of business in society, most respondents “still fall closer to Milton Friedman than to Ben & Jerry,” says Bradley Googins, executive director of Boston College's Center for Corporate Citizenship, which conducted the survey. “But they see the Milton Friedman school as less and less viable today,” due to the change in expectations of business from nearly every stakeholder group. In a study conducted by the center in 2005, more than 80% of executives said social and environmental issues were becoming more important to their businesses.

“This debate is over,” says Winston. “The discussion now is about how to build these intangibles into the business.”

Source: Adapted from Kate O'Sullivan, “Virtue Rewarded,” *CFO Asia* (November 2006), pp. 58–63. ([www.cfoasia.com](http://www.cfoasia.com)) © 2007 by CFO Publishing Corporation. Used by permission. All rights reserved.

Many people feel that a firm has no choice but to act in socially responsible ways. They argue that shareholder wealth and, perhaps, the corporation's very existence depend on its being socially responsible. Because the criteria for social responsibility are not clearly defined, however, formulating consistent policies is difficult. When society, acting through various

## Sustainability: Why CFOs Need to Pay Attention



**No longer just the right thing to do, sustainability can affect an organization's reputation, brand and long-term profitability.**

The surging interest in sustainable developments is driven by the recognition that corporations, more than any other organizations (including national governments), have the power, the influence over financial, human and natural resources, the means and arguably the responsibility to promote a corporate agenda that considers not only the economics of growth but also the health of the environment and society at large.

Most early sustainability efforts fell under the umbrella of corporate social responsibility, which corporations practiced with a sense that it was the right thing to do. The concept has changed since then, and its evolution has serious implications for the way financial professionals do their work. Sustainability has emerged as a business strategy for maintaining long-term growth and performance and to satisfy corporate obligations to a range of stakeholders including shareholders.

As they should, profit-oriented corporations prioritize their fiduciary responsibilities and consider mainly the effects of their decisions on their direct shareholders. The interests and values of other stakeholders and the wider society affected by their actions often take lower or no priority.

Under the principles of sustainability, a negative impact on stakeholder values becomes a cost to a corporation. The cost is usually defined as the expenditure of resources that could be used to achieve something else of equal or greater value. Customarily, these costs have remained external to the organization and never make their way onto an income statement. They may include the discharge of contaminants and pollutants into the environment and other abuses of the public good.

Now these costs have begun to appear in corporate financial statements through so-called triple-bottom-line accounting. This accounting approach promotes the incorporation into the income statement of not only tangible financial costs but also traditionally less tangible environmental and social costs of doing business. Organizations have practiced such green accounting since the mid-1980s, as they recognize that financial indicators alone no longer adequately identify and communicate the opportunities and risks that confront them. These organizations understand that failure in non-financial areas can have a substantial impact on shareholder value. Non-financial controversy has dogged companies such as Royal Dutch/Shell (Brent Spar sinking and Niger River delta operations), Talisman Energy Inc. (previous Sudan investments) and Wal-Mart Stores Inc. (labor practices).

To corporations, sustainability presents both a stick and a carrot. The stick of sustainability takes the form of a threat to attracting financing. Investors, particularly institutions, now ask more penetrating questions about the long-term viability of the elements in their portfolios. If a company cannot demonstrate that it has taken adequate steps to protect itself against long-term non-financial risks, including risks to its reputation and brand, it may become a much less attractive asset to investors. Lenders, too, increasingly look at sustainability in their assessment of their debt portfolios.

The carrot of sustainability comes in a variety of forms. Carbon-management credits are becoming a source of income for some companies. Younger consumers are increasingly green-minded, screening their investment and consumption choices by filtering out less socially and environmentally responsible organizations.

Organizations can learn how to account more completely for environmental and social issues and then define, capture and report on these non-financial indicators as part of their performance measurement. In the process, they can uncover new ways to safeguard their reputation, build trust among stakeholders, consolidate their license to operate and ultimately enhance their growth and profitability.

Source: James Hartshorn, "Sustainability: Why CFOs Need to Pay Attention," *Canadian Treasurer* (22 June/July 2006), p. 15. ([www.tmac.ca](http://www.tmac.ca)) Used by permission. All rights reserved.

representative bodies, establishes the rules governing the trade-offs between social goals, environmental sustainability, and economic efficiency, the task for the corporation is clearer. We can then view the company as producing both private and social goods, and the maximization of shareholder wealth remains a viable corporate objective.

## Corporate Governance

### Corporate

**governance** The system by which corporations are managed and controlled. It encompasses the relationships among a company's shareholders, board of directors, and senior management.

**Corporate governance** refers to the system by which corporations are managed and controlled. It encompasses the relationships among a company's shareholders, board of directors, and senior management. These relationships provide the framework within which corporate objectives are set and performance is monitored. Three categories of individuals are, thus, key to corporate governance success: first, the common shareholders, who elect the board of directors; second, the company's board of directors themselves; and, third, the top executive officers led by the chief executive officer (CEO).

The board of directors – the critical link between shareholders and managers – is potentially the most effective instrument of good governance. The oversight of the company is ultimately their responsibility. The board, when operating properly, is also an independent check on corporate management to ensure that management acts in the shareholders' best interests.

### ● ● ● The Role of the Board of Directors

The board of directors sets company-wide policy and advises the CEO and other senior executives, who manage the company's day-to-day activities. In fact, one of the board's most important tasks is hiring, firing, and setting of compensation for the CEO.

Boards review and approve strategy, significant investments, and acquisitions. The board also oversees operating plans, capital budgets, and the company's financial reports to common shareholders.

In the United States, boards typically have 10 or 11 members, with the company's CEO often serving as chairman of the board. In Britain, it is common for the roles of chairman and CEO to be kept separate, and this idea is gaining support in the United States.

### Sarbanes-Oxley Act of 2002 (SOX)

Addresses, among other issues, corporate governance, auditing and accounting, executive compensation, and enhanced and timely disclosure of corporate information.

### ● ● ● Sarbanes-Oxley Act of 2002

There has been renewed interest in corporate governance in this last decade caused by major governance breakdowns, which led to failures to prevent a series of recent corporate scandals involving Enron, WorldCom, Global Crossing, Tyco, and numerous others. Governments and regulatory bodies around the world continue to focus on the issue of corporate governance reform. In the United States, one sign of the seriousness of this concern was that Congress enacted the **Sarbanes-Oxley Act of 2002 (SOX)**.

Sarbanes-Oxley mandates reforms to combat corporate and accounting fraud, and imposes new penalties for violations of securities laws. It also calls for a variety of higher standards for corporate governance, and establishes the **Public Company Accounting Oversight Board (PCAOB)**. The Securities and Exchange Commission (SEC) appoints the chairman and the members of the PCAOB. The PCAOB has been given the power to adopt auditing, quality control, ethics, and disclosure standards for public companies and their auditors as well as investigate and discipline those involved.

### Public Company Accounting Oversight Board (PCAOB)

Private-sector, nonprofit corporation, created by the *Sarbanes-Oxley Act of 2002* to oversee the auditors of public companies in order to protect the interests of investors and further the public interest in the preparation of informative, fair, and independent audit reports.

## Organization of the Financial Management Function

Whether your business career takes you in the direction of manufacturing, marketing, finance, or accounting, it is important for you to understand the role that financial management plays in the operations of the firm. Figure 1.1 is an organization chart for a typical manufacturing firm that gives special attention to the finance function.

As the head of one of the three major functional areas of the firm, the vice president of finance, or chief financial officer (CFO), generally reports directly to the president, or chief

## More Rules, Higher Profits

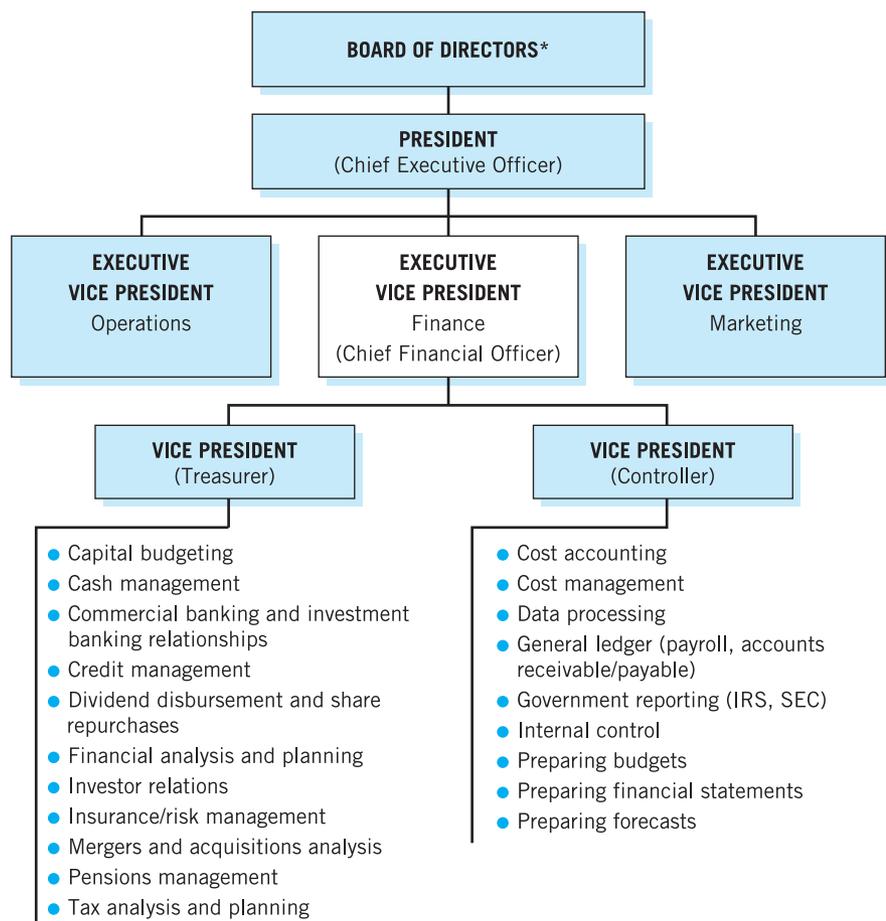
# CFO

New research shows that good governance practices may reduce your cost of capital.

All too often, the drive for corporate-governance reform feels like a costly exercise in wishful thinking. After all, can you really find a strong correlation between a mandatory retirement age for directors and a bigger net profit margin?

You can, as it happens. A growing body of research suggests that the governance practices promoted by such proxy groups as Institutional Shareholder Services (ISS) and the Investor Responsibility Research Center are indeed associated with better corporate performance and a lower cost of capital. One 2003 study by researchers at Harvard University and the Wharton School found that companies with greater protections for shareholders had significantly better equity returns, profits, and sales growth than others. A more recent study, by ISS, found that companies that closely follow its governance advice have higher price-earnings ratios.

Source: Adapted from Don Durfee, "More Rules, Higher Profits," *CFO* (August 2006), p. 24. ([www.cfo.com](http://www.cfo.com)) Copyright © 2006 by CFO Publishing Corporation. Used by permission. All rights reserved.



**Figure 1.1**

Financial management on the organization chart

\*In response to heightened concern over shareholders' interests, a growing number of companies have placed shareholders in a box above the board of directors on their organization chart.

## Four Eyes Are Better

# CFO

Could a different reporting structure have prevented the WorldCom fraud? Harry Volande thinks so.

The Siemens Energy & Automation CFO reports to the board of directors, rather than to the CEO. He says the structure, which Siemens refers to as the “four-eye principle,” makes it easier for finance chiefs to stay honest. “The advantage is that you have a CFO who does not depend on the CEO for reviews or a remuneration package,” says Volande. “That gives him the freedom to voice an independent opinion.” The reporting structure, which is more common in Germany, applies throughout the German electronics conglomerate. In the United States, such a reporting practice is rare, in part because at many companies the CEO also chairs the board. “Most CEOs would resist such a change in the hierarchy,” says James Owers, professor of finance at Georgia State University.

With a change in the reporting model unlikely, governance watchdogs are advocating frequent and independent meetings between the CFO and the board. Many CFOs have access to the board only when the CEO requests a finance presentation, says Owers.

Espen Eckbo, director of the Center for Corporate Governance at Dartmouth’s Tuck School of Business, says boards should consider taking more responsibility for evaluating the CFO and determining his or her compensation, rather than relying solely on the CEO’s opinion. Such a practice would provide more independence for the finance chief, he says.

Of course, there are drawbacks when the CFO reports directly to the board. Volande admits that it can slow the decision-making process. For example, if there are disagreements about a possible merger, the board ultimately has to make the decision. “You require additional communication, which can be useful, but it takes longer,” says Volande. He acknowledges that the structure is not for everyone, as conflicts can arise when senior executives share power: “It takes a CEO and CFO with a certain amount of humility and flexibility.”

*Source:* Kate O’Sullivan, “Four Eyes Are Better,” *CFO* (June 2006), p. 21. ([www.cfo.com](http://www.cfo.com)) Copyright © 2006 by CFO Publishing Corporation. Used by permission. All rights reserved.

executive officer (CEO). In large firms, the financial operations overseen by the CFO will be split into two branches, with one headed by a treasurer and the other by a controller.

The controller’s responsibilities are primarily accounting in nature. Cost accounting, as well as budgets and forecasts, concerns internal consumption. External financial reporting is provided to the IRS, the Securities and Exchange Commission (SEC), and the stockholders.

The treasurer’s responsibilities fall into the decision areas most commonly associated with financial management: investment (capital budgeting, pension management), financing (commercial banking and investment banking relationships, investor relations, dividend disbursement), and asset management (cash management, credit management). The organization chart may give you the false impression that a clear split exists between treasurer and controller responsibilities. In a well-functioning firm, information will flow easily back and forth between both branches. In small firms the treasurer and controller functions may be combined into one position, with a resulting commingling of activities.

## Organization of the Book

We began this chapter by offering the warning that today’s financial manager must have the flexibility to adapt to the changing external environment if his or her firm is to survive. The recent past has witnessed the production of sophisticated new technology-driven techniques for raising and investing money that offer only a hint of things to come. But take heart. Although the techniques of financial management change, the principles do not.

As we introduce you to the most current techniques of financial management, our focus will be on the underlying principles or fundamentals. In this way, we feel that we can best prepare you to adapt to change over your entire business career.

## ● ● ● The Underpinnings

In Part 1, Chapter 1, we define financial management, advocate maximization of shareholder wealth as the goal of the firm, and look at the position that financial management holds on the firm's organization chart. Our next aim is to arm you with certain background material and some of the basic tools of financial analysis. Therefore, in Chapter 2 we examine the legal setting for financial management as it relates to organizational form and to taxes. The function of financial markets and institutions, as well as of interest rates, is also included

### Ask Alice About Ethics



Dear Alice,

*With all the sound and fury going on about our national moral crisis, do you have any words of wisdom and encouragement on the subject of business ethics?*

*Hopeful in Hawaii*

Dear Hopeful,

Glad to hear someone out there still has some faith in the immortality of morality in these troubled times. I don't know why business ethics should be a subset of general, run-of-the-mill ethics, but I'm willing to make a stab at defining how one's ethics can impact one's business.

The way I see it, a business person needs several fundamental ingredients to succeed. These might include skills specific to the trade he or she is in, sufficient capital, a willingness to apply a generous amount of elbow grease, and a whole lot of luck. But even given all of the above, if the ingredient of integrity is absent, true success will elude the enterprise – for what kind of a business can survive without a good reputation? And what is reputation, after all, but ethics and integrity?

To be sure, much morality is imposed externally these days. Laws and regulations tend to make individuals, corporations, and even countries more virtuous than they might otherwise be. Good intentions are fine, but a little external incentive never hurts to get the job done. Yet the true hope for the future of ethics in society stems from the fact that the vast majority of folks have an internal moral compass and would do the right thing even without extraordinary external pressure.

And while these times may indeed appear to be troubled, they are no more so than times gone by. Consider the virtual caste system declaimed by Aristotle, the rampant corruption of the late Roman Empire, the blood and guts of the Middle Ages, not to mention the exploitation of colonialism in more recent times.

If you'd like to see a wonderful example of how the ethical dilemmas of ancient times apply even today, take a look at this very pithy essay on honest business dealings. Here you will find a journal article by Randy Richards of St. Ambrose University titled "Cicero and the Ethics of Honest Business Dealings." ([www.stthom.edu/Public/getFile.asp?isDownload=1&File\\_Content\\_ID=518](http://www.stthom.edu/Public/getFile.asp?isDownload=1&File_Content_ID=518)) It tells about how Cicero came to write his treatise *On Duties*, in which he addresses what we ought to do when what is right and ethical conflicts with what seems advantageous.

Cicero sent his son off to school in Athens, where Junior proved to be a less-than-stellar pupil. Word got back to Rome about excessive partying and lack of attention to scholarship, and Dad was inspired to write a long letter to his offspring on the subject of doing one's duty. Cicero's examples of problems in doing one's duty, as described by the article's author, are as contemporary as any of the business ethics cases you read about in your daily newspaper. Manipulating earnings and stock values à la Enron and Andersen! Covering up a defect in a product or property à la Firestone! Same race, different rats!

So keep the faith and remain hopeful. Mankind has been struggling with ethical challenges fairly successfully for the two millennia since that wise old Roman fired off a letter to his kid. And as long as the struggle to do the right thing continues, civilization will continue to improve – despite our temporary epidemic of sex, lies and media hype.

*Source:* Adapted from Alice Magos, "Ask Alice About Ethics." Retrieved from [www.toolkit.cch.com/advice/096askalice.asp](http://www.toolkit.cch.com/advice/096askalice.asp). Reproduced with permission from CCH Business Owner's Toolkit, published and copyrighted by:

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as pertinent background information. In particular, we will focus on how business firms interact with financial markets. The time value of money, valuation, and the twin concepts of risk and return are explored in Part 2, Chapters 3, 4, and 5, because an understanding of these fundamentals is essential to sound financial decisions. Indeed, the foundation for maximizing shareholder wealth lies in valuation and in an understanding of the trade-offs between risk and return. As a result, we explore these topics early on.

**Question**

**If I have no intention of becoming a financial manager, why do I need to understand financial management?**

**Answer**

One good reason is “to prepare yourself for the workplace of the future.” More and more businesses are reducing management jobs and squeezing together the various layers of the corporate pyramid. This is being done to reduce costs and boost productivity. As a result, the responsibilities of the remaining management positions are being broadened. The successful manager will need to be much more of a team player who has the knowledge and ability to move not just vertically within an organization but horizontally as well. Developing cross-functional capabilities will be the rule, not the exception. Thus a mastery of basic financial management skills is a key ingredient that will be required in the workplace of your not-too-distant future.

To invest in, finance, and manage assets efficiently, financial managers must plan carefully. For one thing, they must project future cash flows and then assess the likely effect of these flows on the financial condition of the firm. On the basis of these projections, they also must plan for adequate liquidity to pay bills and other debts as they come due. These obligations may make it necessary to raise additional funds. In order to control performance, the financial manager needs to establish certain norms. These norms are then used to compare actual performance with planned performance. Because financial analysis, planning, and control underlie a good deal of the discussion in this book, we examine these topics in Part 3, Chapters 6 and 7.

### ● ● ● Managing and Acquiring Assets

Decisions regarding the management of assets must be made in accordance with the underlying objective of the firm: to maximize shareholder wealth. In Part 4, we examine cash, marketable securities, accounts receivable, and inventories. We shall explore ways of efficiently managing these current assets in order to maximize profitability relative to the amount of funds tied up in the assets. Determining a proper level of liquidity is very much a part of this asset management. The optimal level of a current asset depends on the profitability and flexibility associated with that level in relation to the cost involved in maintaining it. In the past, the management of working capital (current assets and their supporting financing) dominated the role of financial managers. Although this traditional function continues to be vital, expanded attention is now being paid to the management of longer-term assets and liabilities.

In Part 5, under capital budgeting, we consider the acquisition of fixed assets. Capital budgeting involves selecting investment proposals whose benefits are expected to extend beyond one year. When a proposal requires an increase or decrease in working capital, this change is treated as part of the capital budgeting decision and not as a separate working capital decision. Because the expected future benefits from an investment proposal are uncertain, risk is

necessarily involved. Changes in the business-risk complexion of the firm can have a significant influence on the firm's value in the marketplace. Because of this important effect, attention is devoted to the problem of measuring risk for a capital investment project. In addition to risk, an investment project sometimes embodies options for management to alter previous decisions. Therefore the effect of managerial options on project desirability is studied. Capital is apportioned according to an acceptance criterion. The return required of the project must be in accord with the objective of maximizing shareholder wealth.

### ● ● ● Financing Assets

A major facet of financial management involves providing the financing necessary to support assets. A wide variety of financing sources are available. Each has certain characteristics as to cost, maturity, availability, claims on assets, and other terms imposed by the suppliers of capital. On the basis of these factors, the financial manager must determine the best mix of financing for the firm. Implications for shareholder wealth must be considered when these decisions are made.

In Part 6 we discuss the capital structure (or permanent long-term financing makeup) of a firm. We look at the concept of financial leverage from a number of different angles in an effort to understand financial risk and how this risk is interrelated with business (or operating) risk. In addition, we analyze the retention of earnings as a source of financing. Because this source represents dividends forgone by stockholders, dividend policy very much impinges on financing policy and vice versa. Whereas in Part 4, previously discussed, we examine the various sources of short-term financing, in Part 7 the sources of long-term financing are explored. Both parts reveal the features, concepts, and problems associated with alternative methods of financing.

### ● ● ● A Mixed Bag

In Part 8 we cover some of the specialized areas of financial management in detail. Some of the more exotic financing instruments – convertibles, exchangeables, and warrants – are discussed. Mergers, strategic alliances, divestitures, restructurings, and remedies for a failing company are explored. Growth of a company can be internal, external, or both, and domestic or international in flavor. Finally, because the multinational firm has come into prominence, it is particularly relevant that we study growth through international operations.

Financial management, then, involves the acquisition, financing, and management of assets. These three decision areas are all interrelated: the decision to acquire an asset necessitates the financing and management of that asset, whereas financing and management costs affect the decision to invest. The focus of this book is on the investment, financing, and asset management decisions of the firm. Together, these decisions determine the value of the firm to its shareholders. Mastering the concepts involved is the key to understanding the role of financial management.

## Key Learning Points

- *Financial management* is concerned with the acquisition, financing, and management of assets with some overall goal in mind.
- The decision function of financial management can be broken down into three major areas: the investment, financing, and asset management decisions.
- We assume in this book that the *goal of the firm* is to maximize the wealth of the firm's present owners (or shareholders). Shareholder wealth is represented by the market price per share of the firm's common stock, which, in turn, is a reflection of the firm's investment, financing, and asset management decisions.

- The market price of a firm's stock represents the focal judgment of all market participants as to the value of the particular firm. It takes into account present and prospective future earnings per share; the timing, duration, and risk of these earnings; the dividend policy of the firm; and other factors that bear on the market price of the stock.
- *Agency theory* suggests that managers (the agents), particularly those of large, publicly owned firms, may have different objectives from those of the shareholders (the principals). The shareholders can assure themselves that the managers will make shareholder wealth-maximizing decisions only if management receives appropriate incentives and only if management is monitored.
- Maximizing shareholder wealth does *not* relieve the firm of the responsibility to act in socially responsible ways.
- Corporate governance is the system by which corporations are managed and controlled. It encompasses the relationships among a company's shareholders, board of directors, and senior management.
- In large firms, the finance function is the responsibility of the vice president of finance, or chief financial officer (CFO), who generally reports directly to the president, or chief executive officer (CEO). The financial operations overseen by the CFO will be split into two branches, with one headed by a treasurer and the other by a controller. The controller's responsibilities are primarily accounting in nature, whereas the treasurer's responsibilities fall into the decision areas most commonly associated with financial management.



## Questions

1. If all companies had an objective of maximizing shareholder wealth, would people overall tend to be better or worse off?
2. Contrast the objective of maximizing earnings with that of maximizing wealth.
3. What is financial management all about?
4. Is the goal of zero profits for some finite period (three to five years, for example) ever consistent with the maximization-of-wealth objective?
5. Explain why judging the efficiency of any financial decision requires the existence of a goal.
6. What are the three major functions of the financial manager? How are they related?
7. Should the managers of a company own sizable amounts of common stock in the company? What are the pros and cons?
8. During the last few decades, a number of environmental, hiring, and other regulations have been imposed on businesses. In view of these regulatory changes, is maximization of shareholder wealth any longer a realistic objective?
9. As an investor, do you think that some managers are paid too much? Do their rewards come at your expense?
10. How does the notion of risk and reward govern the behavior of financial managers?
11. What is corporate governance? What role does a corporation's board of directors play in corporate governance?
12. Compare and contrast the roles that a firm's treasurer and controller have in the operation of the firm.

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## 6

## Financial Statement Analysis

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## Objectives

**After studying Chapter 6, you should be able to:**

- Understand the purpose of basic financial statements and their contents.
- Understand what is meant by “convergence” in accounting standards.
- Explain why financial statement analysis is important to the firm and to outside suppliers of capital.
- Define, calculate, and categorize (according to liquidity, financial leverage, coverage, activity, and profitability) the major financial ratios and understand what they can tell us about the firm.
- Define, calculate, and discuss a firm’s operating cycle and cash cycle.
- Use ratios to analyze a firm’s health and then recommend reasonable alternative courses of action to improve the health of the firm.
- Analyze a firm’s return on investment (i.e., “earning power”) and return on equity using a Du Pont approach.
- Understand the limitations of financial ratio analysis.
- Use trend analysis, common-size analysis, and index analysis to gain additional insights into a firm’s performance.

*Financial statements are like a fine perfume – to be sniffed but not swallowed.*

—ABRAHAM BRILLOFF

To make rational decisions in keeping with the objectives of the firm, the financial manager must have analytical tools. Some of the more useful tools of financial analysis and planning are the subjects of this and the next chapter.

The firm itself and outside providers of capital – creditors and investors – all undertake financial statement analysis. The type of analysis varies according to the specific interests of the party involved. Trade creditors (suppliers owed money for goods and services) are primarily interested in the liquidity of a firm. Their claims are short term, and the ability of the firm to pay these claims quickly is best judged by an analysis of the firm's liquidity. The claims of bondholders, on the other hand, are long term. Accordingly, bondholders are more interested in the cash-flow ability of the firm to service debt over a long period of time. They may evaluate this ability by analyzing the capital structure of the firm, the major sources and uses of funds, the firm's profitability over time, and projections of future profitability.

Investors in a company's common stock are principally concerned with present and expected future earnings as well as with the stability of these earnings about a trend line. As a result, investors usually focus on analyzing profitability. They would also be concerned with the firm's financial condition insofar as it affects the ability of the firm to pay dividends and avoid bankruptcy.

Internally, management also employs financial analysis for the purpose of internal control and to better provide what capital suppliers seek in financial condition and performance from the firm. From an internal control standpoint, management needs to undertake financial analysis in order to plan and control effectively. To plan for the future, the financial manager must assess the firm's present financial position and evaluate opportunities in relation to this current position. With respect to internal control, the financial manager is particularly concerned with the return on investment provided by the various assets of the company, and with the efficiency of asset management. Finally, to bargain effectively for outside funds, the financial manager needs to be attuned to all aspects of financial analysis that outside suppliers of capital use in evaluating the firm. We see, then, that the type of financial analysis undertaken varies according to the particular interests of the analyst.

## Financial Statements

**Financial (statement) analysis** The art of transforming data from financial statements into information that is useful for informed decision making.

**Balance sheet** A summary of a firm's financial position on a given date that shows total assets = total liabilities + owners' equity.

**Financial analysis** involves the use of various financial statements. These statements do several things. First, the **balance sheet** summarizes the assets, liabilities, and owners' equity of a business at a moment in time, usually the end of a year or a quarter. Next, the **income statement** summarizes the revenues and expenses of the firm over a particular period of time, again usually a year or a quarter. Though the balance sheet represents a snapshot of the firm's financial position *at a moment in time*, the income statement depicts a summary of the firm's profitability *over time*. From these two statements (plus, in some cases, a little additional information), certain derivative statements can be produced, such as a statement of retained earnings, a sources and uses of funds statement, and a statement of cash flows. (We consider the latter two in the next chapter.)

In analyzing financial statements, you may want to use a computer spreadsheet program. For repetitive analyses, such a program permits changes in assumptions and simulations to be done with ease. Analyzing various scenarios allows richer insight than otherwise would be the case. In fact, financial statements are an ideal application for these powerful programs, and their use for financial statement analysis (both external and internal) is quite common.

**Income statement**

A summary of a firm's revenues and expenses over a specified period, ending with net income or loss for the period.

In the US, the Financial Accounting Standards Board (FASB) determines the accounting standards used to prepare, present, and report a corporation's financial statements by issuing Statements of Financial Accounting Standards (SFAS). Collectively, these statements make up what is known as the US Generally Accepted Accounting Principles (US GAAP, or simply GAAP).

Global capital markets demand global accounting standards and global regulatory cooperation. With a goal of developing global accounting standards, the International Accounting Standards Board (IASB) has the responsibility for developing International Financial Reporting Standards (IFRS). In 2005, all European Union (EU) countries adopted IFRS. In addition, many countries outside of Europe, including Japan, rely on accounting standards largely equivalent to IFRS. The IASB works closely with the FASB, and other national accounting standard setters, toward "convergence" in accounting standards around the world. Convergence is a process of getting closer. Convergence of accounting standards aims to narrow or remove differences so that investors can better understand financial statements prepared under different accounting frameworks.

**Speaking In Tongues**

**Dragging America down the rocky road to a set of global accounting rules**

**F**ORGET Esperanto. Too straightforward. The *lingua franca* that is increasingly spanning the globe is a tongue-twisting accounting-speak that is forcing even Americans to rethink some precious notions of financial sovereignty.

International Financial Reporting Standards (IFRS), which aim to harmonise financial reporting in a world of cross-border trade and investment, have made great strides since they were adopted by 7,000 or so listed companies in the European Union in 2005. To date, over 100 countries, from Canada to China, have adopted the rules, or said that they plan to adopt them. The London-based International Accounting Standards Board (IASB) expects that to swell to 150 in the next four years.

Even America, no ardent internationalist, is working with the IASB to narrow the gap between its own accounting standards and IFRS, which foreign companies listed in America could choose by 2009, or possibly sooner. Today such companies must "reconcile" their accounts with American rules – a costly exercise that some believe is driving foreign listings away from the United States.

But even the EU's embrace of IFRS has been less than effusive. It chose a version of the rules endorsed by the

European Parliament, rather than one issued by the IASB. There is only one difference, but it is a big one – the rule on how to account for financial instruments (derivatives and the like).

Kuwait and other countries in the Middle East, too, are said to be adopting IFRS with certain peculiarities. The worry is that if enough countries seek to tailor standards to their liking, there could be "hundreds of different versions of IFRS instead of one set of international rules, which is the whole point," says Sir David Tweedie, the head of the IASB. "We have to nip this in the bud."

So far, nipping means working with international standard setters to compel companies to disclose exactly what set of rules they are using. The hope is that investors would press companies not to use country-specific, bespoke versions of IFRS, or charge them higher risk premiums if they do. Today, an investor in Europe could not tell from reading a company's financial report whether it is using full-blown IFRS or the EU version.

Whether pure IFRS or not, all countries are prone to interpret the rules in ways that reflect their old national accounting standards, according to KPMG, an accountancy firm. Regulators are working through IOSCO, an international body of securities regulators, to attempt to whittle down these differences.

The task is further complicated by the fact that international accounting rules tend to be "principles based," which means there are no hard-and-fast codes to follow. This is different from America, where accounting principles are accompanied by thousands of pages of prescriptive regulatory guidance and interpretations from auditors and accounting groups, some of it gleaned from SEC speeches. IFRS have no such baggage, leaving more room for judgment.

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## ● ● ● Balance Sheet Information

Table 6.1 shows the balance sheets of Aldine Manufacturing Company for the fiscal years ending March 31, 20X2, and March 31, 20X1. The assets are listed in the upper panel according to their relative degree of liquidity (i.e., their closeness to cash). Cash is the ultimate in liquidity, and appears first.

### Take Note

For many years in the US and other countries, cash was combined with **cash equivalents** under the heading “cash and cash equivalents” on a company’s balance sheet and statement of cash flows. In an attempt to simplify accounting standards the US Financial Accounting Standards Board voted approval in early 2007 to change this heading to simply “cash.” Items previously classified as cash equivalents would now be classified in the same way as other short-term investments. An implementation date has yet to be set, but in anticipation of this change, we will use the new terminology in the financial statements presented in this text. However, unless there is official implementation and guidance on this issue, “cash and cash equivalents” must be used in actual practice.

#### Cash equivalents

Highly liquid, short-term marketable securities that are readily convertible to known amounts of cash and generally have remaining maturities of three months or less at the time of acquisition.

**Table 6.1**

Aldine Manufacturing Company balance sheets (in thousands)<sup>1</sup>

ASSETS <sup>2</sup>	MARCH 31		EXPLANATIONS
	20X2	20X1	
Cash	\$ 178	\$ 175	1. Shows how company stands at close of business on a given date.
Accounts receivable <sup>3</sup>	678	740	2. What Aldine owned.
Inventories, at lower of cost or market <sup>4</sup>	1,329	1,235	3. Amounts owed to company by customers.
Prepaid expenses <sup>5</sup>	21	17	4. Raw materials, work-in-process, and finished goods.
Accumulated tax prepayments	35	29	5. Future expense items (e.g., insurance premiums) that have already been paid.
Current assets <sup>6</sup>	\$2,241	\$2,196	6. Cash and items likely convertible to cash within 1 year.
Fixed assets at cost <sup>7</sup>	1,596	1,538	7. Original amount paid for land, buildings, and equipment.
Less: Accumulated depreciation <sup>8</sup>	(857)	(791)	8. Accumulated deductions for wear and tear on fixed assets.
Net fixed assets	\$ 739	\$ 747	9. Assets = liabilities + shareholders' equity.
Investment, long term	65	—	10. What Aldine owed.
Other assets, long term	205	205	11. Ownership interest of shareholders.
Total assets <sup>9</sup>	\$3,250	\$3,148	12. Due to suppliers for goods and services.
LIABILITIES AND SHAREHOLDERS' EQUITY <sup>10,11</sup>	MARCH 31		13. “Accrued” refers to an obligation incurred but payment not yet made.
	20X2	20X1	14. Unpaid wages, salaries, etc.
Bank loans and notes payable	\$ 448	\$ 356	15. Debts payable within 1 year.
Accounts payable <sup>12</sup>	148	136	16. Debt that need not be paid until after 1 year (e.g., bonds).
Accrued taxes <sup>13</sup>	36	127	17. Amount originally invested in the business by the shareholders.
Other accrued liabilities <sup>14</sup>	191	164	18. Earnings retained (i.e., re-invested) in the business.
Current liabilities <sup>15</sup>	\$ 823	\$ 783	19. Liabilities + shareholders' equity = assets.
Long-term debt <sup>16</sup>	631	627	
Shareholders' equity			
Common stock, \$1 par value <sup>17</sup>	421	421	
Additional paid-in capital	361	361	
Retained earnings <sup>18</sup>	1,014	956	
Total shareholders' equity	\$1,796	\$1,738	
Total liabilities and shareholders' equity <sup>19</sup>	\$3,250	\$3,148	

The further an asset is removed from cash, the less liquid it is. Accounts receivable are one step from cash, and inventories are two steps. Accounts receivable represent IOUs from customers, which should convert into cash within a given billing period, usually 30 to 60 days. Inventories are used in the production of a product. The product must first be sold and a receivable generated before it can go the next step and be converted into cash. Because fixed assets, long-term investment, and other long-term assets are the least liquid, they appear last.

### Shareholders' equity

Total assets minus *total liabilities*. Alternatively, the book value of a company's common stock (at par) plus additional paid-in capital and retained earnings.

The bottom panel of the table shows the liabilities and **shareholders' equity** of the company. These items are ordered according to the nearness with which they are likely to be paid. All current liabilities are payable within one year, whereas the long-term debt is payable beyond one year. Shareholders' equity will be "paid" only through regular cash dividends, common stock repurchases, and, perhaps, a final liquidation dividend. Shareholders' equity, or *net worth* as it is sometimes called, consists of several subcategories. *Common stock* (at par) and *additional paid-in capital* together represent the total amount of money paid into the company in exchange for shares of common stock. As we discuss in Chapter 20, a par value is usually assigned to the stock. In this case the par value is \$1 per share, which means that on March 31, 20X2, there were roughly 421,000 shares of common stock outstanding. The additional paid-in capital section represents money paid in excess of par value for shares sold. For example, if the company were to sell an additional share of stock for \$6, there would be a \$1 increase in the common stock section and a \$5 increase in the additional paid-in capital section. *Retained earnings* represent a company's cumulative profits after dividends since the firm's inception: thus these are earnings that have been retained (or reinvested) in the firm.

### Take Note

It is common to hear people say that a company pays dividends "out of retained earnings." Wrong. A company pays dividends out of "cash," while incurring a corresponding reduction in the retained earnings account. Retained earnings are not a pile of cash (or any other asset) but merely an accounting entry used to describe one source of financing for the firm's assets.

We see in the table that total assets equal – or *balance* – total liabilities plus shareholders' equity. Indeed, that is an accounting identity. Also, it follows that assets minus liabilities equal shareholders' equity. For the most part, the liabilities of the firm are known with certainty. Most accounting questions concerning the balance sheet have to do with the numbers attached to the assets. We must remember that the figures are accounting numbers as opposed to estimates of the economic value of the assets. The accounting value of fixed assets (land, buildings, equipment) is based on their actual (historical) costs, not on what they would cost today (the replacement value). Inventories are stated at the lower of cost or market value. The receivable figure implies that all of these receivables will be collected. This may or may not be the case. Often it is necessary to go beyond the reported figures to analyze the financial condition of the firm properly. Depending on the analysis, the shareholders' equity figure shown on the balance sheet, which is a residual amount, may or may not be a reasonable approximation of the true value of the firm to the shareholders.

### Cost of goods sold

Product costs (inventoriable costs) that become period expenses only when the products are sold; equals *beginning inventory* plus *cost of goods purchased* or *manufactured* minus *ending inventory*.

### Income Statement Information

The income (earnings, or profit and loss) statement in Table 6.2 shows Aldine's revenues, expenses, and net profits for the two fiscal years under discussion. The **cost of goods sold** represents the cost of actually producing the products that were sold during the period. Included here are the cost of raw materials, labor costs associated with production, and manufacturing overhead related to products sold. Selling, general, and administrative expenses as

## Ask Alice About Accountants



Dear Alice,

*In light of the Enron debacle, should we believe anything any accountant says from now on?*

*Skeptical in Skokie*

Dear Skeptical,

My fellow Illinoisan, Abe Lincoln, was fond of posing this riddle: “How many legs does a dog have if you call his tail a leg?” His answer was four. He observed that calling a tail a leg doesn’t *make* it a leg! We, the consumers of accounting data, need to keep this type of critical thinking in mind when reading annual reports, audited financial statements, or even our own bookkeeper’s (or dare I say spouse’s) monthly scribblings.

Being a lifelong bean-counter myself, I may be a bit biased, but I think the accounting profession is getting more of a bad rap lately than it perhaps deserves. A few bad apples shouldn’t discourage us from keeping the faith with the vast majority of professionals who have always acted in the public interest as a matter of tradition and pride.

Furthermore, it seems to me that we should *all* take some responsibility for being too easily duped, much and often, on a host of issues including, but certainly not limited to, financial reports.

Cooking the books to pacify or please investors and/or lenders is an age-old practice generally perpetrated by business owners or managers, not accountants. Booking revenue you hope or expect to receive soon, or deferring reporting expenses already incurred (or doing the reverse of one or both) is the first part of the recipe.

Misstating inventories, failing to disclose contingent liabilities such as possible lawsuits or questionable insurance claims, and a host of other practices are often employed to get a firm over a rough patch . . . with every good intention of amending the books at a later point in time.

In a small business, this is a dangerous exercise in self-deception. In a large business, this would be appropriately known as fraud.

The problem with this kind of wishful-thinking accounting is compounded when the professional accountant comes along and quite rightly questions the incorrect statements, and the owner/manager presents a forceful and convincing argument for allowing the misdirection to remain. Since the accountant would seem to be employed by the owner/manager, and the competition for clients is fierce, one can see how these problems and conflicts of interest persist.

Times have changed and accounting has become so much more complex due to technology, government regulation, global commerce and the sheer speed and volume of transactions taking place 24/7 in most businesses. The role of the accountant in the culture also has changed. These factors require that we, you and I, the consumers of this critical product, use our own brains, experience, and plain old-fashioned common sense when interpreting the results of an accountant’s work.

Had the Wall Street analysts done a little more independent thinking and analysis, Enron might not have crashed and burned.

Don’t be afraid to dig into reports that might appear to be perfection personified just because they’re printed in four dazzling colors on expensive parchment. In financial statements as in life, appearances often differ from reality. If you think you see a five-legged dog, persevere and be an ad hoc independent auditor.

Source: Adapted from Alice Magos, “Ask Alice About Accountants.” Retrieved from ([www.toolkit.cch.com/advice/02-256askalice.asp](http://www.toolkit.cch.com/advice/02-256askalice.asp))  
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well as interest expense are shown separately from the cost of goods sold because they are viewed as period expenses rather than product costs.

For a manufacturing company, as in this case, depreciation expense is generally considered one component of the cost of goods manufactured and thus becomes part of the cost of goods sold. For a merchandising firm (wholesaler or retailer), depreciation is generally listed separately as another period expense (like interest expense) *below* the gross profit figure. Depreciation was discussed in Chapter 2, but remember that it is based on historical costs, which in a period of inflation may not correspond with economic costs.

Table 6.2

Aldine Manufacturing Company statements of earnings (in thousands)<sup>1</sup>

	YEARS ENDED MARCH 31		EXPLANATIONS
	20X2	20X1	
Net sales <sup>2</sup>	<u>\$3,992</u>	\$3,721	1. Measures profitability over a period of time.
Cost of goods sold <sup>3</sup>	<u>2,680</u>	<u>2,500</u>	
Gross profit	<u>\$1,312</u>	\$1,221	2. Amount received, or receivable, from customers.
Selling, general, and administrative expenses <sup>4</sup>	<u>912</u>	<u>841</u>	3. Directly related to operating levels: wages, raw materials, supplies, and manufacturing overhead.
Earnings before interest and taxes <sup>5</sup>	<u>\$ 400</u>	\$ 380	
Interest expense <sup>6</sup>	<u>85</u>	<u>70</u>	
Earnings before taxes <sup>7</sup>	<u>\$ 315</u>	\$ 310	4. Salesmen's commissions, advertising, officers' salaries, etc.
Income taxes (federal and state)	<u>114</u>	<u>112</u>	
Earnings after taxes <sup>8</sup>	<u>\$ 201</u>	\$ 198	5. Operating income.
Cash dividends	<u>143</u>	<u>130</u>	6. Cost of borrowed funds.
Increase in retained earnings	<u>\$ 58</u>	<u>\$ 68</u>	7. Taxable income. 8. Amount earned for stockholders.

Note: Depreciation expenses for 20X1 and 20X2 were \$114 and \$112, respectively.

## Take Note

Stock options give the holder the right to buy shares of common stock at a predetermined price on or before a fixed expiration date. Many companies grant them to employees, particularly to senior management, as part of their compensation. If a company awards some of its employees a cash bonus, the company is required to record a compensation expense for the amount of the bonus paid, thereby reducing reported earnings. Historically, however, companies that rewarded employees with stock options did not have a comparable reduction in earnings. Perhaps the sentiment of those in the investment community who complained long and hard about this double-standard is best captured by the following passage from Warren Buffett's 1992 *Chairman's Letter* to Berkshire Hathaway, Inc., shareholders: "It seems to me that the realities of stock options can be summarized quite simply: If options aren't a form of compensation, what are they? If compensation isn't an expense, what is it? And, if expenses shouldn't go into the calculation of earnings, where in the world should they go?"

Finally bowing to public pressure, beginning January 1, 2006, the US Financial Accounting Standards Board (FASB) has required US companies to record stock-options expense using the "fair value method." Under this approach, compensation is measured by the fair value of the stock options on their grant date and is recognized over their vesting period (i.e., time period before employees gain control over their stock options).

Most companies will include stock option expense as part of Selling, General, and Administrative (SG&A) expenses. To estimate the fair value of employee stock options granted, companies use an option-pricing model such as the Black-Scholes model. (The Black-Scholes Option Model is discussed in Chapter 22, Appendix: Option Pricing.)

The actual details pertaining to expensing stock options are contained in the FASB's Statement of Financial Accounting Standards No. 123 (Revised 2004) – SFAS 123R. It sets forth rules for valuing stock options, recognition of expense, accounting for income tax benefits and making the transition to the new method of accounting for stock options. At 295 pages, it is not "light" reading.

## Statement of retained earnings

A financial statement summarizing the changes in retained earnings for a stated period – resulting from earnings (or losses) and dividends paid. This statement is often combined with the income statement.

The last three rows of the income statement shown in Table 6.2 represent a simplified **statement of retained earnings**. Dividends are deducted from earnings after taxes to give the increase in retained earnings. The increase of \$58,000 in fiscal year 20X2 should agree with the balance sheet figures in Table 6.1. At fiscal year end for two consecutive periods, retained earnings were \$956,000 and \$1,014,000, the difference being \$58,000. Therefore, there is agreement between the two balance sheets and the most recent income statement. With this background in mind, we are now ready to examine financial statement analysis.

Ask the Fool



**The Motley Fool**  
To Educate, Amuse & Enrich™

**Q** Can you explain the “accrual” method of recognizing sales?

**A** With pleasure. It’s an important concept to understand because, under this system, the “revenues” on a company’s income statement may not have actually been received by the company.

Revenues, sometimes reported as “sales,” don’t necessarily represent the receipt of cash in a sale. Many firms

“accrue” revenues, booking sales when goods are shipped, when services are rendered, or as a long-term contract proceeds through stages of completion.

Imagine the Beehive Wig Co. (ticker: WHOAA). With the accrual method, if it has shipped off a thousand crates of wigs but hasn’t yet received payment for them, those sales still appear on the income statement. The checks “in the mail” get reported as “accounts receivable” on the balance sheet.

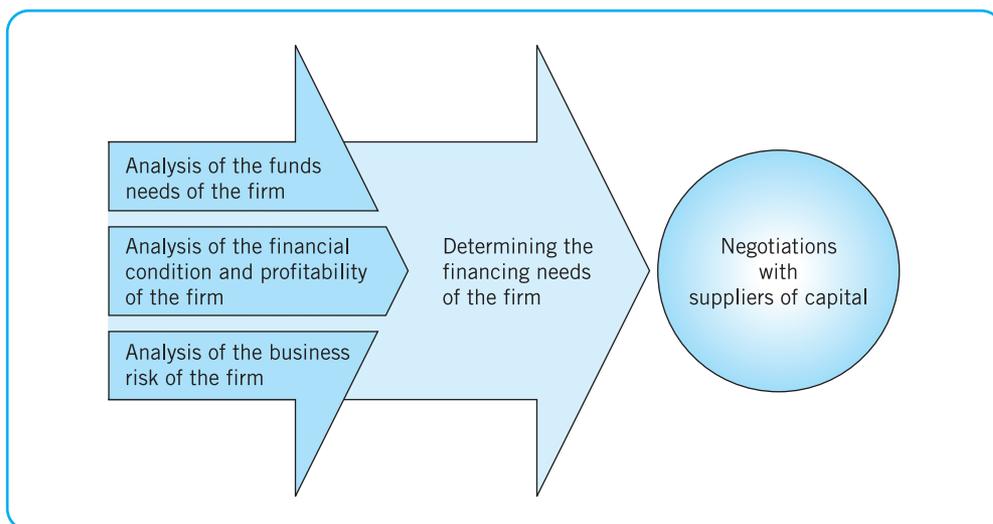
Keep an eye on receivables, to make sure the company isn’t booking as sales that which it cannot collect. Also, make sure it’s not packing sales into this quarter that really belong in the next quarter.

Source: The Motley Fool ([www.fool.com](http://www.fool.com)). Reproduced with the permission of The Motley Fool.

A Possible Framework for Analysis

A number of different approaches might be used in analyzing a firm. Many analysts have a favorite procedure for coming to some generalizations about the firm being analyzed. At the risk of treading on some rather sacred ground, we present a conceptual framework that lends itself to situations in which external financing is contemplated. The factors to be considered are shown in Figure 6.1.

Taking them in order, our concern in the first case is with the trend and seasonal component of a firm’s funds requirements. How much funding will be required in the future, and what is the nature of these needs? Is there a seasonal component to the needs? Analytical tools used to answer these questions include sources and uses of funds statements, statements of cash flow, and cash budgets, all of which are considered in Chapter 7. The tools used to assess the financial condition and performance of the firm are financial ratios, a topic taken



**Figure 6.1**

Framework for financial analysis

up in this chapter. The financial analyst uses these ratios much like a skilled physician uses lab-test results. In combination, and over time, these data offer valuable insight into the health of a firm – its financial condition and profitability. Completing our first set of three factors is an analysis of the business risk of the firm. *Business risk* relates to the risk inherent in the operations of the firm. Some companies are in highly volatile lines of business and/or may be operating close to their break-even point. Other companies are in very stable lines of business and/or find themselves operating far from their break-even point. A machine tool company might fall in the first category, whereas a profitable electric utility would probably fall in the latter. The analyst needs to estimate the degree of business risk of the firm being analyzed.

All three of these factors should be used in determining the financial needs of the firm. Moreover, they should be considered jointly. The greater the funds requirements, of course, the greater the total financing that will be necessary. The nature of the needs for funds influences the type of financing that should be used. If there is a seasonal component to the business, this component lends itself to short-term financing, bank loans in particular. The firm's level of business risk also strongly affects the type of financing that should be used. The greater the business risk, the less desirable debt financing usually becomes relative to common stock financing. In other words, equity financing is safer in that there is no contractual obligation to pay interest and principal, as there is with debt. A firm with a high degree of business risk is generally ill advised to take on considerable financial risk as well.<sup>1</sup> The financial condition and performance of the firm also influence the type of financing that should be used. The greater the firm's liquidity, the stronger the overall financial condition; and the greater the profitability of the firm, the more risky the type of financing that can be incurred. That is, debt financing becomes more attractive with improvements in liquidity, financial condition, and profitability. The circled item in Figure 6.1 indicates that it is not sufficient to determine the best financing plan from the viewpoint of the firm and simply assume that it can be achieved. The plan needs to be sold to outside suppliers of capital. The firm may determine that it needs \$1 million in short-term financing, but lenders may not go along with either the amount or the type of financing requested by management. In the end, the firm may have to compromise its plan to meet the realities of the marketplace. The interaction of the firm with these suppliers of capital determines the amount, terms, and price of financing. These negotiations are often not too far removed from the type of haggling one may witness in an oriental bazaar – although usually at a lower decibel level. In any event, the fact that the firm must negotiate with outside suppliers of capital serves as a feedback mechanism to the other factors in Figure 6.1. Analysis cannot be undertaken in isolation from the fact that ultimately an appeal will have to be made to suppliers of capital. Similarly, suppliers of capital must keep an open mind to a company's approach to financing, even if it is different from their own.

As we have just seen, there are a number of facets to financial analysis. Presumably, analysis will be in relation to some structural framework similar to that presented here. Otherwise, the analysis is likely to be loose and not lend itself to answering the questions for which it was intended. As we shall see, an integral part of financial analysis is the analysis of financial ratios – a topic that fills most of the remainder of this chapter.

**Financial ratio** An index that relates two accounting numbers and is obtained by dividing one number by the other.

### ● ● ● Use of Financial Ratios

To evaluate a firm's financial condition and performance, the financial analyst needs to perform "checkups" on various aspects of a firm's financial health. A tool frequently used during these checkups is a **financial ratio**, or index, which relates two pieces of financial data by dividing one quantity by the other.

<sup>1</sup>In Chapter 16 we discuss business risk in some detail, especially as it relates to the firm's willingness to take on financial risk.

Why bother with a ratio? Why not simply look at the raw numbers themselves? We calculate ratios because in this way we get a *comparison* that may prove more useful than the raw numbers by themselves. For example, suppose that a firm had a net profit figure this year of \$1 million. That looks pretty profitable. But what if the firm has \$200 million invested in total assets? Dividing net profit by total assets, we get  $\$1\text{M}/\$200\text{M} = 0.005$ , the firm's return on total assets. The 0.005 figure means that each dollar of assets invested in the firm earned a one-half percent return. A savings account provides a better return on investment than this, and with less risk. In this example, the ratio proved quite informative. But be careful. You need to be cautious in your choice and interpretation of ratios. Take *inventory* and divide it by *additional paid-in capital*. You have a ratio, but we challenge you to come up with any meaningful interpretation of the resulting figure.

**Internal Comparisons.** The analysis of financial ratios involves two types of comparison. First, the analyst can compare a present ratio with past and expected future ratios for the same company. The current ratio (the ratio of current assets to current liabilities) for the present year could be compared with the current ratio for the previous year end. When financial ratios are arrayed over a period of years (on a spreadsheet, perhaps), the analyst can study the composition of change and determine whether there has been an improvement or deterioration in the firm's financial condition and performance over time. In short, we are concerned not so much with one ratio at one point in time, but rather with that ratio over time. Financial ratios can also be computed for projected, or pro forma, statements and compared with present and past ratios.

**External Comparisons and Sources of Industry Ratios.** The second method of comparison involves comparing the ratios of one firm with those of similar firms or with industry averages at the same point in time. Such a comparison gives insight into the *relative* financial condition and performance of the firm. It also helps us identify any significant deviations from any applicable industry average (or standard). Financial ratios are published for various industries by The Risk Management Association, Dun & Bradstreet, Prentice Hall (*Almanac of Business and Industrial Financial Ratios*), the Federal Trade Commission/the Securities and Exchange Commission, and by various credit agencies and trade associations.<sup>2</sup> Industry-average ratios should not, however, be treated as targets or goals. Rather, they provide general guidelines.

The analyst should also avoid using "rules of thumb" indiscriminately for all industries. The criterion that all companies have at least a 1.5 to 1 current ratio is inappropriate. The analysis must be in relation to the type of business in which the firm is engaged and to the firm itself. The true test of liquidity is whether a company has the ability to pay its bills on time. Many sound companies, including electric utilities, have this ability despite current ratios substantially below 1.5 to 1. It depends on the nature of the business. Failure to consider the nature of the business (and the firm) may lead one to misinterpret ratios. We might end up with a situation similar to one in which a student with a 3.5 grade point average from Ralph's Home Correspondence School of Cosmetology is perceived as being a better scholar than a student with a 3.4 grade point average from Harvard Law School just because one index

<sup>2</sup>The Risk Management Association (formerly Robert Morris Associates), an association of financial services providers, publishes industry averages based on financial statements supplied to banks by borrowers. Sixteen ratios are computed annually for over 640 industries. In addition, each industry is divided into asset-size and sales-volume categories. Dun & Bradstreet annually calculates 14 important ratios for more than 800 industries. The *Almanac of Business and Industrial Financial Ratios* (Upper Saddle River, NJ: Prentice Hall, annual) shows industry averages for some 22 financial ratios. Approximately 180 businesses and industries are listed, covering the complete spectrum. The data for this publication come from United States corporate tax filings with the Internal Revenue Service. The *Quarterly Financial Report for Manufacturing Corporations* is published jointly by the Federal Trade Commission and the Securities and Exchange Commission. This publication contains balance sheet and income statement information by industry groupings and by asset-size categories.

number is higher than the other. Only by comparing the financial ratios of one firm with those of similar firms can one make a realistic judgment.

To the extent possible, accounting data from different companies should be standardized (i.e., adjusted to achieve comparability).<sup>3</sup> Apples cannot be compared with oranges. Even with standardized figures, the analyst should use caution in interpreting the comparisons.

### ● ● ● Types of Ratios

The commonly used financial ratios are of essentially two kinds. The first kind summarizes some aspect of the firm's "financial condition" at a point in time – the point at which a balance sheet has been prepared. We call these *balance sheet ratios*, quite appropriately, because both the numerator and denominator in each ratio come directly from the balance sheet. The second kind of ratio summarizes some aspect of a firm's performance over a period of time, usually a year. These ratios are called either *income statement* or *income statement/balance sheet ratios*. Income statement ratios compare one "flow" item from the income statement with another flow item from the income statement. Income statement/balance sheet ratios compare a flow (income statement) item in the numerator with a "stock" (balance sheet) item in the denominator. Comparing a flow item with a stock item poses a potential problem for the analyst. We run the risk of a possible mismatch of variables. The stock item, being a snapshot taken from the balance sheet, may not be representative of how this variable looked over the period during which the flow occurred. (Would a photograph of you taken at midnight on New Year's Eve be representative of how you look, on average?) Therefore, where appropriate, we may need to use an "average" balance sheet figure in the denominator of an income statement/balance sheet ratio to make the denominator more representative of the entire period. (We will have more to say on this later.)

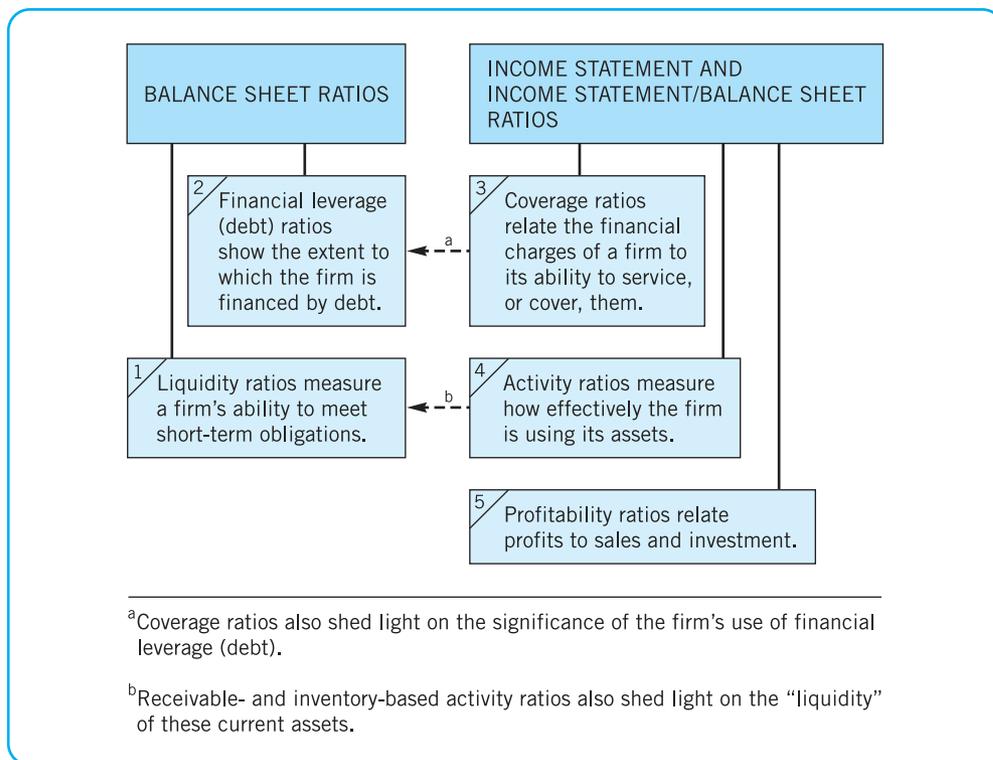
#### TIP • TIP

Benchmarking – measuring a company's operations and performance against those of world-class firms – can be applied to ratio analysis. Therefore, in addition to comparing a firm's ratios to industry averages over time, you may also want to compare the firm's ratios to those of a "benchmark," or world-class, competitor in the firm's industry.

Additionally, we can further subdivide our financial ratios into five distinct types: liquidity, financial leverage (or debt), coverage, activity, and profitability ratios. (See Figure 6.2.) No one ratio gives us sufficient information by which to judge the financial condition and performance of the firm. Only when we analyze a group of ratios are we able to make reasonable judgments. We must be sure to take into account any seasonal character of a business. Underlying trends may be assessed only through a comparison of raw figures and ratios at the same time of year. We should not compare a December 31 balance sheet with a May 31 balance sheet but rather compare December 31 with December 31.

Although the number of financial ratios that might be compared increases geometrically with the amount of financial data, only the more important ratios are considered in this chapter. Actually, the ratios needed to assess the financial condition and performance of a company are relatively few.

<sup>3</sup>Firms, even within the same industry, may apply different accounting procedures, thus contributing to a confusion between perceived and real differences among firms. For example, one firm may use FIFO inventory valuation, while another firm uses LIFO, and still a third firm uses average cost.



**Figure 6.2**

Types of ratios

## Balance Sheet Ratios

### ● ● ● Liquidity Ratios

**Liquidity ratios** Ratios that measure a firm's ability to meet short-term obligations.

**Liquidity ratios** are used to measure a firm's ability to meet short-term obligations. They compare short-term obligations with short-term (or current) resources available to meet these obligations. From these ratios, much insight can be obtained into the present cash solvency of the firm and the firm's ability to remain solvent in the event of adversity.

**Current ratio** Current assets divided by current liabilities. It shows a firm's ability to cover its current liabilities with its current assets.

**Current Ratio.** One of the most general and frequently used of these liquidity ratios is the **current ratio**:

$$\frac{\text{Current assets}}{\text{Current liabilities}} \tag{6.1}$$

For Aldine Manufacturing Company, this ratio for year-end 20X2 is

$$\frac{\$2,241,000}{\$823,000} = 2.72$$

Aldine is engaged in making household electrical appliances. Its current ratio is somewhat above the median ratio for the industry of 2.1. (The median – or middle value – for the industry is taken from the Risk Management Association, *Statement Studies*.<sup>4</sup>) Although comparisons with industry averages do not always reveal financial strength or weakness, they are meaningful in identifying companies that are out of line. Where a significant deviation occurs, the analyst will want to determine the reasons. Perhaps the industry itself is overly liquid, and the

<sup>4</sup>The use of a median average eliminates the influence that extreme values from "unusual" statements would have on a simple arithmetic average.

## Window Dressing: Taking steps, just before financial statements are prepared, to create a more favorable-looking situation than really exists

To illustrate, assume that it is March 30, the auditors are soon to arrive, we hope to make a short-term loan next week, and the bank will be very concerned with our current position as a sign of our short-term solvency.

We could postpone some purchases and use available cash (or sell marketable securities) to pay some current creditors. The current and quick ratios might thus be temporarily improved.

Let's see how Aldine Manufacturing Company might have tried this gambit. Assume, on March 30, 20X2, we find:

<u>Current Assets</u>	<u>Current Liabilities</u>	<u>Current Ratio</u>
\$2,918,000	\$1,500,000	1.95

If we pay off \$677,000 worth of accounts payable from cash and marketable securities, we get

\$2,241,000	\$823,000	2.72
-------------	-----------	------

The current ratio has shown a healthy improvement. However, if we go back to business as usual, has our

liquidity position really been improved by this one-time early payment to creditors?

It should be noted that year-end financial statements may paint a more rosy financial-condition picture than those at any other time in the year, even when no deliberate steps have been taken to artificially enhance financial position. For example, a firm that has adopted a fiscal year ending in a seasonal low point (Red flag: note Aldine's March 31 fiscal-year closing date) may have done so not to deceive but to make inventory counting easier. However, cash may also be at a yearly high in anticipation of inventory purchases while accounts payable may be at a yearly low; the result may be higher than normal current and quick ratios.

Therefore, as a manager you may want to look at an average of monthly or quarterly liquidity ratios. This would give you a feel for the firm's *average* liquidity position. The idea here is that even if others who look at your annual data get fooled – don't fool yourself.

company being examined is basically sound despite a lower current ratio. In another situation, the company being analyzed may be too liquid, relative to the industry, with the result that it forgoes additional profitability. Whenever a financial “red flag” is raised, the analyst must search out the reasons behind it.

Supposedly, the higher the current ratio, the greater the ability of the firm to pay its bills; however, this ratio must be regarded as a crude measure because it does not take into account the **liquidity** of the individual components of the current assets. A firm having current assets composed principally of cash and nonoverdue receivables is generally regarded as more liquid than a firm whose current assets consist primarily of inventories.<sup>5</sup> Consequently, we turn to a more critical, or severe, test of the firm's liquidity – the acid-test ratio.

**Acid-Test (or Quick) Ratio.** A more conservative measure of liquidity is the **acid-test**, or **quick, ratio**:

$$\frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}} \quad (6.2)$$

For Aldine, this ratio for 20X2 year end is

$$\frac{\$2,241,000 - \$1,329,000}{\$823,000} = 1.11$$

This ratio serves as a supplement to the current ratio in analyzing liquidity. This ratio is the same as the current ratio except that it excludes inventories – presumably the least liquid portion of current assets – from the numerator. The ratio concentrates primarily on the more

<sup>5</sup>*Liquidity* has two dimensions: (1) the time required to convert the asset into cash, and (2) the certainty of the price realized. Even if the price realized on receivables were as predictable as that realized on inventories, receivables would be a more liquid asset than inventories, owing to the shorter time required to convert the asset into cash. If the price realized on receivables were more certain than that on inventories, receivables would be regarded as being even more liquid.

**Liquidity** The ability of an asset to be converted into cash without a significant price concession.

**Acid-test (quick) ratio** Current assets less inventories divided by current liabilities. It shows a firm's ability to meet current liabilities with its most liquid (quick) assets.

liquid current assets – cash, marketable securities, and receivables – in relation to current obligations. Thus this ratio provides a more penetrating measure of liquidity than does the current ratio. Aldine’s acid-test ratio is slightly above the industry median average of 1.1, indicating that it is in line with the industry.

**Summary of Aldine’s Liquidity (So Far).** Comparisons of Aldine’s current and acid-test ratios with medians for the industry are favorable. However, these ratios don’t tell us whether accounts receivable and/or inventory might actually be too high. If they are, this should affect our initial favorable impression of the firm’s liquidity. Thus we need to go behind the ratios and examine the size, composition, and quality of these two important current assets. We will look more closely at accounts receivable and inventory when we discuss activity ratios. We will reserve a final opinion on liquidity until then.

### ● ● ● Financial Leverage (Debt) Ratios

**Debt ratios** Ratios that show the extent to which the firm is financed by debt.

**Debt-to-Equity Ratio.** To assess the extent to which the firm is using borrowed money, we may use several different **debt ratios**. The *debt-to-equity ratio* is computed by simply dividing the total debt of the firm (including current liabilities) by its shareholders’ equity:

$$\frac{\text{Total debt}}{\text{Shareholders' equity}} \quad (6.3)$$

For Aldine, at year-end 20X2 this ratio is

$$\frac{\$1,454,000}{\$1,796,000} = 0.81$$

The ratio tells us that creditors are providing 81 cents of financing for each \$1 being provided by shareholders. Creditors would generally like this ratio to be low. The lower the ratio, the higher the level of the firm’s financing that is being provided by shareholders, and the larger the creditor cushion (margin of protection) in the event of shrinking asset values or outright losses. The median debt-to-equity ratio for the electrical appliance industry is 0.80, so Aldine is right in line with the industry. Presumably, it would not experience difficulty with creditors because of an excessive debt ratio.

Depending on the purpose for which the ratio is used, preferred stock is sometimes included as debt rather than as equity when debt ratios are calculated. Preferred stock represents a prior claim from the standpoint of the investors in common stock; consequently, investors might include preferred stock as debt when analyzing a firm. The ratio of debt to equity will vary according to the nature of the business and the variability of cash flows. An electric utility, with very stable cash flows, will usually have a higher debt-to-equity ratio than will a machine tool company, whose cash flows are far less stable. A comparison of the debt-to-equity ratio for a given company with those of similar firms gives us a general indication of the creditworthiness and financial risk of the firm.

**Debt-to-Total-Assets Ratio.** The *debt-to-total-assets ratio* is derived by dividing a firm’s total debt by its total assets:

$$\frac{\text{Total debt}}{\text{Total assets}} \quad (6.4)$$

For Aldine, at the end of 20X2 this ratio is

$$\frac{\$1,454,000}{\$3,250,000} = 0.45$$

This ratio serves a similar purpose to the debt-to-equity ratio. It highlights the relative importance of debt financing to the firm by showing the percentage of the firm’s assets that is supported by debt financing. Thus 45 percent of the firm’s assets are financed with debt

(of various types), and the remaining 55 percent of the financing comes from shareholders' equity. Theoretically, if the firm were liquidated right now, assets could be sold to net as little as 45 cents on the dollar before creditors would face a loss. Once again, this points out that the greater the percentage of financing provided by shareholders' equity, the larger the cushion of protection afforded the firm's creditors. In short, the higher the debt-to-total-assets ratio, the greater the financial risk; the lower this ratio, the lower the financial risk.

In addition to the two previous debt ratios, we may wish to compute the following ratio, which deals with only the long-term capitalization of the firm:

$$\frac{\text{Long-term debt}}{\text{Total capitalization}} \quad (6.5)$$

where *total capitalization* represents all long-term debt and shareholders' equity. For Aldine, the most recent year-end *long-term-debt-to-total-capitalization ratio* is

$$\frac{\$631,000}{\$2,427,000} = 0.26$$

This measure tells us the relative importance of long-term debt to the capital structure (long-term financing) of the firm. Again, this ratio is in line with the median ratio of 0.24 for the industry. The debt ratios just computed have been based on accounting, book value, figures; it is sometimes useful to calculate these ratios using market values. In summary, debt ratios tell us the relative proportions of capital contribution by creditors and by owners.

## Income Statement and Income Statement/Balance Sheet Ratios

We now turn our attention to three new types of ratio – coverage, activity, and profitability ratios – that are derived from either income statement or income statement/balance sheet data. The significance is that we are no longer talking about just stock (balance sheet) relationships. Now, each ratio relates a flow (income statement) item to another flow item or a mixture of a flow to a stock item. (And, to compare a flow with a stock item correctly, we may need to make some minor adjustments.)

### ● ● ● Coverage Ratios

#### Coverage ratios

Ratios that relate the financial charges of a firm to its ability to service, or cover, them.

#### Interest coverage ratio

Earnings before interest and taxes divided by interest charges. It indicates a firm's ability to cover interest charges. It is also called *times interest earned*.

**Coverage ratios** are designed to relate the financial charges of a firm to its ability to service, or cover, them. Bond rating services, such as Moody's Investors Service and Standard & Poor's, make extensive use of these ratios. One of the most traditional of the coverage ratios is the **interest coverage ratio**, or *times interest earned*. This ratio is simply the ratio of earnings before interest and taxes for a particular reporting period to the amount of interest charges for the period; that is,

$$\frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest expense}} \quad (6.6)$$

For Aldine, in fiscal-year 20X2 this ratio is

$$\frac{\$400,000}{\$85,000} = 4.71$$

This ratio serves as one measure of the firm's ability to meet its interest payments and thus avoid bankruptcy. In general, the higher the ratio, the greater the likelihood that the company could cover its interest payments without difficulty. It also sheds some light on the firm's capacity to take on new debt. With an industry median average of 4.0, Aldine's ability to cover annual interest 4.71 times with operating income (EBIT) appears to provide a good margin of safety.

A broader type of analysis would evaluate the ability of the firm to cover all charges of a fixed nature. In addition to interest payments, we could include principal payments on debt obligations, preferred stock dividends, lease payments, and possibly even certain essential capital expenditures. As we will see in Chapter 16, an analysis of this type is a far more realistic gauge than a simple interest coverage ratio in determining whether a firm has the ability to meet its long-term obligations.

In assessing the financial risk of a firm, then, the financial analyst should first compute debt ratios as a rough measure of financial risk. Depending on the payment schedule of the debt and the average interest rate, debt ratios may or may not give an accurate picture of the firm's ability to meet its financial obligations. Therefore we augment debt ratios with an analysis of coverage ratios. Additionally, we realize that interest and principal payments are not really met out of earnings per se, but out of cash. Therefore it is also necessary to analyze the cash-flow ability of the firm to service debt (and other financial charges as well). The topics addressed in the following chapter, as well as Chapter 16, will aid us in that task.

### ● ● ● Activity Ratios

**Activity ratios** Ratios that measure how effectively the firm is using its assets.

**Activity ratios**, also known as *efficiency* or *turnover ratios*, measure how effectively the firm is using its assets. As we will see, some aspects of activity analysis are closely related to liquidity analysis. In this section, we will focus our attention primarily on how effectively the firm is managing two specific asset groups – receivables and inventories – and its total assets in general.

In computing activity ratios for the Aldine Company, we will use year-end asset levels from the balance sheet. However, an average of monthly, quarterly, or beginning and year-end asset levels is often employed with these income statement/balance sheet ratios. As we mentioned earlier in the chapter, the use of an average balance sheet figure is an attempt to better match the income statement flow item with a balance sheet stock figure more representative of the *entire* period, not just year end.

**Receivables Activity.** The *receivable turnover (RT) ratio* provides insight into the quality of the firm's receivables and how successful the firm is in its collections. This ratio is calculated by dividing receivables into annual net credit sales:

$$\frac{\text{Annual net credit sales}}{\text{Receivables}} \quad (6.7)$$

If we assume that all 20X2 sales for Aldine are credit sales, this ratio is

$$\frac{\$3,992,000}{\$678,000} = 5.89$$

This ratio tells us the number of times accounts receivable have been turned over (turned into cash) during the year. The higher the turnover, the shorter the time between the typical sale and cash collection. For Aldine, receivables turned over 5.89 times during 20X2.

When credit sales figures for a period are not available, we must resort to using total sales figures. When sales are seasonal or have grown considerably over the year, using the year-end receivable balance may not be appropriate. With seasonality, an average of the monthly closing balances may be the most appropriate to use. With growth, the receivable balance at the end of the year will be deceptively high in relation to sales. The result is that the receivable turnover calculated is a biased and low estimate of the number of times receivables turned over during the course of the year. In this case, an average of receivables at the beginning and end of the year might be appropriate if the growth in sales was steady throughout the year.

The median industry receivable turnover ratio is 8.1, which tells us that Aldine's receivables are considerably slower in turning over than is typical for the industry. This might be an indication of a lax collection policy and a number of past-due accounts still on the books.

In addition, if receivables are far from being current, we may have to reassess the firm's liquidity. To regard all receivables as liquid, when in fact a sizable portion may be past due, overstates the liquidity of the firm being analyzed. Receivables are liquid only insofar as they can be collected in a reasonable amount of time. In an attempt to determine whether there is cause for concern, the analyst may reformulate the receivable turnover ratio to produce receivable turnover in days (RTD), or average collection period.

*Receivable turnover in days (RTD), or average collection period, is calculated as*

$$\frac{\text{Days in the year}}{\text{Receivable turnover}} \quad (6.8)$$

or equivalently

$$\frac{\text{Receivables} \times \text{Days in the year}}{\text{Annual credit sales}} \quad (6.9)$$

For Aldine, whose receivable turnover we calculated to be 5.89, the average collection period is

$$\frac{365}{5.89} = \mathbf{62 \text{ days}}$$

This figure tells us the average number of days for which receivables are outstanding before being collected. Since the median industry receivable turnover ratio is 8.1, the average collection period for the industry is  $365/8.1 = 45$  days. The disparity between the industry's receivable collection performance and Aldine's is once again highlighted.

However, before concluding that a collections problem exists, we should check the credit terms offered by Aldine to its customers. If the average collection period is 62 days and the credit terms are "2/10, net 30,"<sup>6</sup> a sizable proportion of the receivables are past the final due date of 30 days. On the other hand, if the terms are "net 60," the typical receivable is being collected only two days after the final due date.

Although too high an average collection period is usually bad, a very low average collection period may not necessarily be good. A very low average collection period may be a symptom of a credit policy that is excessively restrictive. The few receivables on the books may be of prime quality, yet sales may be curtailed unduly – and profits less than they might be – because of the restrictive issuance of credit to customers. In this situation, perhaps credit standards used to determine an acceptable credit account should be relaxed somewhat.

**Aging Accounts Receivable.** Another means by which we can obtain insight into the liquidity of receivables and management's ability to enforce its credit policy is through **aging accounts receivable**. With this method we categorize the receivables on a given date according to the percentages billed in previous months. We might have the following hypothetical aging schedule of accounts receivable at December 31:

**Aging schedule for accounts receivable as of December 31**

MONTH OF CREDIT SALE	DEC	NOV	OCT	SEPT	AUG AND BEFORE	TOTAL
MONTHS PAST DUE	CURRENT	0–1	1–2	2–3	3 OR MORE	
Percent of total accounts receivable balance outstanding	67	19	7	2	5	100

If the credit terms are "2/10, net 30," this aging schedule tells us that 67 percent of the receivables outstanding at December 31 are current, 19 percent are up to one month past due,

<sup>6</sup>The notation means that the supplier gives a 2 percent discount if the receivable invoice is paid within 10 days and total payment is due within 30 days if the discount is not taken.

**Aging accounts receivable**

The process of classifying accounts receivable by their age outstanding as of a given date.

7 percent are one to two months past due, and so on. Depending on the conclusions drawn from our analysis of the aging schedule, we may want to examine more closely the company's credit and collection policies. In this example, we might be prompted to investigate the individual receivables that were billed in August and before to determine whether any should be charged off as bad debts. The receivables shown on the books are only as good as the likelihood that they will be collected. An aging of accounts receivable gives us considerably more information than does the calculation of the average collection period, because it pinpoints the trouble spots more specifically.

**Payables Activity.** There may be occasions when a firm wants to study its own promptness of payment to suppliers or that of a potential credit customer. In such cases, it may be desirable to obtain an *aging of accounts payable*, much like that just illustrated for accounts receivable. This method of analysis, combined with the less exact *payable turnover (PT) ratio* (annual credit purchases divided by accounts payable), allows us to analyze payables in much the same manner as we analyze receivables. Also, we can compute the *payable turnover in days (PTD)* or *average payable period* as

$$\frac{\text{Days in the year}}{\text{Payable turnover}} \quad (6.10)$$

or, equivalently,

$$\frac{\text{Accounts payable} \times \text{Days in the year}}{\text{Annual credit purchases}} \quad (6.11)$$

where accounts payable is the ending (or perhaps, average) balance outstanding for the year and annual credit purchases are the external purchases during the year. This figure yields the average age of a firm's accounts payable.

### Take Note

When information on purchases is not available, one can occasionally use instead the “cost of goods sold plus (minus) any increase (decrease) in inventory” in determining these ratios. A department store chain, for example, typically does no manufacturing. As a result, the “cost of goods sold plus the change in inventory” consists primarily of purchases.<sup>7</sup> However, in situations where sizable value is added, as with a manufacturer, the “cost of goods sold plus the change in inventory” is an inappropriate proxy for purchases. One must have the actual dollar amount of purchases if the ratio is to be used. Another caveat relates to growth. As with receivables, the use of a year-end payable balance will result in a biased and high estimate of the time it will take a company to make payment on its payables if there is strong underlying growth. In this situation, it may be better to use an average of payables at the beginning and end of the year.

The average payable period is valuable information in evaluating the probability that a credit applicant will pay on time. If the average age of payables is 48 days and the terms in the industry are “net 30,” we know that a portion of the applicant's payables is not being paid on time. A credit check of the applicant's other suppliers will give insight into the severity of the problem.

<sup>7</sup>Typically, for a retail firm we have

$$(\text{Beginning inventory}) + (\text{Purchases}) - (\text{Cost of goods sold}) = \text{Ending inventory}$$

Therefore

$$(\text{Cost of goods sold}) + [(\text{Ending inventory}) - (\text{Beginning inventory})] = \text{Purchases}$$

**Inventory Activity.** To help determine how effectively the firm is managing inventory (and also to gain an indication of the liquidity of inventory), we compute the *inventory turnover (IT) ratio*:

$$\frac{\text{Cost of goods sold}}{\text{Inventory}} \quad (6.12)$$

For Aldine, this ratio for 20X2 is

$$\frac{\$2,680,000}{\$1,329,000} = 2.02$$

The figure for cost of goods sold used in the numerator is for the period being studied – usually a year; the inventory figure used in the denominator, though a year-end figure in our example, might represent an average value. For a situation involving simple growth, an average of beginning and ending inventories for the period might be used. As is true with receivables, however, it may be necessary to compute a more sophisticated average when there is a strong seasonal element. The inventory turnover ratio tells us how many times inventory is turned over into receivables through sales during the year. This ratio, like other ratios, must be judged in relation to past and expected future ratios of the firm and in relation to ratios of similar firms, the industry average, or both.

Generally, the higher the inventory turnover, the more efficient the inventory management of the firm and the “fresher,” more liquid, the inventory. However, sometimes a high inventory turnover indicates a hand-to-mouth existence. It therefore might actually be a symptom of maintaining too low a level of inventory and incurring frequent **stockouts**. Relatively low inventory turnover is often a sign of excessive, slow-moving, or obsolete items in inventory. Obsolete items may require substantial write-downs, which, in turn, would tend to negate the treatment of at least a portion of the inventory as a liquid asset. Because the inventory turnover ratio is a somewhat crude measure, we would want to investigate further any perceived inefficiency in inventory management. In this regard, it is helpful to compute the turnover of the major categories of inventory to see whether there are imbalances, which may indicate excessive investment in specific components of the inventory.

Aldine’s inventory turnover of 2.02 is in marked contrast to an industry median turnover ratio of 3.3. This unfavorable comparison suggests that the company is less efficient in inventory management than is average for the industry, and that Aldine holds excessive inventory stock. A question also arises as to whether the inventory on the books is worth its stated value. If not, the liquidity of the firm is less than the current ratio or quick ratio alone suggests. Once we have a hint of an inventory problem, we must investigate it more specifically to determine its cause.

An alternative measure of inventory activity is *inventory turnover in days (ITD)*:

$$\frac{\text{Days in the year}}{\text{Inventory turnover}} \quad (6.13)$$

or, equivalently,

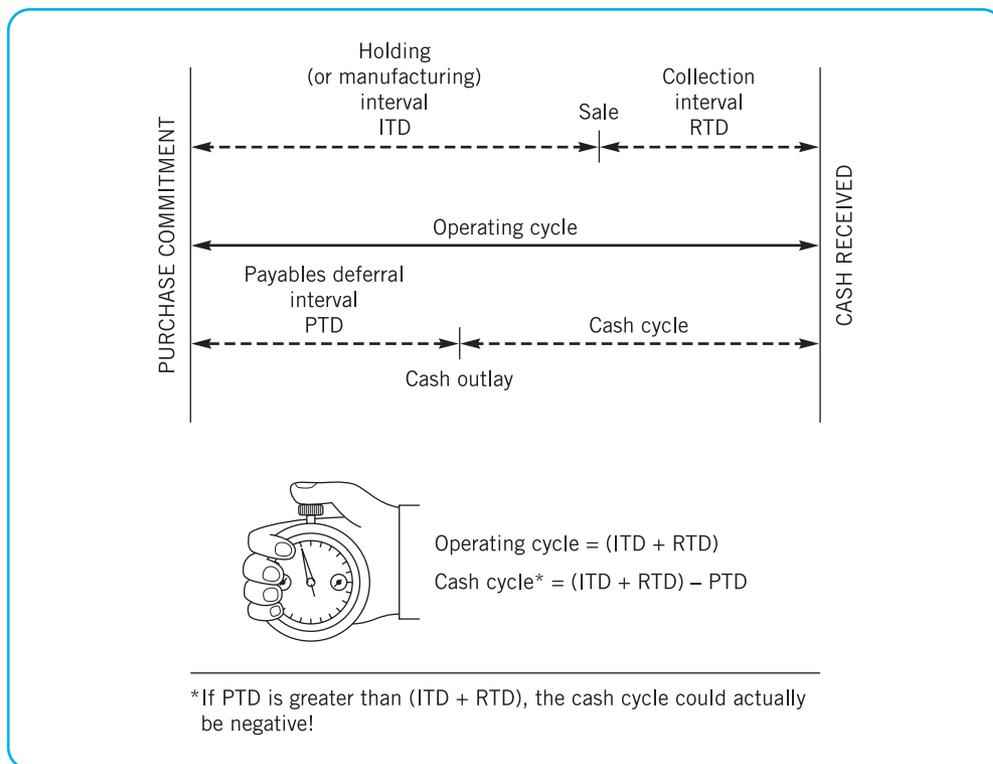
$$\frac{\text{Inventory} \times \text{Days in the year}}{\text{Cost of goods sold}} \quad (6.14)$$

For Aldine, whose inventory turnover we calculated to be 2.02, the inventory turnover in days (ITD) is

$$\frac{365}{2.02} = 181 \text{ days}$$

This figure tells us how many days, on average, before inventory is turned into accounts receivable through sales. Transforming the industry’s median inventory turnover of 3.3 into an inventory turnover in days figure, we get  $365/3.3 = 111$  days. Thus Aldine is, on average, 70 days slower in “turning” its inventory than is typical for the industry.

**Stockout** Not having enough items in inventory to fill an order.



**Figure 6.3**  
Operating cycle versus cash cycle

**Operating cycle** The length of time from the *commitment* of cash for purchases until the collection of receivables resulting from the sale of goods or services.

**Operating Cycle versus Cash Cycle.** A direct result of our interest in both liquidity and activity ratios is the concept of a firm’s **operating cycle**. A firm’s operating cycle is the length of time from the *commitment* of cash for purchases until the collection of receivables resulting from the sale of goods or services. It is as if we start a stopwatch when we purchase raw materials and stop the watch only when we receive cash after the finished goods have been sold. The time appearing on our watch (usually in days) is the firm’s operating cycle. Mathematically, a firm’s *operating cycle* is equal to

$$\frac{\text{Inventory turnover}}{\text{in days (ITD)}} + \frac{\text{Receivable turnover}}{\text{in days (RTD)}} \tag{6.15}$$

We stress the fact that our stopwatch starts at the *commitment* of cash for purchases rather than from the actual cash outlay itself. The reason for this subtle distinction is that most firms do not pay for raw materials immediately but rather buy on credit and incur an account payable. However, if we want to measure the length of time from the actual outlay of cash for purchases until the collection of cash resulting from sales, it is a simple matter. We would subtract the firm’s payable turnover in days (PTD) from its operating cycle and thus produce the firm’s **cash cycle**:

**Cash cycle** The length of time from the *actual outlay* of cash for purchases until the collection of receivables resulting from the sale of goods or services; also called *cash conversion cycle*.

$$\frac{\text{Operating cycle}}{(\text{ITD} + \text{RTD})} - \frac{\text{Payable turnover}}{\text{in days (PTD)}} \tag{6.16}$$

Figure 6.3 illustrates the operating cycle and cash cycle for the firm – and highlights their differences.<sup>8</sup>

Why even worry about the firm’s operating cycle? The length of the operating cycle is an important factor in determining a firm’s current asset needs. A firm with a very short operating cycle can operate effectively with a relatively small amount of current assets and relatively

<sup>8</sup>For more information on the firm’s operating and cash cycles, see Verlyn D. Richards and Eugene J. Laughlin, “A Cash Conversion Cycle Approach to Liquidity Analysis.” *Financial Management* 9 (Spring 1980), 32–38.

low current and acid-test ratios. This firm is relatively liquid in a “dynamic” sense – it can produce a product, sell it, and collect cash for it, all in a relatively short period of time. It does not have to rely so heavily on high “static” levels of liquidity as measured by the current or acid-test ratio. This is very similar to judging the “liquidity” of a garden hose. This liquidity depends not only on the “static” amount of water in the hose at any one time but also the velocity with which the water moves through the hose.

The operating cycle, by focusing on ITD and RTD, provides a summary activity measure. For example, a relatively short operating cycle generally indicates effectively managed receivables and inventory. But, as we have just discussed, this measure provides supplementary information on a firm’s liquidity as well. A relatively short operating cycle would thus also reflect favorably on a firm’s liquidity. In contrast, a relatively long operating cycle might be a warning sign of excessive receivables and/or inventory, and would reflect negatively on the firm’s true liquidity.

Comparing Aldine’s operating cycle with that of the median industry average, we have:

	<u>Aldine</u>	<u>Median Industry Average</u>
Operating cycle	<b>243 days</b>	<b>156 days</b>

The cumulative effect of both a sluggish inventory turnover and receivable turnover for Aldine is clearly apparent; relative to the typical firm in the industry, it takes Aldine an extra 87 days to manufacture a product, sell it, and collect cash from sales. The length of the firm’s operating cycle should also cause us to have second thoughts about the firm’s liquidity.

We have not said very much, so far, about the firm’s cash cycle. One reason is that one must be extremely careful in trying to analyze this measure. On the surface, it would seem that a relatively short cash cycle would be a sign of good management. Such a firm is quick to collect cash from sales once it pays for purchases. The catch is that this measure reflects both operating and financing decisions of the firm, and mismanagement in one or both of these decision areas might be overlooked. For example, one way to arrive at a short cash cycle is simply never to pay your bills on time (a poor financing decision). Your payable turnover in days figure will become large, and subtracted from your operating cycle, it will produce a low (perhaps even negative!) cash cycle. The operating cycle, by focusing strictly on the effects of operating decisions on inventory and receivables, provides clearer signals for the analyst to consider.

## Dell, Inc.’s Negative 42-Day Cash Cycle

Some firms have proven successful at aggressively managing their cash cycle. Dell, Inc. (DELL) – computer hardware manufacturer – is one of the few companies that have even been able to produce a negative cash cycle while still paying its bills on time.

KEY ACTIVITY MEASURES	Q4 1996	Q4 2007
1. Inventory turnover in days	31	5
2. Receivable turnover in days	42	31
3. Operating cycle: Line (1) + Line (2)	73	36
4. Payable turnover in days	33	78
5. <b>Cash cycle: Line (3) – Line (4)</b>	<b>40</b>	<b>(42)</b>

Source: Dell, Inc., quarterly and annual reports. © 2007 Dell Inc. All Rights Reserved.

Since implementing a program late in fiscal year 1996 aimed at shortening its cash cycle, Dell’s cash cycle went from an acceptable 40 days to an astounding negative 42 days in the fourth quarter of fiscal year 2007. (See the table below for details.)

A primarily build-to-order manufacturing model coupled with reliance on standard parts, available from many sources, allowed Dell to carry only a 5-day supply of inventory. Improvements in sales processing and collections helped drive receivable turnover in days down to 31 days. And, by negotiating generous credit terms and ensuring that bills are not paid before the negotiated terms, Dell has pushed payables out to 78 days. The end result – a negative 42-day cash cycle – means that Dell is able to collect cash from a typical customer well before it pays its bills related to that customer.

Few companies can claim negative cash cycles without resort to poor operating and/or payables decisions. However, there are a few firms that can do it – and do it well. They generally use a “just-in-time” approach to inventory (a topic we take up in Chapter 10), manage receivables tightly, and, because of strong purchasing power, secure generous credit terms from suppliers.

**A Second Look at Aldine’s Liquidity.** As you may remember, Aldine’s current and acid-test ratios compared favorably with industry median ratios. However, we decided to reserve a final opinion on liquidity until we had performed a more detailed examination of the firm’s receivables and inventory. The turnover ratios for both of these assets, and the resulting operating cycle, are significantly worse than the industry median values for these same measures. These findings suggest that the two assets are not entirely current, and this factor detracts from the favorable current and quick ratios. A sizable portion of receivables is slow, and there appear to be inefficiencies in inventory management. On the basis of our analysis, we conclude that these assets are not particularly liquid in the sense of turning over into cash in a reasonable period of time (see the boxed feature opposite).

**Total Asset (or Capital) Turnover.** The relationship of net sales to total assets is known as the *total asset turnover*, or *capital turnover, ratio*:

$$\frac{\text{Net sales}}{\text{Total assets}} \quad (6.17)$$

Aldine’s total asset turnover for fiscal-year 20X2 is

$$\frac{\$3,992,000}{\$3,250,000} = 1.23$$

The median total asset turnover for the industry is 1.66, so it is clear that Aldine generates less sales revenue per dollar of asset investment than does the industry, on average. The total asset turnover ratio tells us the relative efficiency with which a firm utilizes its total assets to generate sales. Aldine is less efficient than the industry in this regard. From our previous analysis of Aldine’s receivables and inventory activity, we suspect that excessive investments in receivables and inventories may be responsible for a large part of the problem. If Aldine could generate the same sales revenue with fewer dollars invested in receivables and inventories, total asset turnover would improve.

### ● ● ● Profitability Ratios

#### Profitability ratios

Ratios that relate profits to sales and investment.

**Profitability ratios** are of two types – those showing profitability in relation to sales and those showing profitability in relation to investment. Together, these ratios indicate the firm’s overall effectiveness of operation.

**Profitability in Relation to Sales.** The first ratio we consider is the *gross profit margin*:

$$\frac{\text{Net sales} - \text{Cost of goods sold}}{\text{Net sales}} \quad (6.18)$$

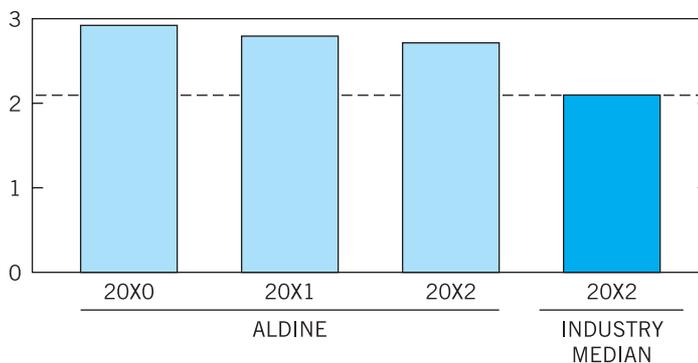
or simply gross profit divided by net sales. For Aldine, the gross profit margin for fiscal-year 20X2 is

$$\frac{\$1,312,000}{\$3,992,000} = 32.9\%$$

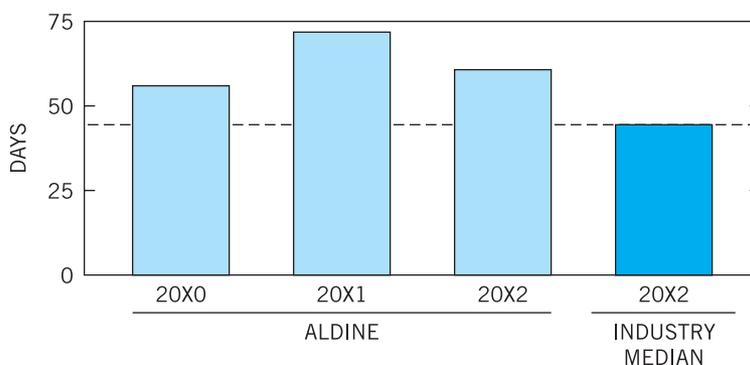
This ratio tells us the profit of the firm relative to sales, after we deduct the cost of producing the goods. It is a measure of the efficiency of the firm’s operations, as well as an indication of how products are priced. Aldine’s gross profit margin is significantly above the median of 23.8 percent for the industry, indicating that it is relatively more effective at producing and selling products above cost.

### How's Aldine's liquidity?

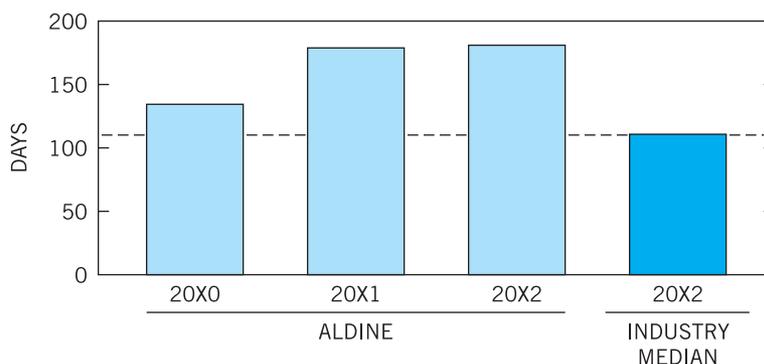
The *current ratio*, although falling, looks strong relative to the industry



but the *average collection period* has grown and exceeds the current industry norm



and the same holds for *inventory turnover in days*.



A more specific measure of sales profitability is the *net profit margin*:

$$\frac{\text{Net profit after taxes}}{\text{Net sales}}$$

[6.19]

For Aldine, this ratio for fiscal-year 20X2 is

$$\frac{\$201,000}{\$3,992,000} = 5.04\%$$

The net profit margin is a measure of the firm’s profitability of sales after taking account of all expenses and income taxes. It tells us a firm’s net income per dollar of sales. For Aldine, roughly 5 cents out of every sales dollar constitutes after-tax profits. Aldine’s net profit margin is above the median net profit margin (4.7 percent) for the industry, which indicates that it has a higher relative level of “sales profitability” than most other firms in the industry.

By considering both ratios jointly, we are able to gain considerable insight into the operations of the firm. If the gross profit margin is essentially unchanged over a period of several years but the net profit margin has declined over the same period, we know that the cause is either higher selling, general, and administrative (SG&A) expenses relative to sales, or a higher tax rate. On the other hand, if the gross profit margin falls, we know that the cost of producing goods relative to sales has increased. This occurrence, in turn, may be due to lower prices or to lower operating efficiency in relation to volume.

**Profitability in Relation to Investment.** The second group of profitability ratios relates profits to investment. One of these measures is the rate of *return on investment (ROI)*, or *return on assets*:

$$\frac{\text{Net profit after taxes}}{\text{Total assets}} \tag{6.20}$$

For Aldine, ROI for fiscal-year 20X2 is

$$\frac{\$201,000}{\$3,250,000} = 6.18\%$$

This ratio compares unfavorably with a median value of 7.8 percent for the industry. Higher profitability per dollar of sales but a slightly lower return on investment confirms that Aldine employs more assets to generate a dollar of sales than does the typical firm in the industry.

**ROI and the Du Pont Approach.** In about 1919 the Du Pont Company began to use a particular approach to ratio analysis to evaluate the firm’s effectiveness. One variation of this Du Pont approach has special relevance to understanding a firm’s return on investment. As shown in Figure 6.4, when we multiply the net profit margin of the firm by the total asset turnover, we obtain the return on investment, or *earning power* on total assets.

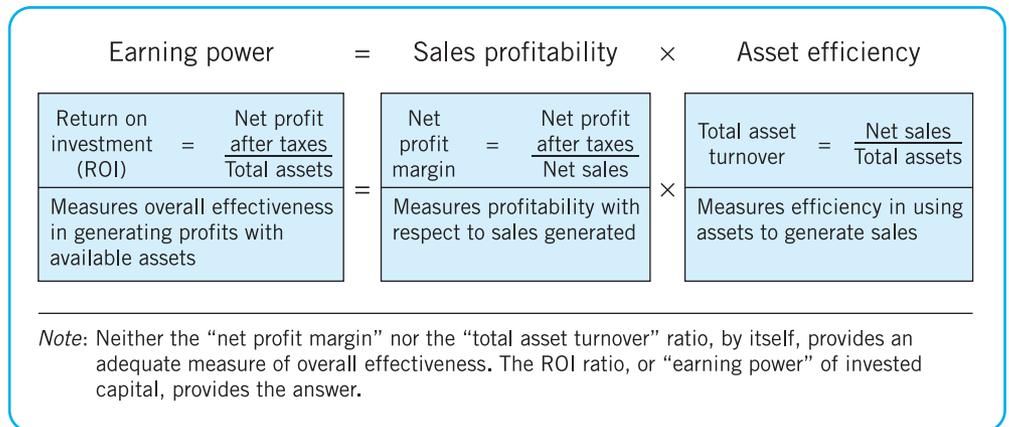
For Aldine, we have

Earning power	=	Sales profitability	×	Asset efficiency
ROI	=	Net profit margin	×	Total asset turnover
6.20%	=	5.04%	×	1.23

Neither the net profit margin nor the total asset turnover ratio by itself provides an adequate measure of overall effectiveness. The net profit margin ignores the utilization of assets, and the total asset turnover ratio ignores profitability on sales. The return on investment ratio, or *earning power*, resolves these shortcomings. An improvement in the earning power of the firm will result if there is an increase in turnover on assets, an increase in the net profit margin, or both. Two firms with different net profit margins and total asset turnovers may have the same earning power. Geraldine Lim’s Oriental Grocery, with a net profit margin of only 2 percent and a total asset turnover of 10, has the same earning power – 20 percent – as the Megawatt Power Supply Company, with a net profit margin of 20 percent and a total asset turnover of 1. For each firm, every dollar invested in assets returns 20 cents in after-tax profit per year.

**Return on Equity (ROE).** Another summary measure of overall firm performance is return on equity. *Return on equity (ROE)* compares net profit after taxes (minus preferred stock dividends, if any) with the equity that shareholders have invested in the firm:

$$\frac{\text{Net profit after taxes}}{\text{Shareholders' equity}} \tag{6.21}$$



**Figure 6.4**

Earning power and the Du Pont approach

For Aldine, ROE is

$$\frac{\$201,000}{\$1,796,000} = 11.19\%$$

This ratio tells us the earning power on shareholders’ book value investment, and is frequently used in comparing two or more firms in an industry. A high return on equity often reflects the firm’s acceptance of strong investment opportunities and effective expense management. However, if the firm has chosen to employ a level of debt that is high by industry standards, a high ROE might simply be the result of assuming excessive financial risk. Aldine’s ROE is below the median return (14.04 percent) for the industry.

To investigate this return more fully, we can utilize a Du Pont approach – that is, break this return measure into its components:

$$\frac{\text{Net profit after taxes}}{\text{Shareholders' equity}} = \frac{\text{Net profit after taxes}}{\text{Net sales}} \times \frac{\text{Net sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Shareholders' equity}}$$

$$\text{ROE} = \text{Net profit margin} \times \text{Total asset turnover} \times \text{Equity multiplier}$$

For, Aldine, we have

$$11.2\% = 5.04\% \times 1.23 \times 1.81$$

This Du Pont approach to ROE helps to explain “why” Aldine’s ROE is less than the industry’s median ROE. Although Aldine’s net profit margin is higher than average and its equity multiplier is about at the industry norm,<sup>9</sup> its lower-than-average total asset turnover pulls its ROE down below that of the typical firm in the industry. This suggests that Aldine’s use of a relatively greater proportion of assets to produce sales than most other firms in the industry is the root cause of its below-average ROE.

With all of the profitability ratios discussed, comparing one company with similar companies and industry standards is extremely valuable. Only by comparisons are we able to judge whether the profitability of a particular company is good or bad, and why. Absolute figures provide some insight, but it is relative performance that is most revealing.

<sup>9</sup>The “equity multiplier” is yet another measure of financial leverage. Since it is equivalent to  $(1 + \text{debt-to-equity ratio})$ , the higher the debt-to-equity ratio, the higher the multiplier. For Aldine, the multiplier is  $1 + 0.81 = 1.81$ , whereas for the industry we have  $1 + 0.80 = 1.80$ .

## Trend Analysis

Until now, our concern has been with introducing the various financial ratios, explaining their uses in analysis, and comparing the ratios computed for our sample company with industry averages. As we pointed out earlier, it is important to compare the financial ratios for a given company over time. In this way, the analyst is able to detect any improvement or deterioration in a firm's financial condition and performance.

To illustrate, Table 6.3 shows selected financial ratios for Aldine Manufacturing Company over the 20X0–20X2 period along with industry median figures for 20X2. As can be seen, the current and acid-test ratios have fallen off somewhat over time but still exceed industry norms in 20X2. The figures for average collection period and inventory turnover in days have grown since 20X0 and exceed the current industry median levels. The trends here tell us that there has been a relative buildup in receivables and inventories. The turnover of each has slowed, which raises questions as to the quality and liquidity of these assets. When a trend analysis of receivables and inventory is coupled with a comparison with median ratios for the industry, the only conclusion possible is that a problem exists. The analyst would want to investigate the credit policies of Aldine, the company's collection experience, and its bad-debt losses. Moreover, one should investigate inventory management, obsolescence of inventory, and any imbalances in the makeup of inventory (i.e., raw material versus work-in-process versus finished goods). Thus, despite above average levels of current and acid-test ratios, the apparent deterioration in receivables and inventory is a matter of concern and needs to be investigated in depth.

The stability of the firm's leverage (debt) ratios coupled with a present relative debt level typical of the industry would be viewed favorably by creditors. The gross profit margin and net profit margin have generally shown improvement over the recent past, and current levels are stronger than for the typical firm in the industry. Return on investment has been relatively stable over time, but at a level below the industry standard. Sluggish asset turnover over time has dampened any positive effects of above-average sales profitability. From our analysis of activity ratios, we know that the primary cause has been the large and growing relative amounts of receivables and inventory.

We see, then, that the analysis of the trend of financial ratios over time, coupled with a comparison with industry averages, can give the analyst valuable insight into changes that have

**Table 6.3**

Selected financial ratios of Aldine Manufacturing Company for fiscal years 20X0–20X2

	20X0	20X1	20X2	INDUSTRY MEDIAN 20X2
<i>Liquidity</i>				
Current ratio	2.95	2.80	2.72	<b>2.10</b>
Acid-test ratio	1.30	1.23	1.11	<b>1.10</b>
<i>Leverage</i>				
Debt-to-equity ratio	0.76	0.81	0.81	<b>0.80</b>
Total-debt-to-total-assets ratio	0.43	0.45	0.45	<b>0.44</b>
<i>Coverage</i>				
Interest coverage ratio	5.95	5.43	4.71	<b>4.00</b>
<i>Activity</i>				
Average collection period <sup>a</sup>	55 days	73 days	62 days	<b>45 days</b>
Inventory turnover in days <sup>a</sup>	136 days	180 days	181 days	<b>111 days</b>
Total asset turnover <sup>a</sup>	1.25	1.18	1.23	<b>1.66</b>
<i>Profitability</i>				
Gross profit margin	30.6%	32.8%	32.9%	<b>23.8%</b>
Net profit margin	4.90%	5.32%	5.04%	<b>4.70%</b>
Return on investment <sup>a</sup>	6.13%	6.29%	6.19%	<b>7.80%</b>
Return on equity <sup>a</sup>	10.78%	11.36%	11.19%	<b>14.04%</b>

<sup>a</sup>In computing "income statement/balance sheet"-type ratios, year-end balance sheet figures were used.

occurred in a firm's financial condition and performance. Additional insight can be provided if we extend our analysis to include comparisons with similar competitors in the industry.

## Common-Size and Index Analysis

### Common-size analysis

An analysis of *percentage* financial statements where all balance sheet items are divided by *total assets* and all income statement items are divided by *net sales* or *revenues*.

### Index analysis

An analysis of *percentage* financial statements where all balance sheet or income statement figures for a base year equal 100.0 (percent) and subsequent financial statement items are expressed as percentages of their values in the base year.

In addition to financial ratio analysis over time, it is often useful to express balance sheet and income statement items as percentages. The percentages can be related to totals, such as total assets or total net sales, or to some base year. Called **common-size analysis** and **index analysis** respectively, the evaluation of levels and trends in financial statement percentages over time affords the analyst insight into the underlying improvement or deterioration in financial condition and performance. Though a good portion of this insight is revealed in the analysis of financial ratios, a broader understanding of the trends is possible when the analysis is extended to include the foregoing considerations. Also, these two new types of analysis are extremely helpful in comparing firms whose data differ significantly in size, because every item on the financial statements gets placed on a relative, or standardized, basis.

### ● ● ● Financial Statement Items as Percentages of Totals

In common-size analysis, we express the various components of a balance sheet as percentages of the total assets of the company. In addition, this can be done for the income statement, but here items are related to net sales. The gross and net profit margins, taken up earlier, are examples of this type of expression, and the procedure can be extended to include all the items on the income statement. The expression of individual financial statement items as percentages of total helps the analyst spot trends with respect to the relative importance of these items over time. To illustrate, common-size balance sheets and income statements are shown alongside regular statements in Tables 6.4 and 6.5 for R. B. Harvey Electronics Company for 20X0 through 20X2. In Table 6.4 we see that, over the three-year span, the percentage of current

**Table 6.4**

R. B. Harvey  
Electronics Company  
balance sheets (at  
December 31)

ASSETS	REGULAR (IN THOUSANDS)			COMMON-SIZE (%)		
	20X0	20X1	20X2	20X0	20X1	20X2
Cash	\$ 2,507	\$ 11,310	\$ 19,648	1.0	3.8	5.1
Accounts receivable	70,360	85,147	118,415	29.3	28.9	30.9
Inventory	77,380	91,378	118,563	32.2	31.0	31.0
Other current assets	6,316	6,082	5,891	2.6	2.1	1.5
Current assets	\$156,563	\$193,917	\$262,517	65.1	65.8	68.5
Fixed assets, net	79,187	94,652	115,461	32.9	32.2	30.1
Other long-term assets	4,695	5,899	5,491	2.0	2.0	1.4
Total assets	<u>\$240,445</u>	<u>\$294,468</u>	<u>\$383,469</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
LIABILITIES AND SHAREHOLDERS' EQUITY						
Accounts payable	\$ 35,661	\$ 37,460	\$ 62,725	14.8	12.7	16.4
Notes payable	20,501	14,680	17,298	8.5	5.0	4.5
Other current liabilities	11,054	8,132	15,741	4.6	2.8	4.1
Current liabilities	\$ 67,216	\$ 60,272	\$ 95,764	27.9	20.5	25.0
Long-term debt	888	1,276	4,005	0.4	0.4	1.0
Total liabilities	\$ 68,104	\$ 61,548	\$ 99,769	28.3	20.9	26.0
Common stock	12,650	20,750	24,150	5.3	7.0	6.3
Additional paid-in capital	37,950	70,350	87,730	15.8	23.9	22.9
Retained earnings	121,741	141,820	171,820	50.6	48.2	44.8
Total shareholders' equity	<u>\$172,341</u>	<u>\$232,920</u>	<u>\$283,700</u>	<u>71.7</u>	<u>79.1</u>	<u>74.0</u>
Total liabilities and shareholders' equity	<u>\$240,445</u>	<u>\$294,468</u>	<u>\$383,469</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

**Table 6.5**

R. B. Harvey  
Electronics Company  
income statements  
(for years ending  
December 31)

	REGULAR (IN THOUSANDS)			COMMON-SIZE (%)		
	20X0	20X1	20X2	20X0	20X1	20X2
Net sales	\$323,780	\$375,088	\$479,077	100.0	100.0	100.0
Cost of goods sold	148,127	184,507	223,690	45.8	49.2	46.7
Gross profit	\$175,653	\$190,581	\$255,387	54.2	50.8	53.3
Selling, general, and administrative expenses	131,809	140,913	180,610	40.7	37.6	37.7
Depreciation	7,700	9,595	11,257	2.4	2.5	2.3
Interest expense	1,711	1,356	1,704	0.5	0.4	0.4
Earnings before taxes	\$ 34,433	\$ 38,717	\$ 61,816	10.6	10.3	12.9
Taxes	12,740	14,712	23,490	3.9	3.9	4.9
Earning after taxes	\$ 21,693	\$ 24,005	\$ 38,326	6.7	6.4	8.0

assets increased, and that this was particularly true for cash. In addition, we see that accounts receivable showed a relative increase from 20X1 to 20X2. On the liability and equity portion of the balance sheet, the total debt of the company declined on a relative (and absolute) basis from 20X0 to 20X1, primarily because of a decline in notes payable. However, with the large absolute increase in assets that occurred in 20X1 and 20X2, the debt ratio increased from 20X1 to 20X2. The rebound in the importance of debt financing is particularly apparent in accounts payable, which increased substantially in both absolute and relative terms in 20X2.

The common-size income statements shown in Table 6.5 show the gross profit margin fluctuating from year to year. An improved 20X2 gross profit margin, coupled with better relative control over selling, general, and administrative expenses, caused 20X2 profitability to improve sharply over 20X0 and 20X1.

### ● ● ● Financial Statement Items as Indexes Relative to a Base Year

The common-size balance sheets and income statements can be supplemented by the expression of items relative to a base year. For Harvey Electronics, the base year is 20X0, and all financial statement items are 100.0 (percent) for that year. Items for subsequent years are expressed as an index relative to that year. For example, comparing Harvey Electronics' accounts receivable in 20X1 (\$85,147,000) with its receivables in the base year, 20X0 (\$70,360,000), the index would be 121.0 (i.e.,  $[\$85,147,000/\$70,360,000] \times 100$ ). Tables 6.6 and 6.7 show indexed balance sheets and income statements alongside regular statements.

#### Take Note

We should expect that changes in a number of the firm's current assets and liabilities accounts (e.g., cash, accounts receivable, inventory, and accounts payable – which all support sales activity) would move roughly together with sales for a normal, well-run company. Therefore, remember for future reference that Harvey Electronics' indexed net sales figure for 20X2 is 148.0, which indicates a 48 percent (148.0 minus 100.0 percent) increase in sales over the base period two years ago.

In Table 6.6 the buildup in cash from the base year is particularly apparent over the past two years, and agrees with our previous assessment. Also, the 683.7 percent (783.7 minus 100 percent) increase in cash over two years seems way out of proportion when compared with only a 48 percent increase in net sales over the same period.

Also, note the large increase in accounts receivable and inventory from 20X1 to 20X2. This latter change was not apparent in the common-size analysis. When we compare the accounts receivable and inventory figures with those for net sales, however, the increases do not seem

Table 6.6

R. B. Harvey  
Electronics Company  
balance sheets (at  
December 31)

ASSETS	REGULAR (IN THOUSANDS)			INDEXED (%)		
	20X0	20X1	20X2	20X0	20X1	20X2
Cash	\$ 2,507	\$ 11,310	\$ 19,648	100.0	451.1	783.7
Accounts receivable	70,360	85,147	118,415	100.0	121.0	168.3
Inventory	77,380	91,378	118,563	100.0	118.1	153.2
Other current assets	6,316	6,082	5,891	100.0	96.3	93.3
Current assets	\$156,563	\$193,917	\$262,517	100.0	123.9	167.7
Fixed assets, net	79,187	94,652	115,461	100.0	119.5	145.8
Other long-term assets	4,695	5,899	5,491	100.0	125.6	117.0
Total assets	<u>\$240,445</u>	<u>\$294,468</u>	<u>\$383,469</u>	<u>100.0</u>	<u>122.5</u>	<u>159.5</u>
LIABILITIES AND SHAREHOLDERS' EQUITY						
Accounts payable	\$ 35,661	\$ 37,460	\$ 62,725	100.0	105.0	175.9
Notes payable	20,501	14,680	17,298	100.0	71.6	84.4
Other current liabilities	11,054	8,132	15,741	100.0	73.6	142.4
Current liabilities	\$ 67,216	\$ 60,272	\$ 95,764	100.0	89.7	142.5
Long-term debt	888	1,276	4,005	100.0	143.7	451.0
Total liabilities	\$ 68,104	\$ 61,548	\$ 99,769	100.0	90.4	146.5
Common stock	12,650	20,750	24,150	100.0	164.0	190.9
Additional paid-in capital	37,950	70,350	87,730	100.0	185.4	231.2
Retained earnings	121,741	141,820	171,820	100.0	116.5	141.1
Total shareholders' equity	<u>\$172,341</u>	<u>\$232,920</u>	<u>\$283,700</u>	<u>100.0</u>	<u>135.2</u>	<u>164.6</u>
Total liabilities and shareholders' equity	<u>\$240,445</u>	<u>\$294,468</u>	<u>\$383,469</u>	<u>100.0</u>	<u>122.5</u>	<u>159.5</u>

Table 6.7

R. B. Harvey  
Electronics Company  
income statements  
(for years ending  
December 31)

	REGULAR (IN THOUSANDS)			INDEXED (%)		
	20X0	20X1	20X2	20X0	20X1	20X2
Net sales	\$323,780	\$375,088	\$479,077	100.0	115.8	148.0
Cost of goods sold	148,127	184,507	223,690	100.0	124.6	151.0
Gross profit	\$175,653	\$190,581	\$255,387	100.0	108.5	145.4
Selling, general, and administrative expenses	131,809	140,913	180,610	100.0	106.9	137.0
Depreciation	7,700	9,595	11,257	100.0	124.6	146.2
Interest expense	1,711	1,356	1,704	100.0	79.3	99.6
Earnings before taxes	\$ 34,433	\$ 38,717	\$ 61,816	100.0	112.4	179.5
Taxes	12,740	14,712	23,490	100.0	115.5	184.4
Earnings after taxes	<u>\$ 21,693</u>	<u>\$ 24,005</u>	<u>\$ 38,326</u>	<u>100.0</u>	<u>110.7</u>	<u>176.7</u>

too much out of line. (We would probably want to follow up on this information, nonetheless, by checking the firm's receivable turnover and inventory turnover to see how well the firm is managing these growing asset accounts.) To a lesser extent, there was a noticeable increase in fixed assets, but the change was accompanied by a somewhat favorable, more than proportionate, change in sales over the past two years.

On the liability portion of the balance sheet, we note the large increase in accounts payable and in other current liabilities that occurred. Only the payables increase, however, seems large relative to the increase in sales, as well as the increases in receivables and inventories. Based on this insight, we would want to take a look at the firm's payable turnover to see whether the firm might not be paying its suppliers in a timely fashion. Finally, increases in long-term debt, common stock, and retained earnings also helped finance the large increase in assets that occurred over the last two years.

The indexed income statements in Table 6.7 give much the same picture as the common-size income statements – namely, fluctuating behavior. The sharp improvement in 20X2

profitability (earnings before interest and taxes, as well as earnings after taxes) is more easily distinguished – especially when we compare it with the smaller percentage improvement in sales. Moreover, the indexed income statements give us information on the magnitude of absolute changes in profits and expenses. With common-size statements, we have no information about how the absolute amounts change over time.

In summary, the standardization of balance sheet and income statement items as percentages of totals and as indexes to a base year often gives us insights additional to those obtained from the analysis of financial ratios. Common-size and index analysis is much easier when a computer spreadsheet program, such as Excel, is employed. The division calculations by rows or columns can be done quickly and accurately with such a program – but it is up to you, the analyst, to interpret the results.

## Key Learning Points

- Financial analysis, though varying according to the particular interests of the analyst, always involves the use of various financial statements – primarily the balance sheet and income statement.
- The *balance sheet* summarizes the assets, liabilities, and owners' equity of a business at a point in time, and the *income statement* summarizes revenues and expenses of a firm over a particular period of time.
- International and national accounting standard setters, are working toward “convergence” in accounting standards around the world. “Convergence” aims to narrow or remove accounting differences so that investors can better understand financial statements prepared under different accounting frameworks.
- A conceptual framework for financial analysis provides the analyst with an interlocking means for structuring the analysis. For example, in the analysis of external financing, one is concerned with the firm's funds needs, its financial condition and performance, and its business risk. Upon analysis of these factors, one is able to determine the firm's financing needs and to negotiate with outside suppliers of capital.
- Financial ratios are the tools used to analyze financial condition and performance. We calculate ratios because in this way we get a *comparison* that *may* prove more useful than the raw numbers by themselves.
- Financial ratios can be divided into five basic types: liquidity, leverage (debt), coverage, activity, and profitability. No one ratio is itself sufficient for realistic assessment of the financial condition and performance of a firm. With a group of ratios, however, reasonable judgments can be made. The number of key ratios needed for this purpose is not particularly large – about a dozen or so.
- The usefulness of ratios depends on the ingenuity and experience of the financial analyst who employs them. By themselves, financial ratios are fairly meaningless; they must be analyzed on a comparative basis. Comparing one company with similar companies and industry standards over time is crucial. Such a comparison uncovers leading clues in evaluating changes and trends in the firm's financial condition and profitability. This comparison may be historical, but it may also include an analysis of the future based on projected financial statements.
- Additional insights can be gained by *common-size* and *index* analysis. In the former, we express the various balance sheet items as a percentage of total assets and the income statement items as a percentage of net sales. In the latter, balance sheet and income statement items are expressed as an index relative to an initial base year.

## Summary of Key Ratios

LIQUIDITY		
CURRENT	$= \frac{\text{Current assets}}{\text{Current liabilities}}$	Measures ability to meet current debts with current assets.
ACID-TEST (QUICK)	$= \frac{\text{Current assets less inventories}}{\text{Current liabilities}}$	Measures ability to meet current debts with most-liquid (quick) current assets.

LEVERAGE		
DEBT-TO-EQUITY	$= \frac{\text{Total debt}}{\text{Shareholders' equity}}$	Indicates the extent to which debt financing is used relative to equity financing.
DEBT-TO-TOTAL-ASSETS	$= \frac{\text{Total debt}}{\text{Total assets}}$	Shows the relative extent to which the firm is using borrowed money.
COVERAGE		
INTEREST COVERAGE	$= \frac{\text{EBIT}^*}{\text{Interest expense}}$	Indicates ability to cover interest charges; tells number of times interest is earned.
ACTIVITY		
RECEIVABLE TURNOVER (RT)	$= \frac{\text{Annual net credit sales}}{\text{Receivables}^{**}}$	Measures how many times the receivables have been turned over (into cash) during the year; provides insight into quality of the receivables.
RECEIVABLE TURNOVER IN DAYS (RTD) (Average collection period)	$= \frac{365}{RT}$	Average number of days receivables are outstanding before being collected.
INVENTORY TURNOVER (IT)	$= \frac{\text{Cost of goods sold}}{\text{Inventory}^{**}}$	Measures how many times the inventory has been turned over (sold) during the year; provides insight into liquidity of inventory and tendency to overstock.
INVENTORY TURNOVER IN DAYS (ITD)	$= \frac{365}{IT}$	Average number of days the inventory is held before it is turned into accounts receivable through sales.
TOTAL ASSET TURNOVER (Capital turnover)	$= \frac{\text{Net sales}}{\text{Total assets}^{**}}$	Measures relative efficiency of total assets to generate sales.
PROFITABILITY		
NET PROFIT MARGIN	$= \frac{\text{Net profit after taxes}}{\text{Net sales}}$	Measures profitability with respect to sales generated; net income per dollar of sales.
RETURN ON INVESTMENT (ROI) (Return on assets)	$= \frac{\text{Net profit after taxes}}{\text{Total assets}^{**}}$	Measures overall effectiveness in generating profits with available assets; earning power of invested capital.
	$= \text{NET PROFIT MARGIN} \times \text{TOTAL ASSET TURNOVER}$	
	$= \frac{\text{Net profit after taxes}}{\text{Net sales}} \times \frac{\text{Net sales}}{\text{Total assets}^{**}}$	
RETURN ON EQUITY (ROE)	$= \frac{\text{Net profit after taxes}}{\text{Shareholders' equity}^{**}}$	Measures earning power on shareholders' book-value investment.
	$= \frac{\text{NET PROFIT MARGIN}}{\text{MARGIN}} \times \frac{\text{TOTAL ASSET TURNOVER}}{\text{TURNOVER}} \times \frac{\text{EQUITY MULTIPLIER}}{\text{MULTIPLIER}}$	
	$= \frac{\text{Net profit after taxes}}{\text{Net sales}} \times \frac{\text{Net sales}}{\text{Total assets}^{**}} \times \frac{\text{Total assets}^{**}}{\text{Shareholders' equity}^{**}}$	

\*Earnings before interest and taxes.

\*\*An average, rather than an ending, balance may be needed.

## Appendix Deferred Taxes and Financial Analysis

### Deferred taxes

A “liability” that represents the accumulated difference between the income tax expense reported on the firm’s books and the income tax actually paid. It arises principally because depreciation is calculated differently for financial reporting than for tax reporting.

**Deferred taxes**<sup>10</sup> – an item that often appears in the long-term liability portion of a firm’s balance sheet – pose some real problems for the financial analyst attempting to do ratio analysis. Though its position on the balance sheet would make it appear to be a long-term debt item, analysts (and especially accountants) can’t agree on whether to treat the deferred taxes account as debt or equity, or neither, in ratio and other analyses. Why the confusion?

### Where Do Deferred Taxes Come From?

Deferred taxes most commonly arise when a firm determines depreciation expense in its published financial statements on a different basis from that in its tax returns. Most likely, a company chooses straight-line depreciation for its published income statement but uses a type of accelerated depreciation (MACRS) for tax purposes. (See Table 6A.1 for an example.) This action “temporarily” defers the payment of taxes by making *tax-return* profits less than *book* profits. When a higher tax expense is reported on the firm’s books than is actually paid, the firm’s books won’t balance. To solve this problem, accountants create a deferred tax account in the long-term liability section of the balance sheet to maintain a running total of these differences between taxes reported and taxes actually due. If the firm slows or ceases buying new assets, there will eventually be a reversal – reported taxes will be less than actual taxes due – and the deferred taxes account will need to be reduced to keep the balance sheet in balance. In this particular situation, our deferred tax liability item is truly a “debt” that eventually comes due. On the other hand, if the firm continues to invest in depreciable assets, payment of the deferred tax may continue to be delayed indefinitely.

### So What’s the Problem?

The catch is that for stable or growing firms there is no foreseeable reversal, and the deferred taxes account balance continues to grow. For many firms, a growing, never-reversing, deferred taxes account is the norm. Faced with this reality, the analyst may decide to modify the financial statements for purposes of analysis.

Depending on the situation (for example, the nature and magnitude of the tax deferrals, whether the account has been growing, and the likelihood of a reversal), the analyst may decide to make one or both of the following adjustments to the firm’s financial statements:

**Table 6A.1**

Income statements highlighting deferred taxes for year ending December 31, 20X2 (in millions)

	FINANCIAL REPORTING	TAX REPORTING
Net sales	\$100.0	\$100.0
Costs and expenses, except for depreciation	45.0	45.0
Depreciation		
Straight-line	15.0	
Accelerated (MACRS)		20.0
Earnings before taxes	\$ 40.0	\$ 35.0
Taxes (40%)	16.0*	14.0
Earnings after taxes	\$ 24.0	\$ 21.0
*Taxes		
Current (involves cash payment)	\$14.0	
Deferred (noncash charge added to deferred taxes account on balance sheet)	2.0	
Total tax shown	\$16.0	

<sup>10</sup>Deferred taxes are not the same thing as *taxes payable*. *Taxes payable* are tax payments due within the year, whereas deferred taxes are “due” at some indefinite long-term date.

- The current period's deferred tax expense (a noncash charge) is added back to net income – the argument is that profits were understated because taxes were, in effect, overstated.
- The deferred taxes reported on the firm's balance sheet are added to equity – here the argument is that because this amount is not a definite, legal obligation requiring payment in the foreseeable future, it overstates the debt position of the firm. In short, it is more like equity than debt.

Such adjustment will, of course, affect the calculation of the firm's debt and profitability ratios.

Still another school of thought rejects both of the previous adjustments. Called the “net-of-tax” approach, this viewpoint calls for most deferred taxes to be treated as adjustments to the amounts at which the related assets are carried on the firm's books. An analyst subscribing to this approach would make the following financial statement adjustment:

- The deferred taxes on the firm's balance sheet are subtracted from net fixed assets – the reason is that when there is an excess of tax depreciation over book depreciation, an asset's value is decreased, rather than a liability created. Accelerated depreciation, in effect, uses up an additional part of an asset's tax-reducing capacity relative to straight-line depreciation. The immediate loss of the future tax-reducing (i.e., tax-shield) benefit should be deducted from the related asset account.

This adjustment will affect the calculation of various leverage, activity, and profitability ratios.



## Questions

1. What is the purpose of a balance sheet? An income statement?
2. Why is the analysis of trends in financial ratios important?
3. Auxier Manufacturing Company has a current ratio of 4 to 1 but is unable to pay its bills. Why?
4. Can a firm generate a 25 percent return on assets and still be technically insolvent (unable to pay its bills)? Explain.
5. The traditional definitions of *collection period* and *inventory turnover* are criticized because in both cases balance sheet figures that are a result of approximately the last month of sales are related to annual sales (in the former case) or annual cost of goods sold (in the latter case). Why do these definitions present problems? Suggest a solution.
6. Explain why a long-term creditor should be interested in liquidity ratios.
7. Which financial ratios would you be most likely to consult if you were the following? Why?
  - a. A banker considering the financing of seasonal inventory
  - b. A wealthy equity investor
  - c. The manager of a pension fund considering the purchase of a firm's bonds
  - d. The president of a consumer products firm
8. In trying to judge whether a company has too much debt, what financial ratios would you use and for what purpose?
9. Why might it be possible for a company to make large operating profits, yet still be unable to meet debt payments when due? What financial ratios might be employed to detect such a condition?
10. Does increasing a firm's inventory turnover ratio increase its profitability? Why should this ratio be computed using cost of goods sold (rather than sales, as is done by some compilers of financial statistics)?

11. Is it appropriate to insist that a financial ratio, such as the current ratio, exceed a certain absolute standard (e.g., 2:1)? Why?
12. Which firm is more profitable – Firm A with a total asset turnover of 10.0 and a net profit margin of 2 percent, or Firm B with a total asset turnover of 2.0 and a net profit margin of 10 percent? Provide examples of both types of firm.
13. Why do short-term creditors, such as banks, emphasize balance sheet analysis when considering loan requests? Should they also analyze projected income statements? Why?
14. How can index analysis be used to reinforce the insight gained from a trend analysis of financial ratios?



## Self-Correction Problems

1. Barnaby Cartage Company has current assets of \$800,000 and current liabilities of \$500,000. What effect would the following transactions have on the firm's current ratio (and state the resulting figures)?
  - a. Two new trucks are purchased for a total of \$100,000 in cash.
  - b. The company borrows \$100,000 short term to carry an increase in receivables of the same amount.
  - c. Additional common stock of \$200,000 is sold and the proceeds invested in the expansion of several terminals.
  - d. The company increases its accounts payable to pay a cash dividend of \$40,000 out of cash.
2. Acme Plumbing Company sells plumbing fixtures on terms of *2/10, net 30*. Its financial statements over the last three years are as follows:

	20X1	20X2	20X3
Cash	\$ 30,000	\$ 20,000	\$ 5,000
Accounts receivable	200,000	260,000	290,000
Inventory	400,000	480,000	600,000
Net fixed assets	800,000	800,000	800,000
	<u>\$1,430,000</u>	<u>\$1,560,000</u>	<u>\$1,695,000</u>
Accounts payable	\$ 230,000	\$ 300,000	\$ 380,000
Accruals	200,000	210,000	225,000
Bank loan, short term	100,000	100,000	140,000
Long-term debt	300,000	300,000	300,000
Common stock	100,000	100,000	100,000
Retained earnings	500,000	550,000	550,000
	<u>\$1,430,000</u>	<u>\$1,560,000</u>	<u>\$1,695,000</u>
Sales	\$4,000,000	\$4,300,000	\$3,800,000
Cost of goods sold	3,200,000	3,600,000	3,300,000
Net profit	300,000	200,000	100,000

Using the ratios discussed in the chapter, analyze the company's financial condition and performance over the last three years. Are there any problems?

3. Using the following information, complete the balance sheet found on the next page:

Long-term debt to equity	0.5 to 1
Total asset turnover	2.5 times
Average collection period*	18 days
Inventory turnover	9 times
Gross profit margin	10%
Acid-test ratio	1 to 1

\*Assume a 360-day year and all sales on credit.

Cash	\$ _____	Notes and payables	\$100,000
Accounts receivable	_____	Long-term debt	_____
Inventory	_____	Common stock	\$100,000
Plant and equipment	_____	Retained earnings	\$100,000
Total assets	_____	Total liabilities and shareholders' equity	_____
	\$ _____		\$ _____

4. Kedzie Kord Company had the following balance sheets and income statements over the last three years (in thousands):

	20X1	20X2	20X3
Cash	\$ 561	\$ 387	\$ 202
Receivables	1,963	2,870	4,051
Inventories	2,031	2,613	3,287
Current assets	\$ 4,555	\$ 5,870	\$ 7,540
Net fixed assets	2,581	4,430	4,364
Total assets	\$ 7,136	\$10,300	\$11,904
Payables	\$ 1,862	\$ 2,944	\$ 3,613
Accruals	301	516	587
Bank loan	250	900	1,050
Current liabilities	\$ 2,413	\$ 4,360	\$ 5,250
Long-term debt	500	1,000	950
Shareholder's equity	4,223	4,940	5,704
Total liabilities and shareholder's equity	\$ 7,136	\$10,300	\$11,904
Sales	\$11,863	\$14,952	\$16,349
Cost of goods sold	8,537	11,124	12,016
Selling, general, and administrative expenses	2,276	2,471	2,793
Interest	73	188	200
Profit before taxes	\$ 977	\$ 1,169	\$ 1,340
Taxes	390	452	576
Profit after taxes	\$ 587	\$ 717	\$ 764

Using common-size and index analysis, evaluate trends in the company's financial condition and performance.



## Problems

1. The data for various companies in the same industry are as follows:

	COMPANY					
	A	B	C	D	E	F
Sales (in millions)	\$10	\$20	\$8	\$5	\$12	\$17
Total assets (in millions)	8	10	6	2.5	4	8
Net income (in millions)	0.7	2	0.8	0.5	1.5	1

Determine the total asset turnover, net profit margin, and earning power for each of the companies.



2. Cordillera Carson Company has the following balance sheet and income statement for 20X2 (in thousands):

BALANCE SHEET		INCOME STATEMENT	
Cash	\$ 400	Net sales (all credit)	\$12,680
Accounts receivable	1,300	Cost of goods sold	<u>8,930</u>
Inventories	<u>2,100</u>	Gross profit	\$ 3,750
Current assets	\$3,800	Selling, general, and	
Net fixed assets	<u>3,320</u>	administration expenses	2,230
Total assets	<u>\$7,120</u>	Interest expense	<u>460</u>
Accounts payable	\$ 320	Profit before taxes	\$ 1,060
Accruals	260	Taxes	<u>390</u>
Short-term loans	<u>1,100</u>	Profit after taxes	<u>\$ 670</u>
Current liabilities	\$1,680		
Long-term debt	2,000		
Net worth	<u>3,440</u>		
Total liabilities and net worth	<u>\$7,120</u>		

Notes: (i) current period's depreciation is \$480; (ii) ending inventory for 20X1 was \$1,800.

On the basis of this information, compute (a) the current ratio, (b) the acid-test ratio, (c) the average collection period, (d) the inventory turnover ratio, (e) the debt-to-net-worth ratio, (f) the long-term debt-to-total-capitalization ratio, (g) the gross profit margin, (h) the net profit margin, and (i) the return on equity.

3. Selected financial ratios for RMN, Incorporated, are as follows:

	20X1	20X2	20X3
Current ratio	4.2	2.6	1.8
Acid-test ratio	2.1	1.0	0.6
Debt-to-total-assets	23%	33%	47%
Inventory turnover	8.7×	5.4×	3.5×
Average collection period	33 days	36 days	49 days
Total asset turnover	3.2×	2.6×	1.9×
Net profit margin	3.8%	2.5%	1.4%
Return on investment (ROI)	12.1%	6.5%	2.8%
Return on equity (ROE)	15.7%	9.7%	5.4%

- a. Why did return on investment decline?  
b. Was the increase in debt a result of greater current liabilities or of greater long-term debt? Explain.
4. The following information is available on the Vanier Corporation:

BALANCE SHEET AS OF DECEMBER 31, 20X6 (IN THOUSANDS)			
Cash and marketable securities	\$500	Accounts payable	\$ 400
Accounts receivable	?	Bank loan	?
Inventories	<u>?</u>	Accruals	<u>200</u>
Current assets	?	Current liabilities	?
Net fixed assets	<u>?</u>	Long-term debt	2,650
Total assets	<u>?</u>	Common stock and retained earnings	<u>3,750</u>
		Total liabilities and equity	<u>?</u>

INCOME STATEMENT FOR 20X6 (IN THOUSANDS)	
Credit sales	\$8,000
Cost of goods sold	<u>?</u>
Gross profit	?
Selling and administrative expenses	?
Interest expense	<u>400</u>
Profit before taxes	?
Taxes (44% rate)	<u>?</u>
Profit after taxes	<u>?</u>

## OTHER INFORMATION

Current ratio	3 to 1
Depreciation	\$500
Net profit margin	7%
Total liabilities/shareholders' equity	1 to 1
Average collection period	45 days
Inventory turnover ratio	3 to 1

Assuming that sales and production are steady throughout a 360-day year, complete the balance sheet and income statement for Vanier Corporation.

5. A company has total annual sales (all credit) of \$400,000 and a gross profit margin of 20 percent. Its current assets are \$80,000; current liabilities, \$60,000; inventories, \$30,000; and cash, \$10,000.
  - a. How much average inventory should be carried if management wants the inventory turnover to be 4?
  - b. How rapidly (in how many days) must accounts receivable be collected if management wants to have an average of \$50,000 invested in receivables? (Assume a 360-day year.)
6. Stoney Mason, Inc., has sales of \$6 million, a total asset turnover ratio of 6 for the year, and net profits of \$120,000.
  - a. What is the company's return on assets or earning power?
  - b. The company is considering the installation of new point-of-sales cash registers throughout its stores. This equipment is expected to increase efficiency in inventory control, reduce clerical errors, and improve record keeping throughout the system. The new equipment will increase the investment in assets by 20 percent and is expected to increase the net profit margin from 2 to 3 percent. No change in sales is expected. What is the effect of the new equipment on the return on assets ratio or earning power?
7. The long-term debt section of the balance sheet of the Queen Anne's Lace Corporation appears as follows:

9¼% mortgage bonds	\$2,500,000
12¾% second mortgage bonds	1,500,000
10¼% debentures	1,000,000
14½% subordinated debentures	<u>1,000,000</u>
	<u>\$6,000,000</u>

If the average earnings before interest and taxes of the company is \$1.5 million and all debt is long term, what is the overall interest coverage?

8. Tic-Tac Homes has had the following balance sheet statements the past four years (in thousands):

	20X1	20X2	20X3	20X4
Cash	\$ 214	\$ 93	\$ 42	\$ 38
Receivables	1,213	1,569	1,846	2,562
Inventories	2,102	2,893	3,678	4,261
Net fixed assets	<u>2,219</u>	<u>2,346</u>	<u>2,388</u>	<u>2,692</u>
Total assets	<u>\$5,748</u>	<u>\$6,901</u>	<u>\$7,954</u>	<u>\$9,553</u>
Accounts payable	\$1,131	\$1,578	\$1,848	\$2,968
Notes payable	500	650	750	750
Accruals	656	861	1,289	1,743
Long-term debt	500	800	800	800
Common stock	200	200	200	200
Retained earnings	<u>2,761</u>	<u>2,812</u>	<u>3,067</u>	<u>3,092</u>
Total liabilities and shareholders' equity	<u>\$5,748</u>	<u>\$6,901</u>	<u>\$7,954</u>	<u>\$9,553</u>

Using index analysis, what are the major problems in the company's financial condition?





## 9. US REPUBLIC CORPORATION BALANCE SHEET, DECEMBER 31, 20X3

ASSETS		LIABILITIES AND SHAREHOLDERS' EQUITY	
Cash	\$ 1,000,000	Notes payable, bank	\$ 4,000,000
Accounts receivable	5,000,000	Accounts payable	2,000,000
Inventory	7,000,000	Accrued wages and taxes	2,000,000
Fixed assets, net	17,000,000	Long-term debt	12,000,000
		Preferred stock	4,000,000
		Common stock	2,000,000
		Retained earnings	4,000,000
		Total liabilities and shareholders' equity	30,000,000
Total assets	<u>\$30,000,000</u>		<u>\$30,000,000</u>

US REPUBLIC CORPORATION STATEMENT OF INCOME AND RETAINED EARNINGS,  
YEAR ENDED DECEMBER 31, 20X3

Net sales			
Credit			\$16,000,000
Cash			4,000,000
Total			<u>\$20,000,000</u>
Cost and Expenses			
Cost of goods sold		\$12,000,000	
Selling, general, and administrative expenses		2,200,000	
Depreciation		1,400,000	
Interest		<u>1,200,000</u>	
Net income before taxes			<u>\$ 3,200,000</u>
Taxes on income			<u>1,200,000</u>
Net income after taxes			<u>\$ 2,000,000</u>
Less: Dividends on preferred stock			<u>240,000</u>
Net income available to common shareholders			<u>\$ 1,760,000</u>
Add: Retained earnings at 1/1/X3			<u>2,600,000</u>
Subtotal			<u>\$ 4,360,000</u>
Less: Dividends paid on common stock			<u>360,000</u>
Retained earnings 12/31/X3			<u>\$ 4,000,000</u>

## a. Fill in the 20X3 column in the table that follows.

## US REPUBLIC CORPORATION

RATIO	20X1	20X2	20X3	INDUSTRY NORMS
1. Current ratio	250%	200%		225%
2. Acid-test ratio	100%	90%		110%
3. Receivable turnover	5.0×	4.5×		6.0×
4. Inventory turnover	4.0×	3.0×		4.0×
5. Long-term debt/total capitalization	35%	40%		33%
6. Gross profit margin	39%	41%		40%
7. Net profit margin	17%	15%		15%
8. Return on equity	15%	20%		20%
9. Return on investment	15%	12%		12%
10. Total asset turnover	0.9×	0.8×		1.0×
11. Interest coverage ratio	5.5×	4.5×		5.0×

- b. Evaluate the position of the company using information from the table. Cite specific ratio levels and trends as evidence.
- c. Indicate which ratios would be of most interest to you and what your decision would be in each of the following situations:
- US Republic wants to buy \$500,000 worth of merchandise inventory from you, with payment due in 90 days.
  - US Republic wants you, a large insurance company, to pay off its note at the bank and assume it on a 10-year maturity basis at a current rate of 14 percent.

- (iii) There are 100,000 shares outstanding, and the stock is selling for \$80 a share. The company offers you 50,000 additional shares at this price.



## Solutions to Self-Correction Problems

1. Present current ratio =  $\$800/\$500 = 1.60$ .
  - a.  $\$700/\$500 = 1.40$ . Current assets decline, and there is no change in current liabilities.
  - b.  $\$900/\$600 = 1.50$ . Current assets and current liabilities each increase by the same amount.
  - c.  $\$800/\$500 = 1.60$ . Neither current assets nor current liabilities are affected.
  - d.  $\$760/\$540 = 1.41$ . Current assets decline, and current liabilities increase by the same amount.

	20X1	20X2	20X3
Current ratio	1.19	1.25	1.20
Acid-test ratio	0.43	0.46	0.40
Average collection period	18	22	27
Inventory turnover	8.0	7.5	5.5
Total debt/equity	1.38	1.40	1.61
Long-term debt/total capitalization	0.33	0.32	0.32
Gross profit margin	0.200	0.163	0.132
Net profit margin	0.075	0.047	0.026
Total asset turnover	2.80	2.76	2.24
Return on assets	0.21	0.13	0.06

The company's profitability has declined steadily over the period. As only \$50,000 is added to retained earnings, the company must be paying substantial dividends. Receivables are growing at a slower rate, although the average collection period is still very reasonable relative to the terms given. Inventory turnover is slowing as well, indicating a relative buildup in inventories. The increase in receivables and inventories, coupled with the fact that shareholders' equity has increased very little, has resulted in the total-debt-to-equity ratio increasing to what would have to be regarded on an absolute basis as quite a high level.

The current and acid-test ratios have fluctuated, but the current ratio is not particularly inspiring. The lack of deterioration in these ratios is clouded by the relative buildup in both receivables and inventories, evidencing a deterioration in the liquidity of these two assets. Both the gross profit and net profit margins have declined substantially. The relationship between the two suggests that the company has reduced relative expenses in 20X3 in particular. The buildup in inventories and receivables has resulted in a decline in the asset turnover ratio and this, coupled with the decline in profitability, has resulted in a sharp decrease in the return on assets ratio.

$$3. \frac{\text{Long-term debt}}{\text{Equity}} = 0.5 = \frac{\text{Long-term debt}}{\$200,000} \quad \text{Long-term debt} = \$100,000$$

Total liabilities and shareholders' equity = **\$400,000**

Total assets = **\$400,000**

$$\frac{\text{Sales}}{\text{Total assets}} = 2.5 = \frac{\text{Sales}}{\$400,000} \quad \text{Sales} = \$1,000,000$$

$$\begin{aligned} \text{Cost of goods sold} &= (1 - \text{Gross profit margin})(\text{Sales}) \\ &= (0.9)(\$1,000,000) = \$900,000 \end{aligned}$$

$$\frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{\$900,000}{\text{Inventory}} = 9 \quad \text{Inventory} = \$100,000$$

$$\frac{\text{Receivables} \times 360 \text{ days}}{\$1,000,000} = 18 \text{ days}$$

$$\text{Receivables} = \$50,000$$

$$\frac{\text{Cash} + \$50,000}{\$100,000} = 1$$

$$\text{Cash} = \$50,000$$

Plant and equipment (plug figure on left-hand side of the balance sheet) = **\$200,000**

BALANCE SHEET			
Cash	\$ 50,000	Notes and payables	\$100,000
Accounts receivable	50,000	Long-term debt	100,000
Inventory	100,000	Common stock	100,000
Plant and equipment	200,000	Retained earnings	100,000
Total	<u>\$400,000</u>	Total	<u>\$400,000</u>

4. COMMON-SIZE ANALYSIS (%)	20X1	20X2	20X3
Cash	7.9	3.8	1.7
Receivables	27.5	27.8	34.0
Inventories	<u>28.4</u>	<u>25.4</u>	<u>27.6</u>
Current assets	63.8	57.0	63.3
Net fixed assets	<u>36.2</u>	<u>43.0</u>	<u>36.7</u>
Total assets	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Payables	26.1	28.6	30.4
Accruals	4.2	5.0	4.9
Bank loan	<u>3.5</u>	<u>8.7</u>	<u>8.8</u>
Current liabilities	33.8	42.3	44.1
Long-term debt	7.0	9.7	8.0
Shareholders' equity	<u>59.2</u>	<u>48.0</u>	<u>47.9</u>
Total liabilities and shareholders' equity	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Sales	100.0	100.0	100.0
Cost of goods sold	72.0	74.4	73.5
Selling, general, and administrative expenses	19.2	16.5	17.1
Interest	<u>0.6</u>	<u>1.3</u>	<u>1.2</u>
Profit before taxes	8.2	7.8	8.2
Taxes	<u>3.3</u>	<u>3.0</u>	<u>3.5</u>
Profit after taxes	<u>4.9</u>	<u>4.8</u>	<u>4.7</u>
INDEX ANALYSIS (%)	20X1	20X2	20X3
Cash	100.0	69.0	36.0
Receivables	100.0	146.2	206.4
Inventories	<u>100.0</u>	<u>128.7</u>	<u>161.8</u>
Current assets	100.0	128.9	165.5
Net fixed assets	<u>100.0</u>	<u>171.6</u>	<u>169.1</u>
Total assets	<u>100.0</u>	<u>144.3</u>	<u>166.8</u>
Payables	100.0	158.1	194.0
Accruals	100.0	171.4	195.0
Bank loan	<u>100.0</u>	<u>360.0</u>	<u>420.0</u>
Current liabilities	100.0	180.7	217.6
Long-term debt	100.0	200.0	190.0
Shareholders' equity	<u>100.0</u>	<u>117.0</u>	<u>135.1</u>
Total liabilities and shareholders' equity	<u>100.0</u>	<u>144.3</u>	<u>166.8</u>
Sales	100.0	126.0	137.8
Cost of goods sold	100.0	130.3	140.8
Selling, general, and administrative expenses	100.0	108.6	122.7
Interest	<u>100.0</u>	<u>257.5</u>	<u>273.9</u>
Profit before taxes	100.0	119.7	137.2
Taxes	<u>100.0</u>	<u>115.9</u>	<u>147.7</u>
Profit after taxes	<u>100.0</u>	<u>122.2</u>	<u>130.2</u>

The common-size analysis shows that cash declined dramatically relative to other current assets and total assets in general. Net fixed assets surged in 20X2 but then fell back as a percentage of the total to almost the 20X1 percentage. The absolute amounts suggest that the company spent less than its depreciation on fixed assets in 20X3. With respect to financing, shareholders' equity has not kept up, so the company has had to use somewhat more debt percentage-wise. It appears to be leaning more on trade credit as a financing source as payables increased percentage-wise. Bank loans and long-term debt also increased sharply in 20X2, no doubt to finance the bulge in net fixed assets. The bank loan remained about the same in 20X3 as a percentage of total liabilities and shareholders' equity, while long-term debt declined as a percentage. Profit after taxes slipped slightly as a percentage of sales over the three years. In 20X2 this decline was a result of the cost of goods sold and interest expense, as other expenses and taxes declined as a percentage of sales. In 20X3 cost of goods sold declined as a percentage of sales, but this was more than offset by increases in other expenses and taxes as percentages of sales.

Index analysis shows much the same picture. Cash declined faster than total assets and current assets, and receivables increased faster than these two benchmarks. Inventories fluctuated but were about the same percentage-wise relative to total assets in 20X3 as they were in 20X1. Net fixed assets increased more sharply than total assets in 20X2 and then fell back into line in 20X3. The sharp increase in bank loans in 20X2 and 20X3 and the sharp increase in long-term debt in 20X2, along with the accompanying increases in interest expenses, are evident. The percentage increases in shareholders' equity were less than those for total assets, so debt increased by larger percentages than for either of the other two items. With respect to profitability, net profits increased less than sales, for the reasons indicated earlier.

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## 15

Required Returns  
and the Cost of Capital

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## Objectives

**After studying Chapter 15, you should be able to:**

- Explain how a firm creates value, and identify the key sources of value creation.
- Define the overall “cost of capital” of the firm.
- Calculate the costs of the individual components of a firm’s overall cost of capital: cost of debt, cost of preferred stock, and cost of equity.
- Explain and use alternative models to determine the cost of equity, including the dividend discount approach, the capital-asset pricing model (CAPM) approach, and the before-tax cost of debt plus risk premium approach.
- Calculate the firm’s weighted average cost of capital (WACC) and understand its rationale, use, and limitations.
- Explain how the concept of Economic Value Added (EVA) is related to value creation and a firm’s cost of capital.
- Understand the capital-asset pricing model’s role in computing project-specific and group-specific required rates of return.

*To guess is cheap. To guess wrong is expensive.*

—CHINESE PROVERB

Having just considered risk in the capital budgeting process, we need to understand how risk affects the valuation of the enterprise. Its effect on value is shown through the returns that financial markets expect the corporation to provide on debt, equity, and other financial instruments. In general, the greater the risk, the higher the returns the financial markets expect from a capital investment. Thus the link from a capital investment to valuation is the required return used to determine whether or not a capital budgeting project will be accepted.

The acceptance criterion for capital investments is perhaps the most difficult and controversial topic in finance. We know that in theory the minimum acceptable rate of return on a project should be the rate that will leave the market price of the company's common stock unchanged. The difficulty lies in determining this rate in practice. Because predicting the effect of capital investment decisions on stock prices is an inexact science (some would call it an art form), estimating the appropriate required rate of return is inexact as well. Rather than skirt the issue, we address it head on and propose a general framework for measuring the required rate of return. The idea is a simple one. We try to determine the opportunity cost of a capital investment project by relating it to a financial market investment with the same risk.

## Creation of Value

If the return on a project exceeds what the financial markets require, it is said to earn an *excess return*. This excess return, as we define it, represents the creation of value. Simply put, the project earns more than its economic keep. Finding and undertaking these value-creating (positive NPV) projects increases a company's common stock share price.

Value creation has several sources, but perhaps the most important are industry attractiveness and competitive advantage. These are the things that give rise to projects with positive net present values – ones that provide expected returns in excess of what the financial markets require.

### ● ● ● Industry Attractiveness

Favorable industry characteristics include positioning in the growth phase of a product cycle, barriers to competitive entry, and other protective devices, such as patents, temporary monopoly power, and/or oligopoly pricing where nearly all competitors are profitable. In short, industry attractiveness has to do with the relative position of an industry in the spectrum of value-creating investment opportunities.

### ● ● ● Competitive Advantage

Competitive advantage involves a company's relative position within an industry. The company could be multidivisional, in which case competitive advantage needs to be judged industry by industry. The avenues to competitive advantage are several: cost advantage, marketing and price advantage, perceived quality advantage, and superior organizational capability (corporate culture). Competitive advantage is eroded with competition. Relative cost, quality, or marketing superiority, for example, are conspicuous and will be attacked. A successful company is one that continually identifies and exploits opportunities for excess returns. Only with a sequence of short-run advantages can any overall competitive advantage be sustained.

Thus industry attractiveness and competitive advantage are principal sources of value creation. The more favorable these are, the more likely the company is to have expected returns

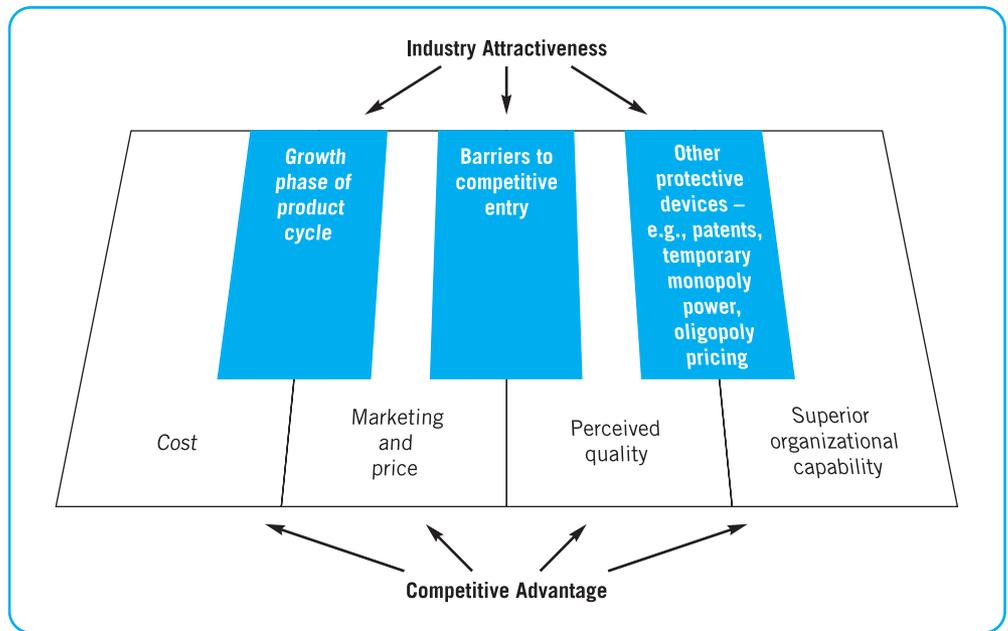


Figure 15.1

Key sources of value creation

in excess of what the financial markets require for the risk involved. These notions are illustrated in Figure 15.1.

## Overall Cost of Capital of the Firm

**Cost of capital** The required rate of return on the various types of financing. The overall cost of capital is a weighted average of the individual required rates of return (costs).

**Cost of equity capital** The required rate of return on investment of the common shareholders of the company.

**Cost of debt (capital)** The required rate of return on investment of the lenders of a company.

**Cost of preferred stock (capital)** The required rate of return on investment of the preferred shareholders of the company.

A company can be viewed as a collection of projects. As a result, the use of an overall **cost of capital** as the acceptance criterion (hurdle rate) for investment decisions is appropriate only under certain circumstances. These circumstances are that the current projects of the firm are of similar risk and that investment proposals under consideration are of the same character. If investment proposals vary widely with respect to risk, the required rate of return for the company as a whole is not appropriate as the sole acceptance criterion. The advantage of using the firm's overall required rate of return is, of course, its simplicity. Once it is computed, projects can be evaluated using a single rate that does not change unless underlying business and financial market conditions change. Using a single hurdle rate avoids the problem of computing individual required rates of return for each investment proposal. It is important to note, however, that if the firm's overall required rate of return is used as an acceptance criterion, projects should generally correspond to the foregoing conditions. Otherwise, one should determine an individual acceptance criterion for each project, a topic that we take up in the latter part of this chapter.

The overall cost of capital of a firm is a proportionate average of the costs of the various components of the firm's financing. The **cost of equity capital** is the most difficult to measure, and it will occupy most of our attention. We also consider the component **costs of debt** and **preferred stock**. We will rely on return (yield) calculations to determine cost figures because "cost" and "return" are essentially two sides of the same coin.<sup>1</sup> Our concern throughout will be with the *marginal* cost of a specific source of financing. The use of marginal costs follows from the fact that we use the cost of capital to decide whether to invest in *new* projects. Past costs of financing have no bearing on this decision. All costs will be expressed on an after-tax basis, to conform to the expression of investment project cash flows on an

<sup>1</sup>For example, if we give you \$10, you have just experienced a \$10 return while we have experienced a \$10 cost.

after-tax basis. Once we have examined the explicit costs of the various sources of financing, we will assign weights to each source. Finally, we will compute a weighted average of the component costs of financing to obtain an overall cost of capital to the firm. We assume in the development of this chapter that the reader has covered the foundation materials in Chapters 3 and 4 on the mathematics of finance and on valuation.

**Question**

**The cost of capital – what is it, really?**

**Answer**

It is the firm’s required rate of return that will just satisfy *all* capital providers. To get some feel for what this *cost of capital* figure really means, let’s look at a simple, personal example. Assume that you borrow some money from two friends (at two different costs), add some of your own money with the expectation of at least a certain minimum return, and seek out an investment. What is the minimum return you can earn that will just satisfy the return expectations of all capital providers (as listed in column number 2 of the table below)?

	(1)	(2)	(3)	(2) × (3)	(1) × (2)
CAPITAL PROVIDERS	INVESTED CAPITAL	PERCENTAGE ANNUAL COST (INVESTOR RETURN)	PROPORTION OF TOTAL FINANCING	WEIGHTED COST	DOLLAR ANNUAL COST (INVESTOR RETURN)
Bubba	\$ 2,000	5%	20%	1.0%	\$ 100
Dolly	3,000	10	30	3.0	300
You	5,000	15	50	7.5	750
	<u>\$10,000</u>		<u>100%</u>	<u>11.5%</u>	<u>\$1,150</u>

Assume that your “firm” earns a yearly 11.5 percent return (the weighted average cost of capital employed) on the \$10,000 of invested capital. The \$1,150 so provided will just satisfy the return requirements of all the capital providers. Now, replace “Bubba,” “Dolly,” and “You” with the terms “Debt,” “Preferred Stock,” and “Common Stock” (and yes, we still need to consider tax implications; but let’s assume no taxes for the moment). With these new terms in place you should begin to understand the direction that we will be taking in finding the firm’s required rate of return – *the cost of capital* – that will just satisfy all capital providers.

● ● ● **Cost of Debt**

Although the liabilities of a company are varied, our focus is only on nonseasonal debt that bears an explicit interest cost. We ignore accounts payable, accrued expenses, and other obligations not having an explicit interest cost. For the most part, our concern is with long-term debt. However, continuous short-term debt, such as an accounts-receivable-backed loan, also qualifies. (A bank loan to finance seasonal inventory requirements would not qualify.) The assumption is that the firm is following a **hedging (maturity matching) approach** to project financing. That is, the firm will finance a capital project, whose benefits extend over a number of years, with financing that is generally long term in nature.

The explicit cost of debt can be derived by solving for the discount rate,  $k_d$ , that equates the market price of the debt issue with the present value of interest plus principal payments and by then adjusting the explicit cost obtained for the tax deductibility of interest payments. The discount rate,  $k_d$ , known as the *yield to maturity*, is solved for by making use of the formula

**Hedging (maturity matching) approach**  
A method of financing where each asset would be offset with a financing instrument of the same approximate maturity.

$$P_0 = \sum_{t=1}^n \frac{I_t + P_t}{(1 + k_d)^t} \quad (15.1)$$

where  $P_0$  is the current market price of the debt issue;  $\Sigma$  denotes the summation for periods 1 through  $n$ , the final maturity;  $I_t$  is the interest payment in period  $t$ ; and  $P_t$  is the payment of principal in period  $t$ . If principal payments occur only at final maturity, only  $P_n$  will occur. By solving for  $k_d$ , the discount rate that equates the present value of cash flows to the suppliers of debt capital with the current market price of the new debt issue, we obtain the required rate of return of the lenders to the company. This required return to lenders can be viewed as the issuing company's before-tax cost of debt. (Most of this should already be familiar to you from our discussion of yield to maturity (YTM) on bonds in Chapter 4.)

The after-tax cost of debt, which we denote by  $k_i$ , can be approximated by

$$k_i = k_d(1 - t) \quad (15.2)$$

where  $k_d$  remains as previously stated and  $t$  is now defined as the company's marginal tax rate. Because interest charges are tax deductible to the issuer, the after-tax cost of debt is substantially less than the before-tax cost. If the before-tax cost,  $k_d$ , in Eq. (15.1) was found to be 11 percent and the marginal tax rate (federal plus state) was 40 percent, the after-tax cost of debt would be

$$k_i = 11.00(1 - 0.40) = \mathbf{6.60\%}$$

You should note that the 6.60 percent after-tax cost in our example represents the marginal, or incremental, cost of additional debt. It does not represent the cost of debt funds already employed.

Implied in the calculation of an after-tax cost of debt is the fact that the firm has taxable income. Otherwise, it does not gain the tax benefit associated with interest payments. The explicit cost of debt for a firm without taxable income is the before-tax cost,  $k_d$ .

### ● ● ● Cost of Preferred Stock

The cost of preferred stock is a function of its stated dividend. As we discuss in Chapter 20, this dividend is not a contractual obligation of the firm but, rather, is payable at the discretion of the firm's board of directors. Consequently, unlike debt, it does not create a risk of legal bankruptcy. To the holders of common stock, however, preferred stock is a security that takes priority over their securities when it comes to the payment of dividends and to the distribution of assets if the company is dissolved. Most corporations that issue preferred stock fully intend to pay the stated dividend. The market-required return for this stock, or simply the yield on preferred stock, serves as our estimate of the cost of preferred stock. Because preferred stock has no maturity date, its cost,  $k_p$ , may be represented as

$$k_p = D_p/P_0 \quad (15.3)$$

where  $D_p$  is the stated annual dividend and  $P_0$  is the current market price of the preferred stock.<sup>2</sup> If a company were able to sell a 10 percent preferred stock issue (\$50 par value) at a current market price of \$49 a share, the cost of preferred stock would be  $\$5/\$49 = \mathbf{10.20\%}$ . Note that this cost is not adjusted for taxes because the preferred stock dividend used in Eq. (15.3) is already an after-tax figure – preferred stock dividends being paid after taxes. Thus the explicit cost of preferred stock is greater than that for debt.

<sup>2</sup>Virtually all preferred stock issues have a *call feature* (a provision that allows the company to force retirement). If the issuer anticipates retiring (calling) preferred stock at a particular date, we can apply a modified version of the formula used to solve for the yield on debt, Eq. (15.1), to find the yield (cost) of preferred stock that will be called. In Eq. (15.1) the periodic preferred dividend replaces the periodic interest payment, and the "call price" replaces the principal payment at final maturity (call date). The discount rate that equates all payments to the price of the preferred stock is the cost of the preferred stock.

However, the preferred stock offers a desirable feature to the corporate investor. The tax law provides that generally 70 percent of the dividends received by one corporation from another are exempt from federal taxation. This attraction on the demand side usually results in yields on preferred stock being slightly below those on bonds issued by the same company. It is only after taxes, then, that debt financing generally looks more attractive to the issuing firm.

### ● ● ● Cost of Equity: Dividend Discount Model Approach

#### Take Note

The cost of equity capital is by far the most difficult cost to measure. Equity capital can be raised either internally by retaining earnings or externally by selling common stock. In theory, the cost of both may be thought of as the minimum rate of return that the company must earn on the equity-financed portion of an investment project in order to leave the market price of the firm's common stock unchanged. If the firm invests in projects having an expected return less than this required return, the market price of the stock will suffer over the long run.

In the context of the dividend discount valuation models presented in Chapter 4, the cost of equity capital,  $k_e$ , can be thought of as the discount rate that equates the present value of all expected future dividends per share, as perceived by investors at the margin, with the current market price per share. Recall from Chapter 4 that

$$P_0 = \frac{D_1}{(1 + k_e)^1} + \frac{D_2}{(1 + k_e)^2} + \dots + \frac{D_\infty}{(1 + k_e)^\infty} \quad (15.4)$$

$$= \sum_{t=1}^{\infty} \frac{D_t}{(1 + k_e)^t}$$

where  $P_0$  is the market price of a share of stock at time 0,  $D_t$  is the dividend per share expected to be paid at the end of time period  $t$ ,  $k_e$  is the appropriate discount rate, and  $\Sigma$  represents the sum of the discounted future dividends from period 1 through infinity, depicted by the symbol  $\infty$ .

**Estimating Future Dividends.** If we accurately estimate the stream of future dividends that the market expects, it is an easy matter to solve for the discount rate that equates this cash stream with the current market price of the stock. Because expected future dividends are not directly observable, they must be estimated. Herein lies the major difficulty in estimating the cost of equity capital. Given reasonably stable patterns of past growth, one might project this trend into the future. However, we must temper our projection with current market sentiment. Insight into such sentiment can come from reviewing various analyses about the company in financial newspapers and magazines.

For example, if dividends are expected to grow at an 8 percent annual rate into the foreseeable future, the constant growth model presented in Chapter 4 might be used to determine the required rate of return. If the expected dividend in the first year were \$2 and the present market price were \$27, we would have

$$k_e = (D_1/P_0) + g \quad (15.5)$$

$$= (\$2/\$27) + 0.08 = \mathbf{15.4\%}$$

This rate would then be used as an estimate of the firm's required return on equity capital. The key element in Eq. (15.5) is an accurate measurement of the growth in dividends per share,  $g$ , as perceived by investors at the margin.

**Growth Phases.** If the growth in dividends is expected to taper off in the future, the constant growth model will not do. As explained in Chapter 4, a modification of Eq. (15.4) is then in order. Frequently, the transition in dividend growth is from an above-normal growth rate to one that is considered normal. If dividends were expected to grow at a 15 percent compound rate for five years, at a 10 percent rate for the next five years, and then grow at a 5 percent rate, we would have

$$P_0 = \sum_{t=1}^5 \frac{D_0(1.15)^t}{(1+k_e)^t} + \sum_{t=6}^{10} \frac{D_5(1.10)^{t-5}}{(1+k_e)^t} + \sum_{t=11}^{\infty} \frac{D_{10}(1.05)^{t-10}}{(1+k_e)^t} \quad (15.6)$$

We see that the current dividend,  $D_0$ , is the base on which the expected growth in future dividends is built. By solving for  $k_e$ , we obtain the cost of equity capital. One would use the method illustrated in Chapter 4 to solve for  $k_e$ . For example, if the current dividend,  $D_0$ , were \$2 a share and the market price per share,  $P_0$ , were \$70,  $k_e$  in Eq. (15.6) would be 10.42 percent. For other patterns of expected future growth, Eq. (15.4) can easily be modified to deal with the particular situation.

The more growth segments that we specify, of course, the more the growth pattern will approximate a curvilinear relationship. From Chapter 4, we learned how to determine the present value of the last growth phase in Eq. (15.6). This last phase is nothing more than a constant growth model following periods of above-normal growth.

### ● ● ● Cost of Equity: Capital-Asset Pricing Model Approach

Rather than estimating the future dividend stream of the firm and then solving for the cost of equity capital, we may approach the problem directly by estimating the required rate of return on the company's common stock. From our discussion of the capital-asset pricing model (CAPM) in Chapter 5, we know that the CAPM implies the following required rate of return,  $R_j$ , for a share of common stock:

$$R_j = R_f + (\bar{R}_m - R_f)\beta_j \quad (15.7)$$

where  $R_f$  is the risk-free rate,  $\bar{R}_m$  is the expected return for the market portfolio, and  $\beta_j$  is the beta coefficient for stock  $j$ . From Chapter 5, we know that because of the market's aversion to systematic risk, the greater the beta of a stock, the greater its required return. The risk-return relationship is described by Eq. (15.7) and is known as the *security market line* (see Fig. 5.6 in Chapter 5). It implies that in market equilibrium, security prices will be such that there is a linear trade-off between the required rate of return and systematic risk, as measured by beta.

**Beta.** Beta is a measure of the responsiveness of the excess returns for a security (in excess of the risk-free rate) to those of the market, using some broad-based index, such as the S&P 500 Index as a surrogate for the market portfolio. If the historical relationship between security returns and those for the market portfolio is believed to be a reasonable proxy for the future, one can use past returns to compute beta for a stock. This was illustrated in Chapter 5, where a *characteristic line* was fitted to the relationship between returns in excess of the risk-free rate for a stock and those for the market index. *Beta* is defined as the slope of this line. To free us of the need to calculate beta information directly, several services (for example, Value Line Investment Survey, Standard & Poor's Stock Reports, and Reuters [[www.reuters.com/finance/stocks](http://www.reuters.com/finance/stocks)]) provide historical beta information on a large number of publicly traded stocks. These services allow us to obtain the beta for a stock with ease, thereby greatly facilitating the calculation of the cost of equity capital.

If the past is thought to be a good proxy for the future, we can use Eq. (15.7) to compute the cost of equity capital for a company. To illustrate, suppose that the beta for Schlosky's Paint Company was found to be 1.20, based on monthly excess return data over the last five years. This beta value tells us that the stock's excess return goes up or down by a somewhat greater percentage than does the excess return for the market. (A beta of 1.00 means that

excess returns for the stock vary proportionally with excess returns for the market portfolio.) Thus the stock of Schlosky's Paint Company has more unavoidable, or systematic, risk than does the market as a whole. Management believes that this past relationship is likely to hold in the future. Furthermore, assume that a rate of return of about 13 percent on stocks in general is expected to prevail and that a risk-free rate of 8 percent is expected.

This is all the information that we need to compute the required rate of return on equity for Schlosky's Paint Company. Using Eq. (15.7), the cost of equity capital would be

$$R_j = 0.08 + (0.13 - 0.08)(1.20) = 14\%$$

Thus the estimated required rate of return for Schlosky's Paint Company is approximately 14 percent. In essence, we are saying that this is the rate of return that investors expect the company to earn on its equity.

**Risk-Free Rate and Market Return.** In addition to beta, it is important that the numbers used for the risk-free rate and the expected market return in Eq. (15.7) be the best possible estimates of the future. The risk-free return estimate is controversial – not as to the type of security return that should be used but as to the security's relevant maturity. Most agree that a Treasury security, which is backed by the full faith and credit of the US government, is the proper instrument to use in making a “risk-free” return estimate. But the choice of a proper maturity is another matter. As the CAPM is a one-period model, some contend that a short-term rate, such as that for three-month Treasury bills, is in order. Others argue that, because capital investment projects are long-lived, a long-term Treasury bond rate should be used. Still others, the authors included, feel more comfortable with an intermediate-term rate, such as that on three-year Treasury securities. This is a middle position in a rather murky area. With an upward-sloping *yield curve* (graph of the relationship between yields and maturity), the longer the maturity, the higher the risk-free rate.

For the expected return on the market portfolio of stock, as usually depicted by the S&P 500 Index, one can use consensus estimates of security analysts, economists, and others who regularly predict such returns. Goldman Sachs, Merrill Lynch, and other investment banks make these predictions, often on a monthly basis. These estimated annual returns are for the immediate future. The expected return on the market portfolio has exceeded the risk-free rate by anywhere from 5 to 8 percent in recent years. Expressed differently, the “before-hand” or *ex ante* market risk premium has ranged from 5 to 8 percent. This is not the range of risk premiums actually realized over some holding period but rather the expected risk premium for investing in the market portfolio as opposed to the risk-free security. Owing to changes in expected inflation, interest rates, and the degree of investor risk aversion in society, both the risk-free rate and the expected market return change over time. Therefore the 14 percent figure that we computed earlier would be an estimate of the required return on equity at only a particular moment in time.

If measurements were exact and the assumption of a perfect capital market held,<sup>3</sup> the cost of equity determined by this method would be the same as that provided by a dividend discount model. Recall that the latter estimate is the discount rate that equates the present value of the stream of expected future dividends with the current market price of the stock. By now it should be apparent that we can only hope to approximate the cost of equity capital. We

<sup>3</sup>As discussed in Chapter 5, the capital-asset pricing model assumes the presence of perfect capital markets. When this assumption is relaxed to take account of real-world conditions, the unsystematic risk of a stock may take on a degree of importance. We know that the total risk of a security is composed of its systematic as well as its unsystematic risk. The assumption of the capital-asset pricing model is that unsystematic risk can be completely diversified away, leaving us with only systematic risk.

If imperfections exist in the capital markets, these may impede efficient diversification by investors. (One example of an imperfection is the presence of significant bankruptcy costs.) The greater the imperfections that are believed to exist, the greater the allowance that must be made for the return on common stock to also provide compensation for unsystematic risk. As a result, it would be necessary to adjust upward the required rate of return on equity.

believe that the methods suggested enable such an approximation to be made more or less accurately, depending on the situation. For a large company whose stock is actively traded on the New York Stock Exchange and whose systematic risk is close to that of the market as a whole, we can usually estimate more confidently than we can for a moderate-sized company whose stock is inactively traded in the over-the-counter market and whose systematic risk is very large. We must live with the inexactness involved in the measurement process and try to do as good a job as possible.

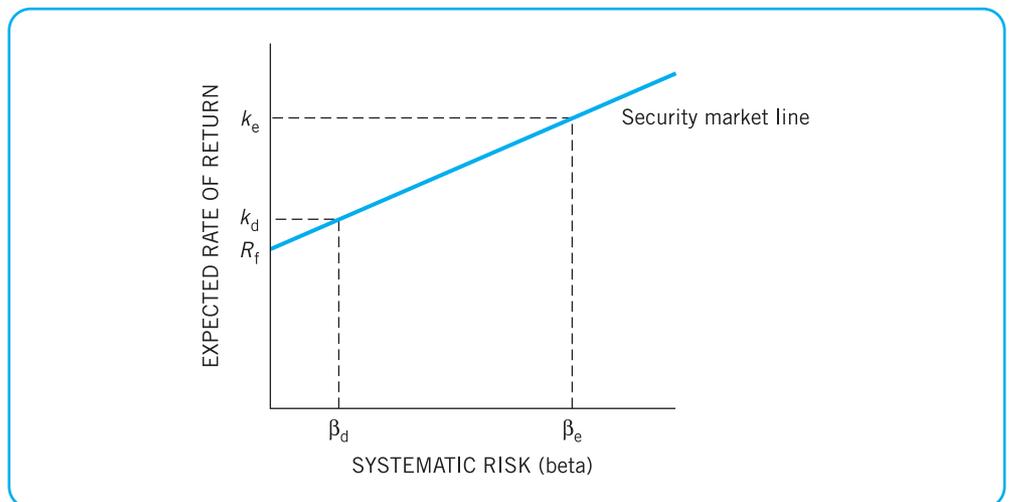
● ● ● **Cost of Equity: Before-Tax Cost of Debt Plus Risk Premium Approach**

Rather than estimate the required return on equity capital using the sophisticated methods previously described, some people use a relatively simple, “quick and dirty,” approach. Here the company’s before-tax cost of debt forms the basis for estimating the firm’s cost of equity. The firm’s before-tax cost of debt will exceed the risk-free rate by a risk premium. The greater the risk of the firm, the greater this premium, and the more interest the firm must pay in order to borrow. The relationship is illustrated in Figure 15.2. On the horizontal axis, the firm’s debt is shown to have systematic risk equal to  $\beta_d$ . As a result, its required return is  $k_d$ , which exceeds the risk-free rate of  $R_f$ .

In addition to this risk premium, the common stock of a company must provide a higher expected return than the debt of the same company. The reason is that there is more systematic risk involved. This phenomenon is also illustrated in Figure 15.2. We see that for an equity beta of  $\beta_e$ , an expected return of  $k_e$  is required and that this percentage exceeds the company’s before-tax cost of debt,  $k_d$ . The historical (modern era) risk premium in expected return for stocks over corporate bonds has been around 5 percent. If this seemed reasonable for a particular company, one could use the firm’s before-tax cost of debt as a base and add to it a premium of around 5 percent to estimate its cost of equity capital.

To illustrate, suppose that Schlosky’s Paint Company’s bonds sell in the market to yield 9 percent. Using the approach just outlined, we find the company’s approximate cost of equity would be

$$\begin{aligned}
 k_e &= \text{Before-tax cost of debt } (k_d) + \text{Risk premium in expected return for stock over debt} && \text{[15.8]} \\
 &= 9\% + 5\% = 14\%
 \end{aligned}$$



**Figure 15.2**  
The security market line (SML) with debt and stock illustrated

This percentage would then be used as an estimate of the cost of equity capital. The advantage of this approach is that one does not have to use beta information and make the calculation involved in Eq. (15.7). One disadvantage is that it does not allow for changing risk premiums over time. Also, because the 5 percent risk premium is based on an average for companies overall, the approach is not as accurate as either of the other methods discussed for estimating the required return on equity capital for a specific company. It does, however, offer an alternative method of estimating the cost of equity capital that falls within the overall framework of the capital-asset pricing model. It also provides a ready check on the reasonableness of the answers we get from applying the more complicated estimation techniques.

### ● ● ● Weighted Average Cost of Capital

Once we have computed the costs of the individual components of the firm’s financing,<sup>4</sup> we would assign weights to each financing source according to some standard and then calculate a weighted average cost of capital (WACC). Thus the firm’s overall cost of capital can be expressed as

$$\text{Cost of capital} = \sum_{x=1}^n k_x(W_x) \tag{15.9}$$

where  $k_x$  is the after-tax cost of the  $x$ th method of financing,  $W_x$  is the weight given to that method of financing as a percentage of the firm’s total financing, and  $\Sigma$  denotes the summation for financing methods 1 through  $n$ . To illustrate the calculations involved, suppose that a firm had the following financing at the latest balance sheet statement date, where the amounts shown in the table below represent market values.

	AMOUNT OF FINANCING	PROPORTION OF TOTAL FINANCING
Debt	\$ 30 million	30%
Preferred stock	10 million	10
Common stock equity	<u>60 million</u>	<u>60</u>
	\$100 million	100%

#### Take Note

Remember, common stock equity on our books is the sum total of common stock at par, additional paid-in capital, and retained earnings. For market value purposes, however, it is represented by the current market price per share of common stock times the number of shares outstanding. In calculating proportions, it is important that we use *market value* as opposed to *book value* weights. Because we are trying to maximize the value of the firm to its shareholders, only market value weights are consistent with our objective. Market values are used in the calculation of costs of the various components of financing, so market value weights should be used in determining the weighted average cost of capital. (Also, we are implicitly assuming that the current financing proportions will be maintained into the future. We will have more to say on this issue a little later in the chapter.)

<sup>4</sup>Debt, preferred stock, and equity are the major types of financing. So, generally we have

$$\text{Cost of capital} = k_i(W_i) + k_p(W_p) + k_e(W_e)$$

However, there are other types of financing, such as leasing and convertible securities. Because determining the costs of these other financing sources involves some special and rather complex issues, we treat them in individual chapters, where we are able to give such issues proper attention. For our purposes in this chapter, knowing the costs of debt, preferred stock, and equity financing is sufficient for illustrating the overall cost of capital for a company. When costs are determined for other types of financing, they can be inserted in the weighting scheme to be discussed now.

To continue with our illustration, suppose that the firm computed the following after-tax costs for the component sources of financing:

	COST
Debt	6.6%
Preferred stock	10.2
Common stock equity	14.0

### TIP • TIP

As explained earlier, the common stock of a company must provide a higher expected return than the debt of the same company. Therefore, distrust *any* calculation of cost of equity that produces a cost estimate lower than the before-tax cost of the firm's debt.

Again we emphasize that these costs must be present-day costs based on current financial market conditions. Past embedded costs of financing have no bearing on the required rate of return to be applied to new projects. Given the costs shown, the weighted average cost of capital for this example problem is determined as follows:

	(1) COST	(2) PROPORTION OF TOTAL FINANCING	(1) × (2) WEIGHTED COST
Debt	6.6%	30%	1.98%
Preferred stock	10.2	10	1.02
Common stock equity	14.0	<u>60</u>	<u>8.40</u>
		100%	<b>11.40%</b>

Thus, given the assumptions of this example, 11.4 percent represents the weighted average cost of the component sources of financing, where each component is weighted according to market value proportions.

### Some Limitations

With the calculation of a weighted average cost of capital, the critical question is whether the figure represents the firm's real cost of capital. The answer depends on how accurately we have measured the individual marginal costs, on the weighting system, and on certain other assumptions. Assume for now that we are able to accurately measure the marginal costs of the individual sources of financing, and let us examine the importance of the weighting system.

**Weighting System.** The critical assumption in any weighting system is that the firm will in fact raise capital in the proportions specified. Because the firm raises capital *marginally* to make *marginal* investments in new projects, we need to work with the marginal cost of capital for the firm as a whole. This rate depends on the package of funds employed to finance investment projects. In other words, our concern is with new or incremental capital, not with capital raised in the past. For the weighted average cost of capital to represent a marginal cost, the weights employed must be marginal. That is, the weights must correspond to the proportions of financing inputs the firm intends to employ. If they do not, capital is raised on a marginal basis in proportions other than those used to calculate this cost. As a result, the real weighted average cost of capital will differ from that calculated and used for capital investment decisions. If the real cost is greater than that which is measured, certain investment projects that will leave investors worse off than before will be accepted. On the other hand, if the real cost

is less than the measured cost, projects that could increase shareholder wealth will be rejected. Therefore the 11.4 percent weighted average cost of capital computed in our example is realistic only if the firm intends to finance in the future in the same proportions as its existing capital structure would imply.

Raising capital is “lumpy,” and strict proportions cannot be maintained. For example, a firm would have difficulty financing each project with exactly 30 percent debt, 10 percent preferred stock, and 60 percent equity. In practice, it may finance with debt in one instance and with preferred stock or equity in another. Over time, however, most firms are able to finance in a roughly proportional manner. It is in this sense that we try to measure the marginal cost of capital for the package of financing employed.

**Flotation costs** The costs associated with issuing securities, such as underwriting, legal, listing, and printing fees.

**Flotation Costs.** **Flotation costs** involved in the sale of debt instruments, preferred stock, or common stock affect the profitability of a firm’s investments. In many cases, the new issue must be priced below the market price of existing financing. In addition, there are out-of-pocket flotation costs. Owing to flotation costs, the amount of funds the firm receives is less than the price at which the issue is sold. The presence of flotation costs in financing requires that an adjustment be made in the evaluation of investment proposals.

One approach, which we refer to as the *adjustment to initial outlay* (AIO) method, treats the flotation costs of financing as an addition to the initial cash outlay for the project. According to this procedure, the net present value of a project is computed according to:<sup>5</sup>

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+k)^t} - (ICO + \text{Flotation costs}) \quad (15.10)$$

where  $CF_t$  is the project cash flow at time  $t$ ,  $ICO$  is the initial cash outlay required for the project, and  $k$  is the firm’s cost of capital.

Suppose that an investment proposal costs \$100,000 and that to finance the project the company must raise \$60,000 externally. Both debt and common stock are involved, and after-tax flotation costs (in present value terms) come to \$4,000.<sup>6</sup> Therefore \$4,000 should be added to \$100,000, bringing the total initial outlay to \$104,000. In this way, the proposal is properly “penalized” for the flotation costs associated with its financing. The expected future cash flows associated with the project are then discounted at the weighted average cost of capital. If the project were expected to provide annual after-tax cash inflows of \$24,000 for 20 years and the weighted average cost of capital were 20 percent, the project’s net present value would be

$$\begin{aligned} NPV &= \sum_{t=1}^{20} \frac{\$24,000}{(1+0.20)^t} - (\$100,000 + \$4,000) \\ &= \$24,000(PVIFA_{20\%,20}) - \$104,000 \\ &= \$116,870 - \$104,000 = \mathbf{\$12,870} \end{aligned}$$

This amount contrasts with a net present value of  $\$116,870 - \$100,000 = \mathbf{\$16,870}$  if no adjustment is made for flotation costs.

A second, more traditional approach calls for an upward adjustment of the cost of capital when flotation costs are present. This method, which we refer to as the *adjustment to discount*

<sup>5</sup>Alternatively, expressing flotation costs as a percentage of the initial investment,  $f = \text{flotation costs}/ICO$ , we can rewrite Eq. (15.10) as follows:

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+k)^t} - ICO(1+f)$$

This alternative formula may come in handy when trying to estimate actual future flotation costs proves difficult. One could use instead a flotation cost percentage based on past experience.

<sup>6</sup>Equity flotation costs are not tax deductible. Debt flotation costs, however, are a tax-deductible expense amortized over the life of the debt issue. Therefore we reduce out-of-pocket total flotation costs by the present value of the debt flotation cost tax-shield benefits provided over the life of the debt issue.

rate (ADR) procedure, thus adjusts a project's discount rate for flotation costs and not the project's cash flows. Under this procedure each component cost of capital would be recalculated by finding the discount rate that equates the present value of cash flows to the suppliers of capital with the *net proceeds* of a security issue, rather than with the security's market price.<sup>7</sup> The resulting "adjusted" component costs would then be weighted and combined to produce an overall "adjusted" cost of capital for the firm.

The "adjusted" cost of capital figure thus calculated will always be greater than the "unadjusted" cost of capital figure, which we have described in this chapter. However, NPVs calculated under the AIO and ADR methods will (with rare exceptions) have different numerical values and may, in fact, have opposite signs. Thus the question of which method is "correct" is not a matter of indifference.

Advocates of the AIO method argue that it is superior to the ADR method because (1) it is simpler and/or (2) the discount rate derived under the ADR approach is not the "true" cost of capital and therefore does not give the "true" market value of a project's cash flows.<sup>8</sup> We tend to agree with both arguments and therefore favor the AIO method. We suggest that a flotation cost adjustment be made to the project's initial cash outlay and that the weighted average "unadjusted" cost of capital be used as the discount rate. However, we should point out that in many circumstances (for example, where external financing is a small proportion of total project financing) the differences in resulting NPVs under the two alternative methods will be small. In such cases, the ADR method is acceptable.

### Question

**Some projects that a firm accepts will undoubtedly result in zero or negative returns. Therefore, shouldn't the firm adjust its hurdle rate upward to ensure that the weighted average return on its total new investments meets or exceeds the firm's cost of capital?**

### Answer

No. Arbitrarily raising the firm's hurdle rate means that the firm will be rejecting some projects with otherwise positive net present values. Only by accepting all positive net present value projects does the firm maximize its ability to offset any nonearning investments.

## ● ● ● Rationale for a Weighted Average Cost

The rationale behind the use of a weighted average cost of capital is that, by financing in the proportions specified and accepting projects yielding more than the weighted average required return, the firm is able to increase the market price of its stock. This increase occurs because investment projects are expected to return more on their equity-financed portions than the required return on equity capital,  $k_e$ . Once these expectations are apparent to the marketplace, the market price of the firm's stock should rise, all other things remaining equal. The firm has accepted projects that are expected to provide a return greater than that required by investors at the margin, based on the risk involved.

We must return to the critical assumption that over time the firm finances projects in the proportions specified. If it does so, the financial risk of the company remains roughly

<sup>7</sup>Computationally, in Equations (15.1), (15.3), and (15.5), the current market price of every security ( $P_0$ ) would be replaced with the current *net proceeds* for each new issued security ( $NP_0$ ). For example, consider Eq. (15.3), which states that  $k_p = D_p/P_0$ . Using the ADR procedure, a modified Eq. (15.3) would give  $k_p = D_p/NP_0$ .

<sup>8</sup>For a defense of the AIO procedure, see John R. Ezzell and R. Burr Porter, "Flotation Costs and the Weighted Average Cost of Capital," *Journal of Financial and Quantitative Analysis* 11 (September 1976), 403–413.

unchanged. As we shall see in Chapter 17, the “implicit” costs of financing are embodied in the weighted average cost of capital by virtue of the fact that a firm has to supplement non-equity financing with equity financing. It does not continually raise capital with supposedly cheaper debt funds without increasing its equity base. The firm’s financing mix need not be optimal for the firm to employ the weighted average cost of capital for capital budgeting purposes. The important consideration is that the weights be based on the future financing plans of the company. If they are not, the weighted average cost of capital calculated does not correspond to the actual cost of funds obtained. As a result, capital budgeting decisions are likely to be suboptimal.

### Question

**Felsham Industries plans on financing *all* of its new capital budgeting projects this year with long-term debt. Therefore, its cost of capital this year should be the after-tax cost of its new debt – right?**

### Answer

Wrong. Firms frequently finance new projects with long-term debt one year and equity the next. The firm’s capital structure will thus vary somewhat year to year from its optimal level. It is the firm’s long-term, target capital structure along with its associated component costs and market value weights that should be used to determine the firm’s cost of capital. To do otherwise would cause the firm’s cost of capital (hurdle rate) to be overly generous (low) in years when debt financing is primarily employed and unduly severe (high) in years when equity capital is primarily used to finance new projects.

The use of a weighted average cost of capital figure must also be qualified for the points raised earlier. It assumes that the investment proposals being considered do not differ in systematic, or unavoidable, risk from that of the firm and that the unsystematic risk of the proposals does not provide any diversification benefits to the firm. Only under these circumstances is the cost of capital figure obtained appropriate as an acceptance criterion. These assumptions are extremely limiting. They imply that the projects of a firm are completely alike with respect to risk and that only projects of the same risk will be considered.

In actual practice, however, the issue is one of degree. If the conditions noted are approximately met, then the company’s weighted average cost of capital may be used as the acceptance criterion. If a firm produced only one product and all proposals considered were in conjunction with the marketing and production of the product, the use of the firm’s overall cost of capital as the acceptance criterion would probably be appropriate. (Even here, however, there may be significant enough differences in risk among investment proposals to warrant separate consideration.) For a multiproduct firm with investment proposals of varying risk, the use of an overall required return is inappropriate. Here a required rate of return based on the risk characteristics of the specific proposal should be used. We will determine these project-specific required rates of return with the methods proposed in the next section. The key, then, to using the overall cost of capital as a project’s required rate of return is the similarity of the project with respect to the risk of existing projects and investment proposals under consideration.

#### Economic value added (EVA)

A measure of business performance. It is a type of economic profit, which is equal to a company’s after-tax net operating profit minus a dollar cost of capital charge (and possibly including some adjustments).

### ● ● ● Economic Value Added (EVA)

Another way of expressing the fact that to create value a company must earn returns on invested capital greater than its cost of capital is through the concept of **Economic Value Added (EVA)**. EVA is the trademarked name for a specific approach to calculating *economic*

**Net operating profit after tax (NOPAT)**

A company's potential after-tax net profit if it was all-equity-financed or "unlevered."

*profit* developed by the consulting firm of Stern Stewart & Co. The concept of economic profit (or residual income) has been discussed in the economic literature for more than 100 years. EVA, however, was introduced in the late 1980s. Basically, EVA is the economic profit a company earns after all capital costs are deducted. More specifically, it is a firm's **net operating profit after tax (NOPAT)** minus a dollar-amount cost of capital charge for the capital employed. Although the basic EVA calculation appears quite simple, Stern Stewart's specific method of calculating EVA includes a long list of possible adjustments to the accounting figures. Adjustments are suggested to NOPAT to reflect more of a cash rather than accrual accounting approach to performance. And adjustments are suggested to the accounting book value of capital employed, such as capitalizing research and development (R&D) expenditures to better reflect the investment nature of these expenditures.

Infosys Technologies Limited, one of India's largest Information Technology companies, follows a Stern Stewart & Co. style approach to EVA. Based on figures reported in Infosys Technologies 2007 annual report, here is a condensed version of their EVA calculation for fiscal year 2007:

	(IN MILLIONS OF INDIAN RUPEES – Rs.)
Net (adjusted) operating profit after taxes	Rs. 34,910
Less: Average capital employed × Cost of capital	
Rs. 94,170 × 14.97%	13,690
Economic value added	Rs. 21,220

This says that Infosys Technologies earned roughly Rs. 21,220 million more in profit than is required to cover all costs, including the cost of capital.

## Sarbanes-Oxley Helps Cost of Capital

### financialexecutive

**D**espite current calls in Congress to ease the impact of the Sarbanes-Oxley Act, an MIT Sloan School of Management professor and co-authors find that the Act's reporting and disclosure standards have brought significant financial benefits for businesses, including smaller firms that some have been seeking to exempt from the law.

Far from just adding to corporate costs, says MIT Sloan Assistant Professor Ryan LaFond, "our findings tell a very different but consistent story about Sarbanes-Oxley. Firms with strong internal controls already in place and firms that remediate prior control weaknesses are rewarded with a significantly lower cost of capital," which falls by as much as 150 basis points [1.5 percent] for firms that can demonstrate such compliance.

LaFond compared unaudited financial disclosures by companies prior to Sarbanes-Oxley to audit opinions issued after the law was enacted. "Our results indicate

that the market was adding higher costs of capital borrowing even before the formal internal control reporting required by [the law]," he says. "Companies with poor internal controls tend to have poorer quality financial information, which indicates problems to investors, which causes the market to assess a higher cost of capital."

But that market penalty is reversed – and capital costs are lower – after Sarbanes-Oxley compliance enables companies to prove to investors they have maintained or established solid financial systems. "A subset of the firms that we reviewed had poor internal controls," says LaFond. "The real test of our study is whether their cost of capital goes down once the Sarbanes-Oxley audit demonstrates to the market that the internal control problems are fixed. And those costs do consistently go down."

LaFond agrees that Sarbanes-Oxley does add costs for businesses, but predicts that burden will most likely ease over time. "Most audit firms will tell you that there was a large, one-time cost to get companies up to speed to meet SOX requirements, but going forward, things won't be so costly. There is already some evidence that audit fees are going down."

Source: Jeffrey Marshall and Ellen M. Heffes, "Sarbanes-Oxley Helps Cost of Capital: Study," *Financial Executive* (October 2006), p. 8. ([www.financialexecutives.org](http://www.financialexecutives.org)) © Copyright 2006 by Financial Executives International Incorporated. Used by permission. All rights reserved.

EVA's strength comes from its explicit recognition that a firm is not really creating shareholder value until it is able to cover all of its capital costs. *Accounting profit* calculations explicitly consider debt financing charges but exclude the costs related to equity financing. *Economic profit*, and hence EVA, differs from accounting profit in that it includes a charge for *all* the company's capital – both debt and equity. In short, a firm showing a positive accounting profit could actually be destroying value because shareholders might not be earning their required return. Thus a positive EVA value generally indicates that shareholder value is being created, whereas a negative EVA value suggests value destruction.<sup>9</sup>

EVA enjoys growing popularity because it serves as a constant reminder to managers that they have not really done a good job unless and until they have earned a return that covers their cost of capital. To the extent a company finds that the EVA concept better links corporate strategy and investments with shareholder value, it is a useful device. It also helps underscore why it is so important for all managers to understand the concept of the cost of capital.

## The CAPM: Project-Specific and Group-Specific Required Rates of Return

When the existing investment projects of the firm and investment proposals under consideration are not alike with respect to risk, the use of the firm's cost of capital as the sole acceptance criterion will not do. In such cases, we must formulate a specific acceptance criterion for the particular project involved. One means for so doing relies on the capital-asset pricing model (CAPM). This CAPM approach is described in this section.

### ● ● ● Capital-Asset Pricing Model Approach to Project Selection

We assume initially that projects will be financed entirely by equity, that the firm considering projects is entirely equity financed, and that all beta information pertains to all-equity situations. Later we modify the approach for financial leverage, but our understanding of the basics is made much easier if we first ignore this consideration. This simplifying assumption results in the firm's overall cost of capital being simply its cost of equity. For such a firm, the CAPM approach to determining a required return is equivalent to determining the cost of equity capital of a firm. However, instead of the expected relationship between excess returns for common stock (returns in excess of the risk-free rate) and those for the market portfolio, one is concerned with the expected relationship of excess returns for a project and those for the market portfolio. The required return for an equity-financed project, therefore, would be

$$R_k = R_f + (\bar{R}_m - R_f)\beta_k \quad (15.11)$$

where  $\beta_k$  is the slope of the *characteristic line* that describes the relationship between excess returns for project  $k$  and those for the market portfolio. As can be seen, the right-hand side of this equation is identical to that of Eq. (15.7) except for the substitution of the project's beta for that of the stock.  $R_k$ , then, becomes the required return for the project, which compensates for the project's systematic risk.

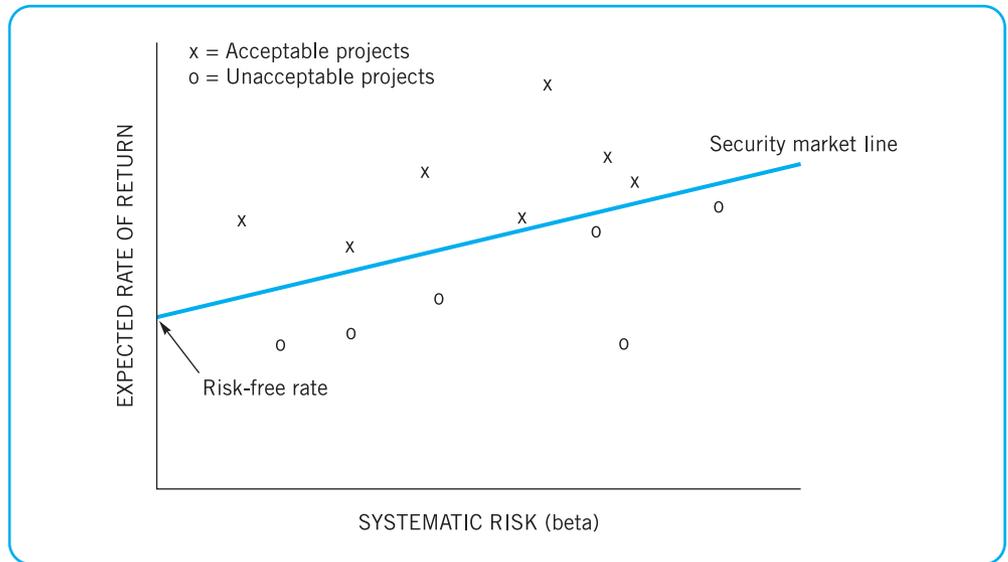
Assuming that the firm intends to finance a project entirely with equity, the acceptance criterion would then be to invest in the project if its expected return met or exceeded the required return,  $R_k$ , as determined by Eq. (15.11).<sup>10</sup> To illustrate the acceptance criterion for

<sup>9</sup>Conceptually, free cash flow, economic value added, and net present value approaches to valuation and decision-making are equivalent. See Ronald E. Shrieves and John M. Wachowicz, Jr., "Free Cash Flow (FCF), Economic Value Added (EVA), and Net Present Value (NPV): A Reconciliation of Discounted-Cash-Flow (DCF) Valuation," *The Engineering Economist* 46 (No. 1, 2001), 33–52.

<sup>10</sup>Alternatively, the required rate of return,  $R_k$ , could be used as the appropriate discount rate for calculating the project's net present value, in which case the acceptance criterion would be to invest in the project if its net present value was greater than or equal to zero.

**Figure 15.3**

Creating value by accepting projects expected to provide returns greater than their respective required returns



projects using this concept, see Figure 15.3. The line in the figure represents the security market line – the market-determined relationship between required rate of return and systematic risk. All projects with internal rates of return lying on or above the line should be accepted, because they are expected to provide returns greater than or equal to their respective required returns. Acceptable projects are depicted by x's. All projects lying below the line, shown by the o's, would be rejected. Note that the greater the systematic risk of a project, the greater the return that is required. If a project had no systematic risk, only the risk-free rate would be required. For projects with more risk, however, a risk premium is demanded, and it increases with the degree of systematic risk of the project. The goal of the firm, in this context, is to search for investment opportunities lying above the line.

**Application of the Model – the Use of Proxy Companies.** The difficulty in applying the CAPM approach to project selection is in estimating the beta for a project. Recall from Chapter 5 that derivation of the *characteristic line* (whose slope equals beta) is based on a series of period returns for a stock and those for the market portfolio. It is therefore necessary to estimate a project's period returns in terms of its periodic cash flows and its change in value from the beginning of each period to the end of that period. The difficulty is in estimating the value of the project from period to period. Unfortunately, the values of assets that are not publicly traded are not directly observable, so we cannot calculate beta in the manner presented earlier for a publicly traded stock.

However, in many cases a project is sufficiently similar to a company whose stock is publicly held so that we can use that company's beta in deriving the required rate of return on equity for the project. For large projects one can frequently identify publicly traded companies that are engaged entirely, or almost entirely, in the same type of operation. The important thing is to identify a company or companies with systematic risk characteristics similar to those of the project in question.

Suppose that a chemical company is considering the formation of a real estate division. Because there are a number of real estate companies with publicly traded stock, one could simply determine the beta for one of those companies, or a group of them, and use it in Eq. (15.11) to derive the required rate of return for the project. Note that the relevant required rate of return is not that for the chemical company but that for other real estate firms. Stated differently, the market views the chemical company's potential real estate venture in the same way that it views other firms engaged solely in real estate. By concentrating on companies in the same line of business as the firm desires to enter, we can find surrogates

that approximate the systematic risk of the project. An exact duplication of the project's risk is unlikely, but reasonable approximations are frequently possible.

To illustrate the calculations, suppose that the median beta for a sample of real estate companies whose stocks were publicly traded and whose basic businesses were similar to the venture contemplated by the chemical company was 1.6. We can use this beta as a surrogate for the beta of the project.<sup>11</sup> If we expect the average return on the market portfolio of stocks to be 13 percent and the risk-free rate to be 8 percent, the required return on equity for the project would be

$$R_k = 0.08 + (0.13 - 0.08)1.6 = 16\%$$

Therefore 16 percent would be used as the required equity return for the project.

**Finding Proxy Companies.** One should try to identify companies of a similar nature to the project in question. The search for these companies is usually industry based. One option is to turn to the **North American Industry Classification System (NAICS)**, pronounced “nakes”) **Codes** to determine an initial sample.<sup>12</sup> When a project falls into a single industry classification, the job is relatively easy. The betas of the proxy companies should be rank ordered. Rather than computing an arithmetic average of the sample betas, we suggest taking a median or modal value from the rank-ordered array. This choice helps minimize the effects of any outliers in the group. The idea is to come up with a beta that broadly portrays the business risk of the investment project.

**North American Industry Classification System (NAICS)**, pronounced “nakes”) **Codes** A standardized classification of businesses by types of economic activity developed jointly by Canada, Mexico, and the United States. A five- or six-digit code number is assigned depending on how a business is defined.

Unless one is able to find a company or companies whose stock is publicly traded to use as a proxy for the project, the derivation of a beta for a specific project is a difficult matter. For this reason, we will restrict our discussion to the use of proxy company information. Sometimes a mutual fund specializes in common stocks in a specific industry. In such a case, one might use the fund's beta and industry leverage ratio to measure the project's systematic risk.

**The Required Return with Leverage.** If the firm consistently finances its projects only with equity, we would use the required return on equity,  $R_k$ , as the required rate of return for the project. If some debt financing is employed, however, we need to determine a weighted average required return. Here the weighting system is the same as that illustrated earlier for the firm's overall cost of capital. Rather than vary the proportion of debt financing project by project, a more consistent approach is to apply the same weights to all projects. Presumably these weights will correspond to the proportions with which the firm intends to finance over time. If, for example, the firm intends to finance with one part debt for every three parts equity, and the after-tax cost of debt is 6.60 percent and the required return on equity is 16 percent, the overall (weighted average) required return for the project is

$$\begin{aligned} \text{Weighted average} \\ \text{required return} &= \left[ \begin{array}{l} \text{Cost of} \\ \text{debt} \end{array} \right] \left[ \begin{array}{l} \text{Proportion} \\ \text{of debt} \end{array} \right] + \left[ \begin{array}{l} \text{Cost of} \\ \text{equity} \end{array} \right] \left[ \begin{array}{l} \text{Proportion} \\ \text{of equity} \end{array} \right] \\ &= (0.066)(0.25) + (0.16)(0.75) = 13.65\% \end{aligned}$$

If the project were expected to provide an internal rate of return greater than or equal to this rate, the project would be accepted. If not, it would be rejected. Thus, even for a leveraged firm, the acceptance criterion remains specifically related to the systematic risk of the project through the cost of equity capital.

<sup>11</sup>If the proxy company did not have financing similar to our firm, we would need to adjust this company's beta for the difference in relative financial risk. We will have more to say on this later in the chapter.

<sup>12</sup>NAICS replaces the older *Standard Industrial Classification (SIC) System*.

### ● ● ● Group-Specific Required Return

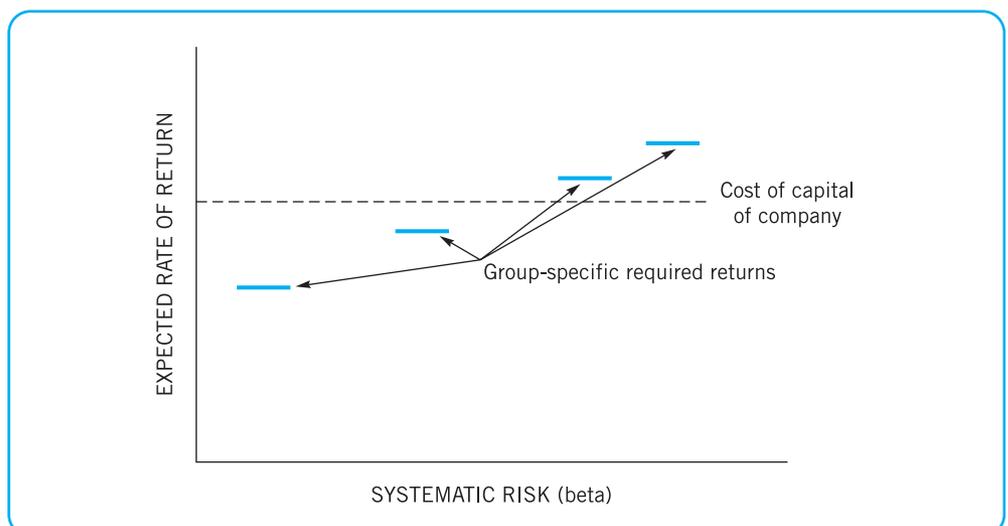
Rather than determine project-specific required returns, some companies categorize projects into roughly risk-equivalent groups and then apply the same CAPM-determined required return to all projects included within that group. One advantage of this procedure is that it is not as time-consuming as computing required returns for each project. Another advantage is that it is often easier to find proxy companies for a group than it is for individual projects. By “group,” we mean some subunit of the company that carries on a set of activities that can be differentiated from the other activities of the firm. Usually these activities are differentiated along product or service lines as well as along management lines. Frequently the subunits are divisions or **subsidiaries** of the company.

**Subsidiary** A company which has more than half of its voting shares owned by another company (the parent company).

If the products or services of the group are similar with respect to risk and new proposals are of the same sort, a group-specific required return is an appropriate acceptance criterion. It represents the rate charged by the company against a group for capital employed. Stated differently, it is the rate of return the company expects the group to earn on its capital investments. The greater the systematic risk of the group, the greater its required return.

The computation of the required rate of return is the same as that for the specific project. For each group, proxy companies whose stocks are publicly traded are identified. Based on these surrogates, a beta is derived for each group, and a required return on equity capital is calculated from this. If debt is used, a weighted average required return for the group is derived in the same manner as in the previous section. Once group-specific required returns are computed, capital is allocated, or transferred, throughout the firm on the basis of each group’s ability to earn its required rate of return. This approach provides a consistent framework for allocating capital among groups with greatly different risks.

The “group-specific required return approach” to project selection is illustrated in Figure 15.4. Here, the horizontal bars represent the required returns, or hurdles, for four different groups. The cost of capital for the firm as a whole is depicted by the dashed line. Projects from a group that provide expected returns above their group-specific bar should be accepted. Those below their respective bars should be rejected. This criterion means that for the two “lower-risk” groups, some accepted projects may provide expected returns below the firm’s overall cost of capital but above the required return for the group. For the two “riskier” groups, rejected projects may have provided expected returns greater than the overall cost of capital but less than the group’s required return. In short, capital is allocated on a risk-return basis specific to the systematic risk of the group. Otherwise, accept/reject decisions will be biased in favor of bad, high-risk projects and against good, low-risk projects.



**Figure 15.4**

Comparison of a company’s cost of capital and group-specific required returns

## Volkswagen AG and the Cost of Capital for Its Automotive Division

**VOLKSWAGEN**

AKTIENGESELLSCHAFT

Volkswagen AG's Annual Report 2006 provides an excellent example of calculating a division's cost of capital (see below). Note especially how Volkswagen uses the capital-asset pricing model (CAPM) to determine its divisional cost of equity. In determining the market risk premium (i.e., the expected return for the market portfolio minus the risk-free rate) input, the company, however, does not use the S&P 500 Index as its surrogate

for the market portfolio. Instead, it uses the DAX Index of the Frankfurt Stock Exchange.

**COST OF CAPITAL  
AUTOMOTIVE DIVISION**

	2006	2005
Risk-free interest rate	3.8%	3.3%
DAX market risk premium	6.0	6.0
Volkswagen-specific risk premium (Volkswagen beta factor)	0.2 (1.03)	— (1.00)
<b>Cost of equity after tax</b>	<b>10.0</b>	<b>9.3</b>
Cost of debt	4.3	3.7
Tax (average rate 35%)	-1.5	-1.3
<b>Cost of debt after tax</b>	<b>2.8</b>	<b>2.4</b>
Proportion of equity	66.7	66.7
Proportion of debt	33.3	33.3
<b>Cost of capital after tax</b>	<b>7.6</b>	<b>7.0</b>

Source: Volkswagen AG Annual Report 2006, p. 77. © 2006 Volkswagen AG. Used by permission. All rights reserved.

### ● ● ● Some Qualifications

Whether the required returns are project specific or group specific, there are certain problems in the application of the CAPM approach. For one thing, the amount of nonequity financing that is attributed to a project is an important consideration. For the procedure to hold, nonequity financing should approximate the same relative amount as that used by the proxy company. In other words, the proportion of nonequity financing allocated to a project should not be significantly out of line with that for the proxy company being used. Otherwise, one will not get a reasonable proxy for the systematic risk of the project. Where the proportions are not nearly the same, the proxy company's beta should be adjusted before it is used in determining the cost of equity capital for the project. A procedure for adjusting the beta is presented in Appendix A to this chapter. Using this procedure, one can derive an adjusted beta for the proxy company – a beta that assumes that the proxy company had the same relative proportion of nonequity financing as that contemplated for the project. Armed with this adjusted beta, the cost of equity capital for the project can then be determined in the same manner as before.

In addition to any practical problems encountered, there is an underlying assumption in the CAPM approach that must be questioned. As we know, the capital-asset pricing model assumes that only the systematic risk of the firm is important. However, the probability of a firm becoming insolvent depends on its total risk, not just its systematic risk. When insolvency or bankruptcy costs are significant, investors may be served by the firm paying attention to the impact of a project on the firm's total risk. The total risk is composed of both systematic and unsystematic risk. The variability of cash flows determines the possibility of a company becoming insolvent, and this variability depends on the firm's total risk, not just its systematic risk.<sup>13</sup> For this reason, a company may wish to estimate the impact of a new project on both systematic and total risk.

<sup>13</sup>When there are significant bankruptcy costs, these costs work to the detriment of stockholders as the residual owners of the company. It therefore may be important for the firm to keep the probability of becoming bankrupt within reasonable bounds. To do so, the company must consider the impact of the project on the firm's total risk (systematic plus unsystematic). This approach is taken up in the last section of the chapter.

### ● ● ● Ascribing Debt Funds to Groups

When determining the weighted average required return for a group, most analysts use the company's overall after-tax borrowing cost as the cost of debt component. However, the notion that equity costs differ according to a group's underlying risk also applies to the cost of debt funds. Both types of costs are determined in capital markets according to a risk-return trade-off. The greater the risk, the greater the interest rate that will be required on debt funds. Although a case can be made for differentiating debt costs among groups according to their systematic risks, few companies do it. For one thing, there are mechanical difficulties in computing the beta, because the market index must include debt instruments. Also, conceptually, the group itself is not ultimately responsible for its debt. The company as a whole is responsible. Because of the diversification of cash flows among groups, the probability of payment for the whole (the firm) may be greater than the sum of the parts (the groups). For these reasons, few companies have tried to apply the capital-asset pricing model to group debt costs as they have to equity costs. Still, it may be appropriate to vary debt costs for groups depending on their risk, even though the adjustment is partly subjective.

If a much higher than average proportion of debt is ascribed to one group, it will have a lower overall required return assigned to it than would otherwise be the case. But is that figure the "true" required return for that group? Should one group be allowed to significantly lower its required return simply by taking on more leverage? Is it fair to other groups? Apart from the incentive issue, what problems are created for the company as a whole by such a policy?

First, high leverage for one group may cause the cost of debt funds for the overall company to rise. This marginal increase should not be allocated across groups, but rather it should be pinpointed to the group responsible. Second, the high leverage incurred by one group may increase the uncertainty of the tax shield associated with debt for the company as a whole. Finally, high leverage for one group increases the volatility of returns to stockholders of the company, together with the possibility of insolvency and bankruptcy costs being incurred. In turn, this will cause investors to increase the required return on equity to compensate for the increased risk. (The way this comes about will be taken up in Chapter 17.)

For these reasons, the "true" cost of debt for the high-leverage group may be considerably greater than originally imagined. If this is the case, some type of premium should be added to the group's required return to reflect more accurately the "true" cost of capital for the group. The difficulty lies in deciding on what premium is appropriate to assign as an adjustment factor. Any adjustments are usually at least partly subjective. While only an approximation, it is best to make some adjustment in overall group required returns when significantly different debt costs and/or proportions of debt financing are involved.

## Evaluation of Projects on the Basis of Their Total Risk

When, for either theoretical or practical reasons, it is not appropriate to compute a required rate of return for a project or group using a CAPM approach, or when we simply want to supplement that approach for the reasons just mentioned, we turn to more subjective means for evaluating risky investments. Many firms deal with the problem in very informal ways. Decision makers simply try to incorporate risk into their judgment on the basis of their "feel" for the projects being evaluated. This "feel" can be improved on by discussions with others familiar with the proposals and the risks inherent in them. Often, such discussions result in a "risk-adjusted discount rate" being applied to the project or group.

### ● ● ● Risk-Adjusted Discount Rate Approach

For investment proposals having risk similar to that of an "average" project for the firm, we have already seen that the firm's overall cost of capital can serve as the required rate of return.

**Risk-adjusted discount rate (RADR)**

A required return (discount rate) that is increased relative to the firm’s overall cost of capital for projects or groups showing greater than “average” risk and decreased for projects or groups showing less than “average” risk.

The **risk-adjusted discount rate (RADR)** approach to investment proposal selection pertains to projects or groups whose outcomes are considered to have greater or less risk than the “average” undertaking of the firm.

**Take Note**

The RADR approach calls for

- Adjusting the required return (discount rate) *upward* from the firm’s overall cost of capital for projects or groups showing *greater* than “average” risk and
- Adjusting the required return (discount rate) *downward* from the firm’s overall cost of capital for projects or groups showing *less* than “average” risk.

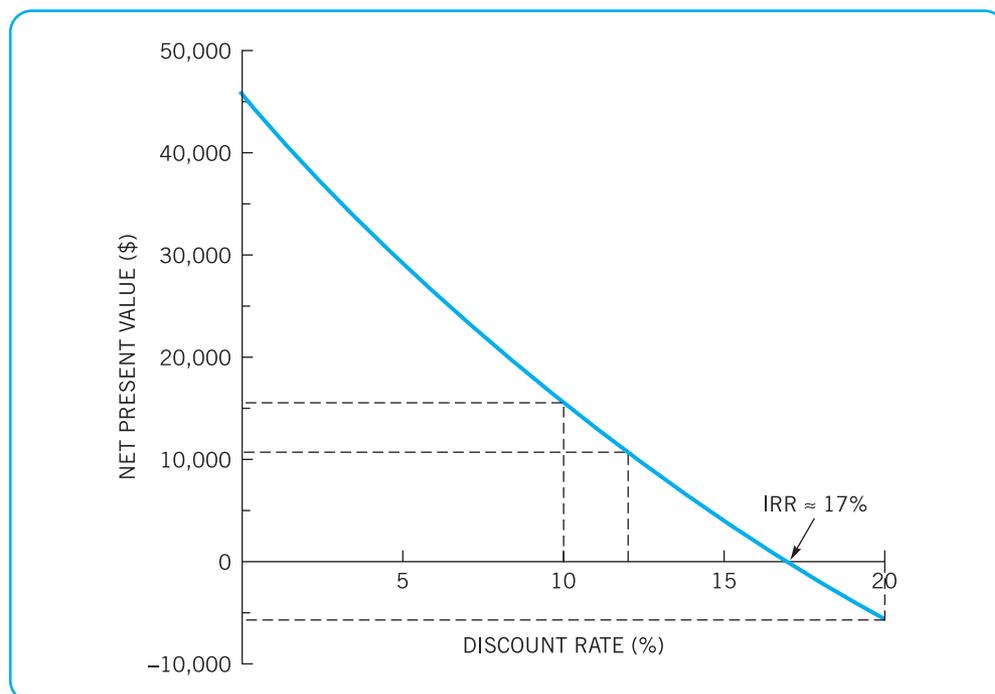
Thus, in the RADR method, the discount rate is “adjusted” for risk by increasing it relative to the overall cost of capital to compensate for greater risk and lowering it to account for less risk. The project- or group-specific required return then becomes the risk-adjusted discount rate.

One way to visualize the RADR approach is to make use of an “old friend,” the *NPV profile*. In Chapter 13, we used an NPV profile (Figure 13.1) to illustrate the NPV and IRR methods as applied to the Faversham Fish Farm fish-flaking facility project. With an IRR of approximately 17 percent and an NPV of \$10,768 at the firm’s cost of capital of 12 percent, we recommended that the project be accepted. That acceptance, however, was based on the assumption that the project was of “average” risk and using the firm’s cost of capital was, therefore, the appropriate discount/hurdle rate.

In Figure 15.5, we modify Chapter 13’s NPV profile slightly to highlight not only the use of the “average” risk RADR (or cost of capital of 12 percent), but also what would happen to our

**Figure 15.5**

NPV profile for fish-flaking facility example from Chapter 13, highlighting the project’s NPV at three alternative risk-adjusted discount rates



analysis under two other possible situations. What if, for example, relative to the firm's other projects, the fish-flaking project is really of "below average" risk (calling for, say, a 10 percent RADR)? Or, alternatively, what if the project is of "above average" risk (requiring, let's assume, a 20 percent RADR)?

Notice, in Figure 15.5, that at a 10 percent discount rate the project is still clearly acceptable. The project's NPV is \$15,516 and the project's IRR is higher than the 10 percent RADR. However, assuming that an "above average" risk discount rate is appropriate, the project would not be acceptable. The project's NPV at a 20 percent RADR is negative and the project's IRR of 17 is less than the appropriate risk-adjusted hurdle rate.

Also, if the RADR approach sounds familiar, it should. A CAPM-determined required return could be considered as simply a special type of risk-adjusted rate, but with any adjustment taking place relative to a risk-free return base. However, the RADR approach, unlike the CAPM approach, generally relies on relatively informal, subjective ways of determining the required risk adjustment. The problems with this approach, of course, are that the information used to make risk adjustments is often sketchy and the treatment applied to this information may not be consistent from project to project or over time.

Other project selection approaches try to make better, more consistent use of proposal information. We know from our discussion in Chapter 14 that expected return and risk can be quantified in a consistent manner. Given this information, the question becomes whether a project should be accepted or rejected. We begin to answer this question by examining how management might evaluate a single investment proposal, and then move on to combinations of risky investments. The methods that we will employ are firm-risk-oriented in the sense that management does not explicitly consider the effect of the firm's project selection on investors' portfolios. The focus is on total risk, the sum of systematic and unsystematic risk. Management assesses the likely effect of project selection on the variability of cash flows and earnings of the firm. From this assessment, management can then estimate the likely effect on share price. The critical factor from the standpoint of stock valuation is how accurately management is able to link share price with risk-return information for an investment proposal. As we shall see, the linkage tends to be subjective, which detracts from the accuracy of these approaches.

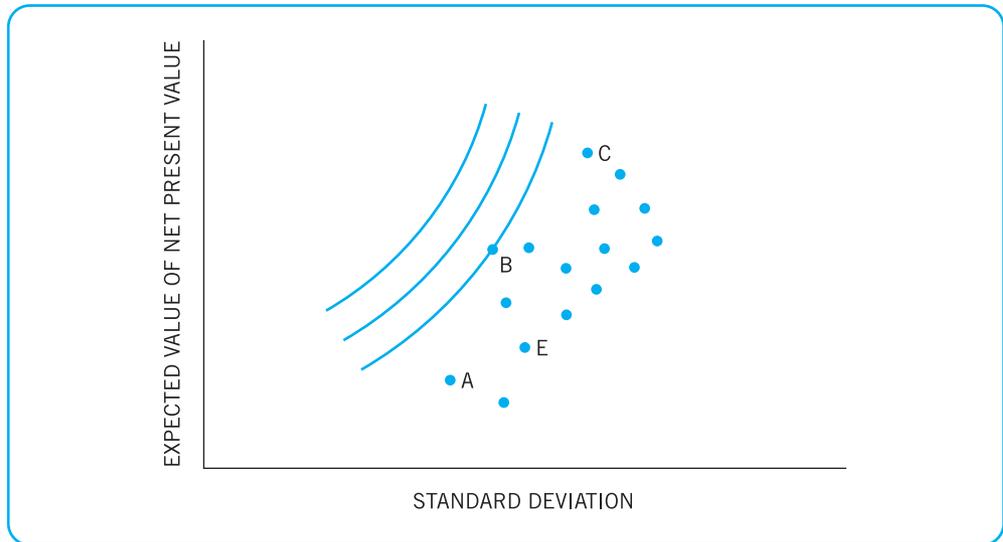
### ● ● ● Probability Distribution Approach

You will recall from Chapter 14 that one set of information that can be generated for an investment proposal is the probability distribution of possible net present values. (Remember, in a probability distribution approach we do not initially "adjust" for risk, but rather study it. Therefore the various cash flows are discounted to their present value at the risk-free rate.) We also saw that by standardizing the dispersion in terms of so many standard deviations from the expected value of the distribution, we can determine the probability that the net present value of the project will be zero or less. In the evaluation of a single proposal, it is unlikely that management would accept an investment proposal having an expected value of net present value of zero unless the probability distribution had no dispersion. In this special case, we would have, by definition, a risk-free proposal providing a risk-free return. For risky investments, the expected net present value would have to exceed zero. How much it would have to exceed zero before acceptance were warranted depends on the amount of dispersion of the probability distribution and the utility preferences of management with respect to risk.

A real problem with this approach is that we cannot relate it directly with the effect of project selection on share price. Management is simply presented with information about the expected return and risk of a project. On the basis of this information it reaches a decision. However, there is no "direct" link between a decision based on this information and the likely reaction of well-diversified stockholders in the company. Thus any success in using

Figure 15.6

Scatter diagram showing the set of feasible combinations (portfolios) of projects with management's indifference map superimposed on this scatter diagram



this method depends entirely on the perceptiveness of management in judging investors' trade-off between profitability and risk. Moreover, there is no analysis of the impact of the project on the overall risk of the firm. In essence, the project is evaluated in isolation – separate from the portfolios of the firm's shareholders and separate from the firm's already existing projects.

### ● ● ● Contribution to Total Firm Risk: Firm-Portfolio Approach

From Chapter 14 we know that the marginal risk of an individual proposal to the firm as a whole depends on its correlation with existing projects as well as its correlation with proposals under consideration that might be accepted. The appropriate information is the expected value and standard deviation of the probability distribution of possible net present values for all feasible combinations of existing projects and investment proposals under consideration. Assume for now that management is interested only in the marginal impact of an investment proposal on the risk complexion of the firm as a whole.

The selection of the most desirable combination of investments will depend on management's risk preferences with respect to expected net present value and standard deviation. Figure 15.6 shows various combinations of risky investments available to the firm. This figure is the same as Figure 14.7 in Chapter 14 except that here we also superimpose a series of management's **indifference curves**. Management is indifferent to any combination of expected value of net present value and standard deviation on a particular curve. As we move to the left in Figure 15.6, each successive curve represents a greater level of satisfaction. Each dot represents a combination of all of the firm's existing investment projects plus one or more proposals under consideration. We see that certain dots dominate others in the sense that they represent a higher expected value of net present value and the same standard deviation, a lower standard deviation and the same expected value of net present value, or both a higher expected value and a lower standard deviation. The dots that dominate others are those that are located on the leftmost outer edge of the figure. With information of this sort before it, management can eliminate most combinations of risky investments simply because they are dominated by other combinations.

In this case, management would probably consider only three combinations of risky investments – A, B, and C. From these it would choose the one that it felt offered the best combination of expected return and risk. If it were moderately averse to risk, as represented

#### Indifference curve

A line representing all combinations of expected return and risk that provide an investor with an equal amount of satisfaction.

by the indifference map shown in Figure 15.6, it would probably choose combination B. This combination is determined by the intersection of a dot in the figure – point B – with the highest attainable indifference curve. Point B represents the portfolio of existing projects and proposals under consideration that possesses the most desirable combination of expected value of net present value and standard deviation. Though combination C provides a somewhat higher expected value of net present value, it also has a higher standard deviation. Combination A has lower risk but also lower expected value of net present value.

As discussed in Chapter 14, the final selection determines the new investment proposal or proposals that will be accepted. An exception would occur only when the combination selected was composed solely of existing projects. In this situation, no investment proposals under consideration would be accepted. If the portfolio of existing projects were represented by combination E in the figure, the selection of any of the three outlying combinations would imply the acceptance of one or more new investment proposals. Investment proposals under consideration that were not in the combination finally selected would, of course, be rejected.

### ● ● ● Conceptual Implications

On the basis of the information just presented, management determines which investment proposals under consideration offer the best marginal contribution of expected value of net present value and standard deviation to the firm as a whole. In determining the standard deviation for a combination, management must consider the correlation between an investment proposal and the set of existing investments and other new proposed investments. This evaluation suggests that the total risk of the firm is what is important. Investment decisions would then be made in light of their marginal impact on total risk.

This approach implies that from the standpoint of stockholders, management should be concerned with the firm's solvency. As discussed, such solvency depends on the total risk of the firm. Owing to less than perfect correlation with each other, certain projects have diversification properties. As a result, the total risk of the firm will be less than the sum of the parts. Management will presumably endeavor to accept investment proposals in a way that will keep the probability of insolvency within reasonable bounds while providing the best combination of expected return and risk.

As indicated before, the problem with this approach is that it ignores the fact that investors can diversify the portfolios of common stocks that they hold. They are not dependent on the firm to diversify away risk. Therefore diversification by the firm may not be a thing of value in the sense of doing something for investors that they cannot do for themselves. To the extent that investors are concerned only with the unavoidable or systematic risk of a project, the CAPM approach illustrated earlier should be used.

**Dual Approach.** It may be reasonable to use both approaches. The CAPM approach might serve as the foundation for judging the valuation implications of an investment project. To the extent that the possibility of insolvency exists and the bankruptcy costs that result are considerable, the project would also be judged in a total firm-risk context. If both approaches give clear accept or reject signals, those signals should be followed. An obvious problem occurs if one approach gives an accept signal but the other gives a reject signal. In this case, management should place more weight on one or the other signal, depending on which approach is more applicable.

If the stock of a large company is publicly held, and if the possibility of insolvency is remote, a strong case can be made for using the signal given by the capital-asset pricing model. If the stock is traded in a market with high transactions and information costs, if the possibility of insolvency is significant, and if the expression of project returns in terms of market-based returns is crude, greater reliance should be placed on the total firm-risk approach. Even here, one should recognize that a portion of unsystematic risk can be diversified away.

## Key Learning Points

- In theory, the required rate of return for an investment project should be the rate that leaves the market price of the stock unchanged. If an investment project earns more than what financial markets require it to earn for the risk involved, value is created. The key sources of value creation are industry attractiveness and competitive advantage.
- If existing investment projects and investment proposals under consideration are similar with respect to risk, it is appropriate to use the overall *cost of capital* as the acceptance criterion.
- The overall *cost of capital* is a weighted average of the individual required rates of return (costs) for the various instruments with which the firm intends to finance.
- By far the most difficult component cost to measure is the *cost of equity capital*. Using a dividend discount model, this cost is the discount rate that equates the present value of the stream of expected future dividends with the market price of the common stock. Alternatively, we can estimate the cost of equity with the capital-asset pricing model or add a risk premium to the before-tax cost of the firm's debt.
- Once we have computed the marginal costs of the individual components of the firm's financing, we assign weights to each financing source and calculate a weighted average cost of capital. The weights employed should correspond to the proportions with which the firm intends to finance long-term.
- The presence of *flotation costs* in financing requires an adjustment in the evaluation of investment proposals. One approach treats the flotation costs of financing as an addition to the initial cash outlay for the project. A second approach calls for an upward adjustment of the cost capital when flotation costs are present. Theoretically, it is more appropriate to make a flotation cost adjustment to the project's initial cash outlay and then use the weighted average "unadjusted" cost of capital as the discount rate.
- The key to using the overall cost of capital as a project's required rate of return is the similarity of the project with respect to the risk of existing projects and investments under consideration.
- When investment projects, both existing and new, vary widely with respect to risk, use of the company's overall cost of capital as an acceptance criterion is not appropriate. In such cases, we should determine an acceptance criterion for each investment project or group of projects under consideration.
- One means for computing a *project-specific required rate of return* for a proposal is with the capital-asset pricing model. Here the idea is to identify publicly traded companies whose line of business and systematic risk closely parallel the project in question. These companies serve as proxies for developing *beta* information, which may be adjusted for financial leverage. (See Appendix A to this chapter.) Once a representative beta is computed, the required return on equity can be determined. If debt financing is employed, a weighted average required return for the project is calculated, based on the proportions the firm uses in its financing.
- A *group-specific required rate of return* may also be determined for a division, a subsidiary, or some other subunit of the firm with the capital-asset pricing model. Certain problems may arise, however, owing to the differential utilization of non-equity financing among various groups of a company.
- The *risk-adjusted discount rate (RADR)* method of investment selection calls for "adjusting" the required return, or discount rate, upward (downward) from the firm's overall cost of capital for projects or groups showing greater (less) than "average" risk. The RADR approach, unlike the CAPM approach, generally relies on relatively informal, subjective ways of determining the required risk adjustment.
- A practical means for evaluating risky investments is to analyze the expected value and standard deviation of the probability distribution of possible returns for an investment proposal and, on the basis of this information, reach a decision. The greater the dispersion of the distribution, the greater the expected value that would presumably be required by management. The problem with this approach is that the link between the investment decision and anticipated share price reaction is not direct.
- Solvency depends on the total risk of the firm. When the possibility of firm insolvency is real and potentially costly, management may be concerned with the marginal impact of an investment project on the total risk of the firm. By analyzing the expected return and risk of various possible combinations of existing projects and investment proposals under consideration, management is able to select the best combination – often relying on dominance.

## Appendix A Adjusting the Beta for Financial Leverage

The common stock beta for a firm with financial leverage reflects both the *business risk* and the *financial risk* of the company. In attempting to indirectly calculate a project's (or group's) cost of equity capital, we need to use a proxy company that has business risk similar to that of our project. Unfortunately, the proxy firm may use a significantly different proportion of debt than that used by our firm. Therefore it may be necessary to adjust the beta of the proxy company for this difference in capital structure.

In what follows, we present a way to adjust betas for capital structure differences. This adjustment is made under the assumptions of the capital-asset pricing model with taxes. At the end, we qualify the results somewhat owing to considerations to be taken up in Chapter 17.

The required rate of return for common stock in a firm with financial leverage (a "levered" firm) is

$$R_j = R_f + (\bar{R}_m - R_f)\beta_j \quad (15A.1)$$

where  $R_f$  = risk-free rate

$\bar{R}_m$  = expected return on the market portfolio

$\beta_j$  = beta measuring the systematic risk of the equity of the levered firm

Equation (15A.1) can also be expressed as<sup>14</sup>

$$R_j = R_f + (\bar{R}_m - R_f)\beta_{ju}[1 + (B/S)(1 - T_c)] \quad (15A.2)$$

where  $\beta_{ju}$  = beta measuring the systematic risk of the equity of the firm in the *absence of financial leverage* (the beta if the firm were all-equity-financed or "unlevered")

$B/S$  = debt-to-equity ratio in market value terms

$T_c$  = corporate tax rate

Rewriting Eq. (15A.2), we can clearly see that the required rate of return on equity is composed of the risk-free rate, plus a premium for business risk and a premium for financial risk:

Required return	=	Risk-free rate	+	Business-risk premium	+	Financial-risk premium
$R_j$	=	$R_f$	+	$(\bar{R}_m - R_f)\beta_{ju}$	+	$(\bar{R}_m - R_f)\beta_{ju}(B/S)(1 - T_c)$

The measured beta for the stock,  $\beta_j$ , embodies both risks and is simply

$$\beta_j = \beta_{ju}[1 + (B/S)(1 - T_c)] \quad (15A.3)$$

Rearranging Eq. (15A.3), the unlevered beta for the stock can be expressed as follows:

$$\beta_{ju} = \frac{\beta_j}{1 + (B/S)(1 - T_c)} \quad (15A.4)$$

Given these expressions, we can derive the unlevered beta for a particular stock. Suppose that the measured (levered) beta,  $\beta_j$ , for security  $j$  is 1.4; the debt-to-equity ratio,  $B/S$ , is 0.70; and the tax rate is 40 percent. The unlevered beta would be

$$\beta_{ju} = \frac{1.4}{1 + (0.70)(0.60)} = 0.99$$

If we now wish to determine the beta with a different amount of financial leverage employed, we would use Eq. (15A.3). Using security  $j$  as a proxy for the systematic business risk of our project, we require a debt-to-equity ratio of 0.30 instead of the 0.70 for adjusted security  $j$ . Therefore the adjusted beta would be

$$\begin{aligned} \text{Adjusted } \beta_j &= \beta_{ju}[1 + (B/S)(1 - T_c)] \\ &= (0.99)[1 + (0.30)(0.60)] = 1.17 \end{aligned}$$

<sup>14</sup>See Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporation Finance," *Journal of Finance* 24 (March 1969), 19–30.

This beta is higher than the 0.99 figure for an unlevered security  $j$ , but lower than the 1.40 figure for the actual, more highly levered, security  $j$ .

In summary, we are able to derive an adjusted beta for a security when the proxy firm uses a different proportion of debt than our own. We first estimate the beta for the stock in the absence of leverage and then adjust this figure for the proportion of leverage we wish to employ. The final result is an approximation of the beta that would prevail if the proxy company were to employ the desired proportion of debt.

Note that the adjustment procedure assumes that all the tenets of the capital-asset pricing model, except for the presence of corporate taxes, hold. With corporate taxes, value is assumed to increase in a linear manner with leverage. Chapter 17 introduces additional imperfections in an overall assessment of the impact of capital structure on valuation. Therefore, the adjustment procedure presented provides an approximate beta when the proportion of debt is varied, but it is only an approximation. For large beta adjustments, the procedure is crude.

## Appendix B Adjusted Present Value

**Adjusted present value (APV)** The sum of the discounted value of a project's operating cash flows (assuming equity financing) plus the value of any tax-shield benefits of interest associated with the project's financing minus any flotation costs.

In much of our discussion in Chapter 15, we have focused on the weighted average cost of capital (WACC) as an acceptance criterion. This, of course, is a blended cost of capital where all component costs are embraced. An alternative acceptance criterion is the **adjusted present value (APV)** method, first proposed by Stewart C. Myers.<sup>15</sup> With an APV approach, project cash flows are broken down into two components: operating cash flows and certain cash flows associated with financing the project. These components then are valued so that

$$APV = \frac{\text{Unlevered project value}}{\text{project value}} + \frac{\text{Value of project financing}}{\text{financing}} \quad (15B.1)$$

The decomposition of cash flows is undertaken so that different discount rates may be used on the components. As operating cash flows are more risky than the financing-related cash flows, they are discounted at a higher rate.

More formally, the adjusted present value is

$$APV = \left[ \sum_{t=1}^n \frac{CF_t}{(1 + k_{eu})^t} - ICO \right] + \left[ \sum_{t=1}^n \frac{(I_t)(T_c)}{(1 + k_d)^t} - F \right] \quad (15B.2)$$

where  $CF_t$  is the after-tax operating cash flow at time  $t$ ;  $ICO$  is the initial cash outlay required for the project;  $k_{eu}$  is the required rate of return in the absence of financial leverage (the required rate of return if the firm were all-equity-financed or “unlevered”);  $I_t$  is the interest payment on debt at time  $t$ ;  $T_c$  is the corporate tax rate;  $k_d$  is the before-tax cost of debt financing; and  $F$  is the after-tax flotation cost (in present value terms) associated with financing (debt or equity, or both). The first bracketed term on the right-hand side of Eq. (15B.2) represents the net present value of operating cash flows discounted at the unlevered cost of equity capital. The first component within the second bracketed term is the present value of the **tax-shield** benefits of interest on any debt employed to finance the project. The discount rate used on this component is the before-tax corporate cost of borrowing. This rate is used because the realization of the tax-shield benefits bears a risk comparable to that embraced in the cost of debt funds. Finally, any flotation costs are subtracted to arrive at the project's adjusted present value.

**Tax shield** A tax-deductible expense. The expense protects (shields) an equivalent dollar amount of revenue from being taxed by reducing taxable income.

<sup>15</sup>Stewart C. Myers, “Interactions of Corporate Financing and Investment Decisions – Implications for Capital Budgeting,” *Journal of Finance* 29 (March 1974), 1–25.

**Table 15B.1**

Schedule for determining the present value of the tax-shield benefits of interest related to the new linerboard machine (in thousands)

END OF YEAR	(1) DEBT OWED AT YEAR END (1) <sub>t-1</sub> - \$125	(2) ANNUAL INTEREST (1) <sub>t-1</sub> × 0.10	(3) TAX-SHIELD BENEFITS (2) × 0.40	(4) PV OF BENEFITS AT 10%
0	\$1,000	–	–	–
1	875	\$100	\$40	\$ 36
2	750	88	35	29
3	625	75	30	23
4	500	62	25	17
5	375	50	20	12
6	250	38	15	8
7	125	25	10	5
8	0	12	5	2
				<u>\$132</u>

### An Illustration

Tennessee-Atlantic Paper Company is considering a new linerboard machine costing \$2 million. It is expected to produce after-tax savings of \$400,000 per year for eight years. The required rate of return on unlevered equity is 13 percent. To an all-equity-financed firm, the net present value of the project would be

$$NPV = \sum_{t=1}^8 \frac{\$400,000}{(1 + 0.13)^t} - \$2,000,000 = \mathbf{-\$80,400}$$

Under these circumstances the project would be rejected. Wally Bord, plant manager at the linerboard mill, is heartbroken, because he really wanted the new machine.

But, all is not lost! After all, it is the policy of the company to finance capital investment projects with 50 percent debt, because that is the target debt to total capitalization of the company. Tennessee-Atlantic Paper Company is able to borrow \$1 million at 10 percent interest to finance part of the new machine. (The balance will come from equity funds.) The principal amount of the loan will be repaid in equal year-end installments of \$125,000 through the end of the eighth year. (In this way the amount borrowed declines over time along with, we would assume, the value of the depreciating asset.) If the company's tax rate (federal plus state) equals 40 percent, we now have enough information to compute the tax-shield benefits of interest and their present value. Our results are shown in Table 15B.1. We see in column (4) that the present value of the tax-shield benefits of interest totals \$132,000.

The adjusted present value of the project is now

$$APV = -\$80,400 + \$132,000 = \mathbf{\$51,600}$$

Wally Bord is happy because the project now appears to be acceptable and he can look forward to soon hearing the roar of the shiny, new linerboard machine.

But what about flotation costs? These are the legal, underwriting, printing, and other fees involved in issuing securities. These costs pertain both to new debt and equity, with those belonging to issuance of new equity usually being higher. Suppose in our example that Tennessee-Atlantic incurs after-tax flotation costs (in present value terms) of \$40,000. These costs reduce the company's cash flows such that the adjusted present value becomes

$$APV = -\$80,400 + \$132,000 - \$40,000 = \mathbf{\$11,600}$$

The project is still acceptable but provides less benefit than it did when flotation costs were absent.

## WACC Versus APV Method

We have examined two ways of determining the value of a project. One method makes use of the firm's weighted average cost of capital (WACC), and the other relies on finding the project's adjusted present value (APV). The APV is actually a general theoretical rule that can be shown to contain the WACC method as a subcase. In his original article advocating the APV method, Myers pointed to certain biases involved in the WACC method. His article has been followed by a number of challenges and counterchallenges.<sup>16</sup>

Whenever a capital investment occurs, there is an interaction of investment and financing. As a general rule, as long as the firm maintains a relatively constant debt ratio over time and it invests in projects like those it already owns, the WACC method gives a relatively accurate portrayal of a project's worth. This is merely to say that financial risk and business risk are relatively unchanging over time. If a company should depart radically from its previous financing patterns and/or invest in an entirely new line of business (such as production of motion pictures by a soft-drink company), then the APV approach could theoretically provide a more accurate answer.

A major advantage of the WACC method is that it is easy to understand and widely used. The APV method is pleasing to many academics, but it is not widely used in business. Also, the APV method is not without its own difficulties. Implied is the assumption that there are no market imperfections other than corporate taxes and flotation costs. In other words, consideration of the tax-shield benefits of interest and flotation costs is all that matters when it comes to financing decisions. We explore other market imperfections in Chapter 17, when we evaluate capital structure decisions from a broader perspective. For now it is enough to recognize the differences in approach and that for most situations the two approaches (if properly applied) lead to identical accept or reject decisions.



### Questions

1. Why is it important to use *marginal* weights in calculating a weighted average cost of capital?
2. Under what circumstances is it appropriate to use the weighted average cost of capital as an acceptance criterion?
3. Do the funds provided by sources such as accounts payable and accruals have a cost of capital? Explain.
4. What will happen to the cost of debt funds for cost of capital purposes if a company should go into a period when it has negligible profits and pays no taxes?
5. With a dividend discount model, how do you estimate the cost of equity capital? What is the critical variable in this model?
6. What is the critical assumption inherent in the capital-asset pricing model (CAPM) as it relates to the acceptance criterion for risky investments?
7. Instead of using the expected return on the market portfolio and the risk-free rate in a CAPM approach to estimating the required return on equity, how would one use the firm's debt cost in a CAPM-type approach to estimate the firm's required return on equity?
8. What is the purpose of proxy companies in the application of the capital-asset pricing model to estimating required returns?
9. Distinguish a project-specific required return from a group-specific required return.

<sup>16</sup>See James Miles and John R. Ezzell, "The Weighted Average Cost of Capital, Perfect Capital Markets, and Project Life: A Clarification," *Journal of Financial and Quantitative Analysis* 15 (September 1980), 719–730; Donald R. Chambers, Robert S. Harris, and John J. Pringle, "Treatment of Financing Mix in Analyzing Investment Opportunities," *Financial Management* 11 (Summer 1982), 24–41; and Robert A. Taggart, Jr., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," Working Paper, National Bureau of Economic Research (August 1989).

10. When a project is evaluated on the basis of its total risk, who determines whether the project is acceptable? How? Is share price likely to be maximized?
11. What is the risk-adjusted discount rate (RADR) approach to project selection? How is it similar to the CAPM approach? How is it different from the CAPM approach?
12. What is the distinction between evaluating the expected value of net present value and standard deviation for an individual investment project and those for a group or combination of projects?
13. Should companies in the same industry have approximately the same required rates of return on investment projects? Why or why not?
14. If you use debt funds to finance a project, is the after-tax cost of debt the required return for the project? As long as the project earns more than enough to pay interest and service the principal, does it not benefit the firm?
15. If the cost of bankruptcy proceedings (attorney fees, trustee fees, delays, inefficiencies, and so on) were to rise substantially, would this occurrence have an effect on a company's required rate of return and on the way the firm looks at investment opportunities?
16. Should a company with multiple divisions establish separate required rates of return, or costs of capital, for each division as opposed to using the company's overall cost of capital? Explain.
17. For a corporation investing in capital projects, how is value created by using required return calculations?
18. What are the sources of value creation through capital investment decisions?



## Self-Correction Problems

1. Silicon Wafer Company currently pays a dividend of \$1 per share and has a share price of \$20.
  - a. If this dividend was expected to grow at a 12 percent rate forever, what is the firm's expected, or required, return on equity using a dividend discount model approach?
  - b. Instead of the situation in Part (a), suppose that the dividend was expected to grow at a 20 percent rate for five years and at 10 percent per year thereafter. Now what is the firm's expected, or required, return on equity?
2. Using the capital-asset pricing model, determine the required return on equity for the following situations:

SITUATION	EXPECTED RETURN ON MARKET PORTFOLIO	RISK-FREE RATE	BETA
1	15%	10%	1.00
2	18	14	0.70
3	15	8	1.20
4	17	11	0.80
5	16	10	1.90

What generalizations can you make?

3. The Sprouts-N-Steel Company has two divisions: health foods and specialty metals. Each division employs debt equal to 30 percent and preferred stock equal to 10 percent of its total requirements, with equity capital used for the remainder. The current borrowing rate is 15 percent, and the company's tax rate is 40 percent. At present, preferred stock can be sold yielding 13 percent.

Sprouts-N-Steel wishes to establish a minimum return standard for each division based on the risk of that division. This standard then would serve as the transfer price of capital to the division. The company has thought about using the capital-asset pricing model in this regard. It has identified two samples of companies, with modal value betas of 0.90 for health foods and 1.30 for specialty metals. (Assume that the sample companies had similar capital

structures to that of Sprouts-N-Steel.) The risk-free rate is currently 12 percent and the expected return on the market portfolio 17 percent. Using the CAPM approach, what weighted average required returns on investment would you recommend for these two divisions?

4. You are evaluating two independent projects as to their effect on the total risk and return of your corporation. The projects are expected to result in the following:

	EXPECTED VALUE OF NET PRESENT VALUE OF COMPANY (IN MILLIONS)	STANDARD DEVIATION OF NET PRESENT VALUE (IN MILLIONS)
Existing projects only	\$6.00	\$3.00
Plus project 1	7.50	4.50
Plus project 2	8.20	3.50
Plus projects 1 and 2	9.70	4.80

- a. In which of the new projects (if any) would you invest? Explain.  
b. What would you do if a CAPM approach to the problem suggested a different decision?



## Problems

- Zapata Enterprises is financed by two sources of funds: bonds and common stock. The cost of capital for funds provided by bonds is  $k_b$ , and  $k_e$  is the cost of capital for equity funds. The capital structure consists of  $B$  dollars' worth of bonds and  $S$  dollars' worth of stock, where the amounts represent market values. Compute the overall weighted average of cost of capital,  $k_o$ .
- Assume that  $B$  (in Problem 1) is \$3 million and  $S$  is \$7 million. The bonds have a 14 percent yield to maturity, and the stock is expected to pay \$500,000 in dividends this year. The growth rate of dividends has been 11 percent and is expected to continue at the same rate. Find the cost of capital if the corporation tax rate on income is 40 percent.
- On January 1, 20X1, International Copy Machines (ICOM), one of the favorites of the stock market, was priced at \$300 per share. This price was based on an expected dividend at the end of the year of \$3 per share and an expected annual growth rate in dividends of 20 percent into the future. By January 20X2, economic indicators have turned down, and investors have revised their estimate for future dividend growth of ICOM downward to 15 percent. What should be the price of the firm's common stock in January 20X2? Assume the following:
  - A constant dividend growth valuation model is a reasonable representation of the way the market values ICOM.
  - The firm does not change the risk complexion of its assets nor its financial leverage.
  - The expected dividend at the end of 20X2 is \$3.45 per share.
- K-Far Stores has launched an expansion program that should result in the saturation of the Bay Area marketing region of California in six years. As a result, the company is predicting a growth in earnings of 12 percent for three years and 6 percent for the fourth through sixth years, after which it expects constant earnings forever. The company expects to increase its annual dividend per share, most recently \$2, in keeping with this growth pattern. Currently, the market price of the stock is \$25 per share. Estimate the company's cost of equity capital.
- The Manx Company was recently formed to manufacture a new product. It has the following capital structure in market value terms:

Debentures	\$ 6,000,000
Preferred stock	2,000,000
Common stock (320,000 shares)	8,000,000
	<u>\$16,000,000</u>



The company has a marginal tax rate of 40 percent. A study of publicly held companies in this line of business suggests that the required return on equity is about 17 percent. (The CAPM approach was used to determine the required rate of return.) The Manx Company's debt is currently yielding 13 percent, and its preferred stock is yielding 12 percent. Compute the firm's present weighted average cost of capital.

6. The R-Bar-M Ranch in Montana would like a new mechanized barn, which will require a \$600,000 initial cash outlay. The barn is expected to provide after-tax annual cash savings of \$90,000 indefinitely (for practical purposes of computation, forever). The ranch, which is incorporated and has a public market for its stock, has a weighted average cost of capital of 14.5 percent. For this project, Mark O. Witz, the president, intends to provide \$200,000 from a new debt issue and another \$200,000 from a new issue of common stock. The balance of the financing would be provided internally by retaining earnings.

The present value of the after-tax flotation costs on the debt issue amount to 2 percent of the total debt raised, whereas flotation costs on the new common stock issue come to 15 percent of the issue. What is the net present value of the project after allowance for flotation costs? Should the ranch invest in the new barn?

7. Cohn and Sitwell, Inc., is considering manufacturing special drill bits and other equipment for oil rigs. The proposed project is currently regarded as complementary to its other lines of business, and the company has certain expertise by virtue of its having a large mechanical engineering staff. Because of the large outlays required to get into the business, management is concerned that Cohn and Sitwell earn a proper return. Since the new venture is believed to be sufficiently different from the company's existing operations, management feels that a required rate of return other than the company's present one should be employed.

The financial manager's staff has identified several companies (with capital structures similar to that of Cohn and Sitwell) engaged solely in the manufacture and sale of oil-drilling equipment whose common stocks are publicly traded. Over the last five years, the median average beta for these companies has been 1.28. The staff believes that 18 percent is a reasonable estimate of the average return on stocks "in general" for the foreseeable future and that the risk-free rate will be around 12 percent. In financing projects, Cohn and Sitwell uses 40 percent debt and 60 percent equity. The after-tax cost of debt is 8 percent.

- a. On the basis of this information, determine a required rate of return for the project, using the CAPM approach.
- b. Is the figure obtained likely to be a realistic estimate of the required rate of return on the project?
8. Acosta Sugar Company has estimated that the overall return for the S&P 500 Index will be 15 percent over the next 10 years. The company also feels that the interest rate on Treasury securities will average 10 percent over this interval. The company is thinking of expanding into a new product line – almonds.

It has no experience in this line but has been able to obtain information on various companies involved in producing and processing nuts. Although no company examined produces only almonds, Acosta's management feels that the beta for such a company would be 1.10, once the almond operation was ongoing. There is some uncertainty about the beta that will actually prevail. (Assume that Acosta and all proxy firms are all-equity-financed.) Management has attached the following probabilities to possible outcomes:

Probability	0.2	0.3	0.2	0.2	0.1
Beta	1.00	1.10	1.20	1.30	1.40

- a. What is the required rate of return for the project using the mode-average *beta* of 1.10?
- b. What is the range of required rates of return?
- c. What is the expected value of required rate of return?

9. Able Elba Palindrome, Inc., is evaluating a capital investment project. The after-tax cash flows for the project are listed as follows:

YEAR	EXPECTED CASH FLOW
0	\$-400,000
1	50,000
2	50,000
3	150,000
4	350,000

The risk-free rate is 8 percent, the firm's weighted average cost of capital is 10 percent, and the management-determined risk-adjusted discount rate appropriate to this project is 15 percent. Should the project be accepted? Explain.

10. The Totally Tubular Tube Company wishes to evaluate three new investment proposals. The firm is concerned with the impact of the proposals on its total risk. Consequently, it has determined expected values and standard deviations of the probability distributions of possible net present values for the possible combinations of existing projects, E, and investment proposals under consideration:

COMBINATION	EXPECTED VALUE OF NET PRESENT VALUE (IN MILLIONS)	STANDARD DEVIATION (IN MILLIONS)
E	\$6.50	\$5.25
E + 1	6.80	5.00
E + 2	7.60	8.00
E + 3	7.20	6.50
E + 1 + 2	7.90	7.50
E + 1 + 3	7.50	5.60
E + 2 + 3	8.30	8.50
E + 1 + 2 + 3	8.60	9.00

Which combination do you feel is most desirable? Which proposals should be accepted? Which should be rejected?

### Appendix A Problem



11. Willie Sutton Bank Vault Company has a debt-to-equity ratio (in market value terms) of 0.75. Its present cost of debt funds is 15 percent, and it has a marginal tax rate of 40 percent. Willie Sutton Bank Vault is eyeing the automated bank teller business, a field that involves electronics and is considerably different from its own line of business, so the company is looking for a benchmark or proxy company. The Peerless Machine Company, whose stock is publicly traded, produces only automated teller equipment. Peerless has a debt-to-equity ratio (in market value terms) of 0.25, a beta of 1.15, and an effective tax rate of 0.40.
- If Willie Sutton Bank Vault Company wishes to enter the automated bank teller business, what systematic risk (beta) is involved if it intends to employ the same amount of leverage in the new venture as it presently employs?
  - If the risk-free rate currently is 13 percent and the expected return on the market portfolio is 17 percent, what return should the company require for the project if it uses a CAPM approach?

### Appendix B Problem

12. Aspen Plowing, Inc., is considering investing in a new snowplow truck costing \$30,000. The truck is likely to provide after-tax incremental operating cash flows of \$10,000 per

year for six years. The unlevered cost of equity capital for the firm is 16 percent. The company intends to finance the project with 60 percent debt, bearing an interest rate of 12 percent. The loan will be repaid in equal annual principal payments at the end of each of the six years. Flotation costs (in present value terms) on financing amount to \$1,000, and the company is in a 30 percent tax bracket.

- a. What is the adjusted present value (APV) of the project? Is the project acceptable?
- b. What would happen if expected after-tax incremental operating cash flows were \$8,000 per year instead of \$10,000?



### Solutions to Self-Correction Problems

1. a.  $k_e = D_1/P_0 + g \quad D_1 = D_0(1.12) = \$1(1.12) = \$1.12$

$k_e = \$1.12/\$20 + 12\% = 17.6\%$

- b. Through the trial-and-error approach illustrated in Chapters 3 and 4, one ends up determining that the discount rate necessary to discount the cash-dividend stream to \$20 must fall somewhere between 18 and 19 percent as follows:

END OF YEAR	DIVIDEND PER SHARE	PRESENT VALUE AT 18%	PRESENT VALUE AT 19%
1	\$1.20	\$1.02	\$1.01
2	1.44	1.03	1.02
3	1.73	1.05	1.03
4	2.07	1.07	1.03
5	2.49	1.09	1.04
Present value, years 1-5		\$5.26	\$5.13

Year 6 dividend =  $\$2.49 (1.10) = \$2.74$

Market prices at the end of year 5 using a constant growth dividend valuation model:

$P_5 = D_6/(k_e - g)$

$P_5 = \$2.74/(0.18 - 0.10) = \$34.25, \quad P_5 = \$2.74/(0.19 - 0.10) = \$30.44$

Present value at time 0 for amounts received at end of year 5:

$\$34.25 \text{ at } 18\% = \$14.97, \quad \$30.44 \text{ at } 19\% = \$12.76$

	18%	19%
Present value of years 1-5	\$ 5.26	\$ 5.13
Present value of years 6-∞	14.97	12.76
Present value of all dividends	\$20.23	\$17.89

Therefore, the discount rate is closer to 18 percent than it is to 19 percent. Interpolating, we get

$$0.01 \left[ X \begin{bmatrix} 0.18 & \$20.23 \\ k_e & \$20.00 \\ 0.19 & \$17.89 \end{bmatrix} \$0.23 \right] \$2.34$$

$\frac{X}{0.01} = \frac{\$0.23}{\$2.34} \quad \text{Therefore,} \quad X = \frac{(0.01) \times (\$0.23)}{\$2.34} = 0.0010$

and  $k_e = 0.18 + X = 0.18 + 0.0010 = 18.10\%$ , which is the estimated return on equity that the market requires.

2. SITUATION	EQUATION: $R_f + (\bar{R}_m - R_f)\beta$	REQUIRED RETURN
1	$10\% + (15\% - 10\%)1.00$	15.0%
2	$14\% + (18\% - 14\%)0.70$	16.8
3	$8\% + (15\% - 8\%)1.20$	16.4
4	$11\% + (17\% - 11\%)0.80$	15.8
5	$10\% + (16\% - 10\%)1.90$	21.4

The greater the risk-free rate, the greater the expected return on the market portfolio; and the greater the beta, the greater will be the required return on equity, all other things being the same. In addition, the greater the market risk premium ( $\bar{R}_m - R_f$ ), the greater the required return, all other things being the same.

3. Cost of debt =  $15\%(1 - 0.4) = 9\%$

Cost of preferred stock = 13%

Cost of equity for health foods division =  $0.12 + (0.17 - 0.12)0.90 = 16.5\%$

Cost of equity for specialty metals division =  $0.12 + (0.17 - 0.12)1.30 = 18.5\%$

Weighted average required return for health foods division

$$= 9\%(0.3) + 13\%(0.1) + 16.5\%(0.6) = 13.9\%$$

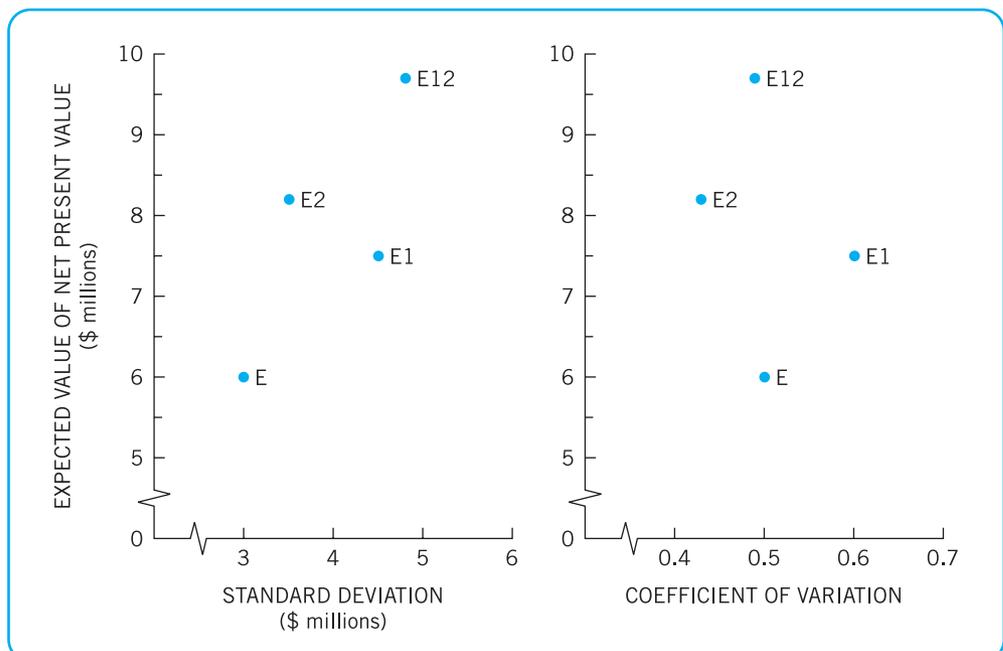
Weighted average required return for specialty metals division

$$= 9\%(0.3) + 13\%(0.1) + 18.5\%(0.6) = 15.1\%$$

As mentioned in the text, a conceptual case can be made for adjusting the non-equity costs of financing of the two divisions for differences in systematic risks. However, we have not done so.

4. a. The coefficients of variation (standard deviation/ $\overline{NPV}$ ) and the graphs of risk versus return for the alternatives are as follows:

Existing projects (E)	0.50
Plus project 1 (E1)	0.60
Plus project 2 (E2)	0.43
Plus projects 1 and 2 (E12)	0.49



- A moderately risk-averse decision maker will probably prefer the existing projects plus both new projects to any of the other three possible combinations. If this is the case, both new projects will be accepted. The actual decision will depend on your risk preferences. A very risk-averse individual might prefer the existing projects plus only project 2. Presumably, these preferences will be influenced by the presence of bankruptcy costs.
- b. If the CAPM approach leads to a different decision, the key to deciding would be the importance of market imperfections. As indicated earlier, if a company's stock is traded in imperfect markets, if the possibility of insolvency is substantive, and if bankruptcy costs are significant, more reliance should be placed on a total variability approach because it recognizes unsystematic plus systematic risk. If things point to minimal market imperfections, more reliance should be placed on the CAPM results.

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- Part VI of the text’s website, *Wachowicz’s Web World*, contains links to many finance websites and online articles related to topics covered in this chapter. (<http://web.utk.edu/~jwachowi/part6.html>)