Accounting

Financial and Managerial Accounting
MET AC630

Boston University/ Met College
Administrative Sciences

McGraw–Hill Primis

ISBN: 0–390–30185–X

Text:

Accounting: Text and Cases, Tenth Edition
Anthony–Hawkins–Merchant

This book was printed on recycled paper.

Accounting

http://www.mhhe.com/primis/online/

111 ACCT ISBN: 0–390–30185–X

Accounting

Contents

Anthony–Hawkins–Merchant • *Accounting: Text and Cases, Tenth Edition*

Chapter One

The Nature and Purpose of Accounting

Most of the world's work is done through organizations—groups of people who work together to accomplish one or more objectives. In doing its work, an organization uses resources—labor, materials, various services, buildings, and equipment. These resources need to be financed, or paid for. To work effectively, the people in an organization need information about the amounts of these resources, the means of financing them, and the results achieved through using them. Parties outside the organization need similar information to make judgments about the organization. **Accounting** is a system that provides such information.

Organizations can be classified broadly as either for-profit or nonprofit. As these names suggest, a dominant purpose of organizations in the former category is to earn a profit, whereas organizations in the latter category have other objectives, such as governing, providing social services, and providing education. Accounting is basically similar in both types of organizations.

The Need for Information

In its details information differs greatly among organizations of various types. But viewed broadly, the information needs of most organizations are similar. We shall outline and illustrate these general information needs by referring to Varsity Motors, Inc., an automobile dealership.

Varsity Motors seeks to earn a profit by selling new and used automobiles and parts and accessories, and by providing repair service. It is an organization of 52 people headed by Pat Voss, its president. It owns a building that contains the showroom, service shop, a storeroom for parts and accessories, and office space. It also owns a number of new and used automobiles, which it offers for sale; an inventory of spare parts, accessories, and supplies; and cash in the bank. These are examples of the resources the company needs to conduct its business.

Illustration 1–1 depicts the different types of information that might be useful to people interested in Varsity Motors. As shown in the illustration, information can be either quantitative or nonquantitative. Quantitative information is information that is expressed in numbers. Examples of nonquantitative information are visual impressions, conversations, television programs, and newspaper stories. Accounting is primarily concerned with quantitative information.

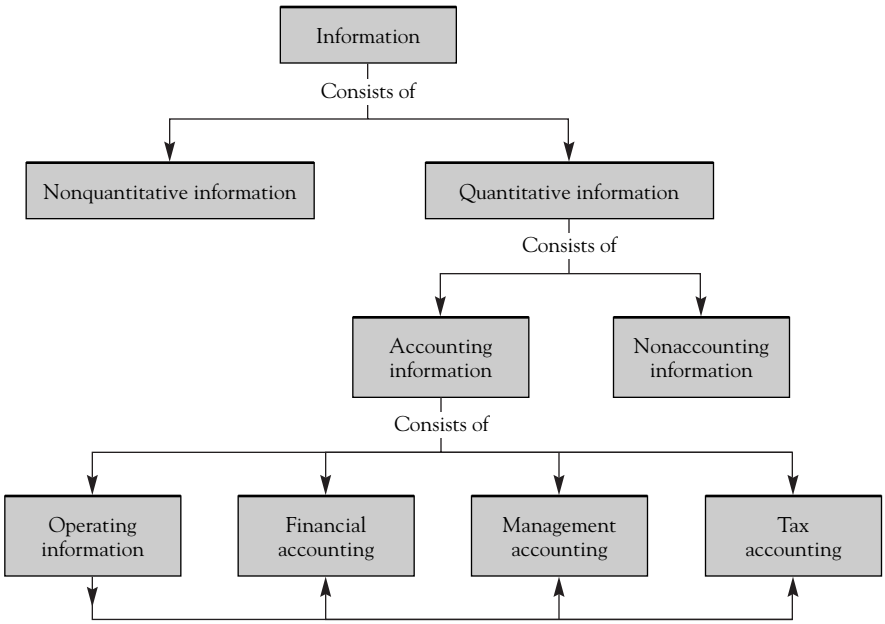
Accounting is one of several types of quantitative information. Accounting information is distinguished from the other types in that it usually is expressed in *monetary* terms. Data on employees' ages and years of experience are quantitative, but they are not usually considered to be accounting information. The line here is not sharply drawn, however; nonmonetary information is often included in accounting reports when it will help the reader understand the report. For example, an accounting sales report for Varsity Motors would show not only the monetary amount of sales revenue, but also the number of automobiles sold, which is nonmonetary information.

What information is needed about the amounts and financing of the resources used in Varsity Motors and the results achieved by the use of these resources? This information can be classified into four categories: (1) operating information, (2) financial accounting information, (3) management accounting information, and (4) tax accounting information. Each is shown in the bottom section of Illustration 1–1.

Operating Information

A considerable amount of **operating information** is required to conduct an organization's day-to-day activities. For example, Varsity Motors' employees must be paid exactly the amounts owed them, and the government requires that records be main-

ILLUSTRATION 1–1
Types of information



tained for each employee showing amounts earned and paid, as well as various deductions. The sales force needs to know what automobiles are available for sale and each one's cost and selling price. When an automobile is sold, a record must be made of that fact. The person in the stockroom needs to know what parts and accessories are on hand; and if the inventory of a certain part becomes depleted, this fact needs to be known so that an additional quantity can be ordered. Amounts owed by the company's customers need to be known; and if a customer does not pay a bill on time, this fact needs to be known so that appropriate action can be taken. The company needs to know the amounts it owes to others, when these amounts should be paid, and how much money it has in the bank.

Operating information constitutes by far the largest quantity of accounting information. As suggested by the arrows at the bottom of Illustration 1–1, operating information provides much of the basic data for management accounting, financial accounting, and tax accounting.

Financial Accounting Information

Financial accounting information is intended both for managers and also for the use of parties external to the organization, including shareholders (and trustees in nonprofit organizations), banks and other creditors, government agencies, investment advisers, and the general public. Shareholders who have furnished capital to Varsity Motors want information on how well the company is doing. If they should decide to sell their shares, they need information that helps them judge how much their investment is worth. Prospective buyers of these shares need similar information. If the company wants to borrow money, the lender wants information that will show that the company is sound and that there is a high probability that the loan will be repaid.

Only in rare instances can outside parties insist that an organization furnish information tailor-made to their specifications. In most cases, they must accept the information that the organization chooses to supply. They could not conceivably

understand this information without knowing the ground rules that governed its preparation. Moreover, they cannot be expected to learn a new set of ground rules for each organization of interest to them, nor can they compare information about two organizations unless both sets of information are prepared according to common ground rules. These ground rules are the subject matter of financial accounting (also called **financial reporting**).

Management Accounting Information

Varsity Motors' president, vice president of sales, service manager, and other managers do not have the time to examine the details of the operating information. Instead, they rely on summaries of this information. They use these summaries, together with other information, to carry out their management responsibilities. The accounting information specifically prepared to aid managers is called **management accounting information.** This information is used in three management functions: (1) planning, (2) implementation, and (3) control.

Planning

Performed by managers at all levels, in all organizations, **planning** is the process of deciding what actions should be taken in the future. A plan may be made for any segment of the organization or for the entire organization. When Varsity Motors' service manager decides the order in which automobiles will be repaired and which mechanic will work on each of them, the service manager is engaged in planning in the same sense as, but on a smaller scale than, the president when the latter decides to build a new showroom and service facility.

An important form of planning is **budgeting.** Budgeting is the process of planning the overall activities of the organization for a specified period of time, usually a year. A primary objective of budgeting is to *coordinate* the separate plans made for various segments of the organization so as to assure that these plans harmonize with one another. For example, Varsity's sales plans and service department capacity plans must be consistent. Also, budgeting helps managers determine whether the coming year's activities are likely to produce satisfactory results and, if not, what should be done. Even tiny organizations find budgeting useful; many persons prepare a budget for their household.

Planning involves making decisions. Decisions are arrived at by (1) recognizing that a problem or an opportunity exists, (2) specifying and ranking the criteria to be used to determine the best solution, (3) identifying alternative ways of addressing the problem or opportunity, (4) analyzing the consequences of each alternative, and (5) comparing these consequences to each other and the criteria so as to decide which is best. Accounting information is useful especially in the analysis step of the decision-making process.

Implementation

Making plans does not itself ensure that managers will implement the plans. In the case of the annual budget, each manager must take actions to provide the human and other resources that will be needed to achieve the planned results. Each manager must also make more detailed implementation plans than are encompassed in the budget; specific actions to be taken on a week-to-week and even day-to-day basis must be planned in advance.

The **implementation** of these very specific plans requires supervision on the part of the manager. Although much of this activity is routine, the manager also must react to events that were not anticipated when the budget was prepared. Indeed, a key

managerial responsibility is to change previous plans appropriately to adjust for new conditions. If an unexpected situation impacts more than one part of the organization, the managers affected must coordinate their responses, just as their original plans were coordinated.

Control

In Varsity Motors most automobile sales are made by salespersons and most service work is done by mechanics. It is not the responsibility of Pat Voss and the other managers to do this work themselves. Rather, it is their responsibility to see that it is done, and done properly, by the employees of the organization. The process they use to assure that employees perform properly is called **control.** Accounting information is used in the control process as a means of communication, motivation, attention getting, and appraisal.

As a means of *communication*, accounting reports (especially budgets) can assist in informing employees about management's plans and in general about the types of action management wishes the organization to take. As a means of *motivation*, accounting reports can induce members of the organization to act in a way that is consistent with the organization's overall goals and objectives. As a means of *attention-getting*, accounting information signals that problems may exist that require investigation and possibly action; this process is called **feedback.** As a means of *appraisal*, accounting helps show how well managers of the organization have performed, particularly with respect to the budgeted performance of the departments for which they are responsible. This provides a basis for a salary increase, promotion, corrective action of various kinds, or (in extreme cases) dismissal.

The relationship among the management functions of planning, implementation, and control is shown in Illustration 1–2. Chapter 15 will further introduce management accounting and contrast it with financial reporting.

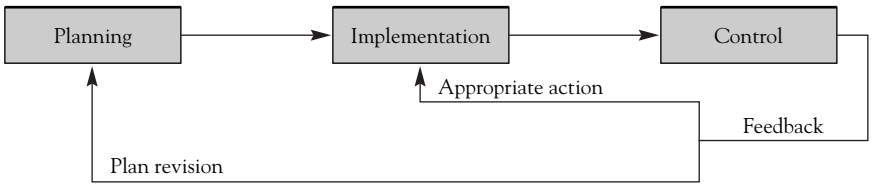
Tax Accounting Information

Varsity Motors must file tax returns with the taxing authorities. As we will see later, in the United States tax accounting rules can differ from financial accounting rules. Varsity Motors therefore must keep separate **tax accounting** records for tax purposes in those areas where it has elected to use different accounting rules for tax accounting and financial accounting.

Definition of Accounting

Accounting is related to all of the activities described above, and in all of them the emphasis is on using accounting information in the process of *making decisions*. Both managers within an organization and interested outside parties use accounting information in making decisions that affect the organization. Thus, of the several available definitions of accounting, the one developed by an American Accounting Association committee is perhaps the best because of its focus on accounting as an aid to decision making. This committee defined accounting as *the process of identifying, measuring, and communicating economic information to permit informed judgments and decisions by users of the information*.

ILLUSTRATION 1–2
Relationship of management functions



The Profession of Accounting

In most organizations the accounting group is the largest staff unit, that is, the largest group other than the "line" activities of production and marketing. The accounting group consists essentially of two types of people: (1) bookkeepers and other data-entry employees who maintain the detailed operating records and (2) staff accountants who decide how items should be reported, prepare the reports, interpret these reports, prepare special analyses, design and operate the systems through which information flows, and ensure that the information is accurate.

All publicly owned companies and many other organizations have their accounting reports audited by an independent public accounting firm. These firms also perform other services for clients. Some of these firms are very large with tens of thousands of employees and hundreds of offices around the world, with annual revenues totaling billions of dollars. They are far larger than any law firm, medical group practice, or other professional firm. At the other extreme, thousands of independent public accountants practice as individuals.

Most independent public accountants are licensed by their state and are designated as Certified Public Accountants (CPAs). The professional organization of CPAs is the American Institute of Certified Public Accountants (AICPA). Many accountants employed by industry belong to the Institute of Management Accountants (IMA). The IMA administers the Certified Management Accountant (CMA) program. Some accountants in industry also are Certified Internal Auditors (CIA). Many college and university accounting faculty members belong to the American Accounting Association (AAA).

Although accounting is a staff function performed by accounting professionals within an organization, the ultimate responsibility for the generation of accounting information—whether financial or managerial—rests with *management*. Management's responsibility for accounting is the reason that one of the top officers of many businesses is the **controller.** Within the division of top management's duties, the controller is the person responsible for satisfying other managers' needs for management accounting information and for complying with the requirements of financial reporting and tax accounting. To these ends the controller's office employs accounting professionals in management, financial, and tax accounting. These accountants design, install, and operate the information systems required to generate financial and managerial reports and tax returns.

Our Approach to Accounting

Accounting can be approached from either of two directions: from the viewpoint of the accountant or from the viewpoint of the user of accounting information. The former approach emphasizes the concepts and techniques that are involved in collecting, summarizing, and reporting accounting information; the latter emphasizes what the user needs to know about accounting. We focus on the latter approach. The difference between these two approaches is only one of emphasis. Accountants need to know how information is to be used because they should collect and report information in a form that is most helpful to those who use it. Users need to know what the accountant does; otherwise, they are unlikely to understand the real meaning of the information that is provided.

The approach to accounting taken here is something like that used by an airplane pilot in learning to use flight instruments. The pilot needs to know the meaning of the

message conveyed by each of the instruments—for example, that a needle on a certain gauge going above a given point probably means that a certain component is not functioning properly. The word *probably* is used because, for one reason or another, an instrument may not always give the reading that it is supposed to give. As the user of the instrument, the pilot must realize this and must also understand something of the likelihood of, and the reason for, these abnormalities. On the other hand, the pilot does not need to know how to design, construct, calibrate, or repair airplane instruments. Specialists are available for these important functions.

Similarly, those who use accounting information must understand what a given accounting figure probably means, what its limitations are, and the circumstances in which it may mean something different from the apparent "signal" that it gives. They do not, however, need to know how to design, construct, operate, or check on the accuracy of an accounting system. They can rely on accountants for these important functions.

Preconceptions about Accounting

Readers of this book have already been exposed to a great deal of accounting information. Cash register or credit card receipts, checks written or (preferably) received, bank statements, merchants' and utilities' bills—all these are parts of accounting systems. One reads in the newspaper about the profit (or losses) of a company or an industry, about dividends, or about money being spent to build new buildings; this information comes from accounting systems. Even before beginning a formal study of the subject, therefore, the reader has accumulated a number of ideas about accounting.

The trouble is that some of these ideas probably are incorrect. For example, it seems intuitively reasonable that accounting should report what a business is "worth." But accounting does not, in fact, do this, nor does it even attempt to do so. As another example, there is a general notion that the word *asset* refers to valuable things, good things to have. But the skills and abilities of an organization's employees are not assets in the accounting sense, even though they may be a key determinant of the organization's success.

Thus, as with many other subjects, students of accounting must be wary of preconceptions. They will discover that accounting *as it really is* may be different in important respects from what they had surmised it to be. They will find that there are sound reasons for these differences, and it is important that they understand these reasons. To achieve such an understanding, users need to know enough about accounting concepts and techniques to understand the nature and limitations of the accounting information. They do not, however, need the detailed knowledge that the accountant must have.

Plan of the Book

We described above four types of accounting information: operating information, financial accounting information, management accounting information, and tax accounting information. Since our viewpoint is that of the current and potential *users* (as opposed to preparers) of accounting information, we shall not describe operating and tax accounting information in any great detail. The book is therefore divided into two approximately equal parts, the first on financial accounting and the second on management accounting.

The discussion of financial accounting comes first because the structure of financial accounting underlies *all* accounting. This structure consists of a few basic principles and concepts, a set of relationships among the elements comprising the accounting system, a terminology, and a number of rules and guidelines for the application of the principles and concepts to specific situations. We shall describe the

financial accounting structure in a general way in Chapters 2, 3, and 4; and we shall then go over the same ground again in more detail in Chapters 5 through 14.

The second half of the book discusses the nature and use of management accounting information. The management of an organization can establish whatever ground rules it wishes for the accounting information collected for its own use. Thus, although the principles of financial accounting are applicable to all organizations, the rules of management accounting are tailor-made to meet the needs of the management of a specific organization.

Nevertheless, a similarity exists in both financial accounting practices and management accounting practices in most organizations. There are obvious economies in using financial accounting information wherever possible for management accounting purposes rather than devising two completely different systems for the two purposes.

The Financial Accounting Framework

Suppose you were asked to keep track of what was going on in an organization so as to provide useful information for management. One way of carrying out this assignment would be to write down a narrative of important events in a log similar to that kept by the captain of a ship.

After some experience with your log, you would gradually develop a set of rules to guide your efforts. For example, since it would be impossible to write down every action of every person in the organization, you would develop rules to guide you in choosing between those events that were important enough to record and those that should be omitted. You would also find that your log would be more valuable if you standardized certain terms. People who studied it would then have a clearer understanding of what you meant. Furthermore, if you standardized terms and their definitions, you could turn the job of keeping the log over to someone else and have some assurance that this person's report of events would convey the same information that you would have conveyed had you been keeping the log yourself.

In devising these rules of keeping a log, you would necessarily be somewhat arbitrary. There might be several ways of describing a certain event, all equally good. But in order to have a common basis of understanding, you would select just one of these for use in your recordkeeping system.

All these considerations were actually involved in the development of the accounting process. Accounting has evolved over a period of many centuries, and during this time certain terminology, rules, and conventions have come to be accepted as useful. If you are to understand accounting reports—the end products of an accounting system—you must be familiar with the rules and conventions lying behind these reports.

Accounting as a Language

Accounting is aptly called the *language of business*. The task of learning accounting, very similar to the task of learning a new language, is complicated by the fact that many words used in accounting mean almost but not quite the same thing as the identical words mean in everyday, nonaccounting usage. Accounting is not exactly a foreign language; the problem of learning it is more like that of an American learning to speak English as it is spoken in Great Britain. For example, the grain that Americans call *wheat* is called *corn* by the British; and the British use the word *maize* for what Americans call *corn*. Unless they are careful, Americans will fail to recognize that some words are used in Great Britain in a different sense from that used in America.

Similarly, some words are used in a different sense in accounting from their colloquial meanings. For example, accountants often use the term *net worth* to describe an amount that appears on accounting reports. The commonsense interpretation is that this amount refers to what something is worth, what its value is. However, such an interpretation is incorrect, and misunderstandings can arise if the user of an accounting statement does not understand what accountants mean by net worth. (The correct meaning, somewhat technical in nature, will be given in Chapter 2.)

Accounting also resembles a language in that some of its rules are definite whereas others are not. There are differences of opinion among accountants as to how a given event should be reported, just as grammarians differ as to many matters of sentence structure, punctuation, and word choice. Nevertheless, just as many practices are clearly poor English, many practices are definitely poor accounting. In the following chapters we describe the elements of good accounting and indicate areas in which there are differences of opinion as to what constitutes good practice.

Finally, languages evolve in response to the changing needs of society, and so does accounting. The rules described here are currently in use, but some of them will probably be modified to meet the changing needs of organizations and their constituencies.

Nature of Principles

The rules and basic concepts of accounting are commonly referred to as *principles*. The word **principle** is here used in the sense of a general law or rule that is to be used as a guide to action. This means that accounting principles do not prescribe exactly how each event occurring in an organization should be recorded. Consequently, there are many matters in accounting practice that differ from one organization to another. In part, these differences are inevitable because a single detailed set of rules could not conceivably apply to every organization. In part, the differences reflect that within "generally accepted accounting principles" accountants have some latitude in which to express their own ideas as to the best way of recording and reporting a specific event.

Readers should realize, therefore, that they cannot know the precise meaning of a number of the items in an accounting report unless they know which of several equally acceptable possibilities has been selected by the person who prepared the report. The meaning intended in a specific situation requires knowledge of the context.

Criteria

Accounting principles are established by humans. Unlike the principles of physics, chemistry, and the other natural sciences, accounting principles were not deduced from basic axioms, nor can they be verified by observation and experiment. Instead, they have evolved. This evolutionary process is going on constantly; accounting principles are not eternal truths.

The general acceptance of an accounting principle usually depends on how well it meets three criteria: relevance, objectivity, and feasibility. A principle has **relevance** to the extent that it results in information that is meaningful and useful to those who need to know something about a certain organization. A principle has **objectivity** to the extent that the resulting information is not influenced by the personal bias or judgment of those who furnish it. Objectivity connotes reliability, trustworthiness. It also connotes verifiability, which means that there is some way of finding out whether the information is correct. A principle has **feasibility** to the extent that it can be implemented without undue complexity or cost.

These criteria often conflict with one another. In some cases the most relevant solution may be the least objective and the least feasible.

Example The development of a new product may have a significant effect on a company's real value—"miracle" drugs and personal computer chips being spectacular examples. Information about the value of new products is most useful to the investor; it is indeed relevant. But the best estimate of the value of a new product is likely to be that made by management, and this is a highly subjective estimate. Accounting therefore does not attempt to record such values. Accounting sacrifices relevance in the interests of objectivity.

The measure of the value of the owners' interest or equity in a biotechnology firm such as Genentech, Inc., obtained from the stock market quotations (i.e., multiplying the price per share of stock times the number of shares outstanding) is a much more accurate reflection of the true value than the amount listed as owners' equity that appears in the corporation's financial statements. The marketplace gave this value as $4.38 billion; the accounting records gave it as $1.12 billion. The difference does not indicate an error in the accounting records. It merely illustrates the fact that accounting does not attempt to report market values.

In developing new principles the essential problem is to strike the right balance between relevance on the one hand and objectivity and feasibility on the other. Failure to appreciate this problem often leads to unwarranted criticism of accounting principles. It is easy to criticize accounting on the grounds that accounting information is not as relevant as it might be; but the critic often overlooks the fact that proposals to increase relevance almost always involve a sacrifice of objectivity and feasibility. On balance, such a sacrifice may not be worthwhile.

Source of Accounting Principles

The foundation of accounting consists of a set of **generally accepted accounting principles,** or **GAAP** for short. Currently, these principles are established by the Financial Accounting Standards Board (FASB). Current information about the FASB's activities can be obtained by accessing the FASB's World Wide Web site (www.fasb.org). The FASB consists of seven members with diverse accounting backgrounds who work full time on developing new or modified principles. The board is supported by a professional staff that does research and prepares a discussion memorandum on each problem that the board addresses. The board acts only after interested parties have been given an opportunity to suggest solutions to problems and to comment on proposed pronouncements. The FASB is a nongovernmental organization financed by contributions from business firms and the accounting profession.[1]

Each of the *Standards* of the FASB deals with a specific topic.[2] Collectively, they do not cover all the important topics in accounting. If an authoritative pronouncement has not been made on a given topic, accountants can treat that topic in the way they believe most fairly presents the situation.

Companies are not legally required to adhere to GAAP as established by the FASB. As a practical matter, however, there are strong pressures for them to do so. The accounting reports of most companies are audited by certified public accountants who are members of the AICPA. Although the AICPA does not require its members to force companies to adhere to FASB standards, it does require that if the CPA finds that the company has not followed FASB standards, the difference must be called to public attention. Since companies usually do not like to go counter to

[1] Financial accounting and reporting standards for state and local governments and government-owned entities, such as colleges and universities, are set by the Government Accounting Standards Board.

[2] Authoritative pronouncements consist of *Statements* and interpretations of the Financial Accounting Standards Board and certain pronouncements of predecessor bodies established by the AICPA. We shall refer to these earlier pronouncements as *Accounting Research Bulletins* and *Opinions*.

the FASB—even though they may feel strongly that the FASB principle is not appropriate in their particular situation—they almost always conform to the FASB pronouncements.

The FASB has established a 13-member group called the Emerging Issues Task Force (EITF). As its name suggests, the EITF issues guides, referred to as *consensuses*, on accounting issues that need to be resolved in a timely manner. Typically, these consensuses are adopted where appropriate by corporations.

Another source of pressure to conform to GAAP is the U.S. Securities and Exchange Commission (SEC). This agency, which exists to protect the interests of investors, has jurisdiction over any corporation with a class of securities listed on a National stock exchange or, if traded over-the-counter, with 500 or more shareholders and $10 million or more total assets. The SEC requires these companies to file accounting reports prepared in accordance with GAAP. In its *Regulation S–X*, its *Financial Reporting Series Releases*, and its *Staff Accounting Bulletins*, the SEC spells out acceptable accounting principles in more detail than, but generally consistent with, the pronouncements of the FASB. Legally, the Securities Exchange Act of 1934 gave the SEC the authority to promulgate GAAP; but over the years, for the most part the SEC has relied on the FASB and its predecessors for carrying out the standard-setting process.

The AICPA has issued pronouncements called *Statements of Position* (SOP) for accounting in a number of industries, including finance companies, government contractors, and real estate investment trusts. Although these pronouncements do not have the force of FASB *Standards*, organizations follow them.

Various regulatory bodies also prescribe accounting rules for the companies they regulate. Among those subjected to such rules are banks and other financial institutions, insurance companies, and public utilities. These rules are not necessarily consistent with the principles of the FASB, although there has been a tendency in recent years for regulatory agencies to change their accounting rules so that they do conform.

The authority of the FASB and other agencies exists, of course, only in the United States of America. Accounting principles in other countries differ in some respects from American GAAP, but in general there is a basic similarity throughout the world. There is a major effort to codify a set of accounting principles that would apply internationally, and over 30 statements known as International Accounting Standards (IAS) have been published by the International Accounting Standards Committee (IASC) located in London, England. The IASC does not have the power to enforce its pronouncements. Their adoption by companies and accounting standard setters is voluntary.[3] With a few exceptions, the IASC standards are generally consistent with the principles described in this book.

A convenient source of data about the various accounting practices used by American companies is *Accounting Trends & Techniques*, published annually by the AICPA. It summarizes the practices of 600 companies. Since these are relatively large companies, the summaries do not necessarily reflect the practices of all companies.

[3]Unlike the United States, the accounting standards of many countries are incorporated as part of the country's company laws. In such countries, companies are required by law to adhere to these standards. There are some exceptions. In some countries, such as the United Kingdom, if a company believes the official accounting Standards do not result in a "true and fair" view of the company's financial condition or financial performance, the company may use an accounting method that management believes produces a "true and fair" view. Another exception is often made for companies listed on stock exchanges. They may use IAS in certain financial reports to stockholders.

Financial Statements

The end product of the financial accounting process is a set of reports that are called **financial statements.** Generally accepted accounting principles require that three such reports be prepared: (1) a statement of financial position, which is generally referred to as a balance sheet, (2) an income statement, and (3) a statement of cash flows.[4] As we examine the details of the financial accounting process, it is important to keep in mind the objective toward which the process is aimed: the preparation of these three financial statements.

Most reports, in any field, can be classified into one of two categories: (1) **stock,** or **status, reports** and (2) **flow reports.** The amount of water in a reservoir at a given moment of time is a measure of stock, whereas the amount of water that moves through the reservoir in a day is a measure of flow. Reports of stocks are always as of a specified *instant* in time; reports of flow always cover a specified *period* of time. Reports of stocks are like snapshots; reports of flows are more like motion pictures. One of the accounting reports, the balance sheet, is a report of stocks. It shows information about the resources and obligations of an organization at a specified moment of time. The other two reports, the income statement and the cash flow statement, are reports of flows. They report activities of the organization for a period of time, such as a quarter or a year.

Companies listed on stock exchanges publish annual and quarterly financial reports. These reports can be obtained either directly from the company or from the Securities and Exchange Commission (SEC). Increasingly, these reports are also available through the Internet.

For example, the Coca-Cola Company's home page (http://www.cocacola.com) contains information about Coca-Cola's products, history, and financial performance and position. (If you have access to the Internet, you might want to access this site to get a sense of a complete set of financial statements. After completing the financial reporting section of this book, you should be able to read and interpret these reports with confidence that you understand them.)[5]

Company financial reports are also available electronically through the Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval System (EDGAR). Nearly all companies registered with the SEC use EDGAR to transmit their required filings to the SEC.

In this chapter we will give a brief introduction to the balance sheet and income statement . The definitions provided should be considered as only working definitions for the purposes of this introductory chapter. The next nine chapters describe more precisely and in greater detail the balance sheet and income statement. We shall defer a description of the cash flow statement until Chapter 11. Because this report is derived from data originally collected for the other two reports, it is inappropriate to discuss the cash flow statement until the balance sheet and income statement have been thoroughly explained.

---

[4]Company financial reports may also include other financial displays, such as changes in owners' equity. This display will be explained in Chapter 10.

[5]The home pages of other well-known companies you might want to access are General Electric (http://www.ge.com), Microsoft (http://www. microsoft.com), General Motors (http://www.gm.com), Wal-Mart (http://www.wal-mart.com), America Online (http://www.aol.com), IBM (http://www.ibm.com), Citicorp (http:/www.citibank.com), and Merrill Lynch (http:www.plan.ml.com).

ILLUSTRATION 1–3 The Balance Sheet

HOLDEN COMPANY
Balance Sheet
As of December 31, 1997
(000 omitted)

Assets		Liabilities and Owners' Equity	
Current assets:		*Current liabilities:*	
Cash	$ 1,449	Accounts payable	$ 5,602
Marketable securities	246	Bank loan payable	1,000
Accounts receivable, net	9,944	Accrued liabilities	876
Inventories	10,623	Estimated tax liability	1,541
Prepaid expenses	389	Current portion of long-term debt	500
Total current assets	22,651	Total current liabilities	9,519
Noncurrent assets:		*Noncurrent liabilities:*	
Property, plant, equipment at cost	26,946	Long-term debt, less current portion	2,000
Less: Accumulated depreciation	13,534	Deferred income taxes	824
Property, plant, equipment—net	13,412	Total liabilities	12,343
Investments	1,110	*Owners' equity:*	
Patents and trademarks	403	Common stock	1,000
Goodwill	663	Additional paid-in capital	11,256
		Total paid-in capital	12,256
		Retained earnings	13,640
		Total owners' equity	25,896
Total assets	$38,239	Total liabilities and owners' equity	$38,239

The Balance Sheet

Illustration 1–3 presents the December 31, 1997, balance sheet of the Holden Company. (Do not worry if you do not know what all of the account titles mean. They will be discussed in later chapters.)

The Holden balance sheet is a snapshot of the financial position of the company. It has two sides: the left, Assets, and the right, Liabilities and Owners' Equity. We will give working descriptions of each side. (More precise descriptions will be provided in Chapter 2.)

Assets

An entity needs cash, equipment, and other resources in order to operate. These resources are its assets. **Assets** are valuable resources owned by the entity. The left side of the balance sheet shows the amounts of these assets as of a certain date. For example, the amount of Cash that Holden Company owned on December 31, 1997, was $1,449,000.

Assets are resources **owned** by Holden Company. Its employees, although perhaps its most valuable resource, are not assets in accounting, because the company does not own its employees.

Liabilities and owners' equity

The right side of the balance sheet shows the sources that provided the entity's assets. As the heading indicates, there are two general types of sources, Liabilities and Owners' Equity.

Liabilities are obligations of the entity to outside parties who have furnished resources. These parties are generally called **creditors** because they have extended credit to the entity. As Illustration 1–3 indicates, suppliers have extended credit in the amount of $5,602,000, as indicated by Accounts Payable.

Creditors have a **claim** against the assets in the amount shown as the liability. For example, a bank has loaned $1,000,000 to Holden Company, and therefore has a claim of this amount, as indicated by Bank Loan Payable.

Because an entity will use its assets to pay off its claims, those claims are against assets. They are claims against *all* the assets, not any particular assets.

The other source of the funds that an entity uses to acquire its assets is called **Owners' equity.** The name is *owners' equity* (singular) not *owners' equities* (plural), even though there are several sources of equity. There are two sources of equity funds: (1) the amount provided directly by equity investors, which is called **Total Paid-in Capital;** and (2) the amount retained from profits (or earnings), which is called **Retained Earnings.**

Creditors can sue the entity if the amounts due them are not paid. Equity investors have only a *residual claim*; that is, if the entity is dissolved, they get whatever is left after the liabilities have been paid, which may be nothing. Liabilities therefore are a stronger claim against the assets than equity.

We can describe the right-hand side of the balance sheet in two somewhat different ways: (1) as the amount of funds supplied by creditors and equity investors; and (2) as the claims of these parties against the assets. Use whichever way is more meaningful to you.

Dual-aspect concept

The assets that remain after the liabilities are taken into account will be claimed by the equity investors. If an entity has assets that total $10,000 and liabilities that total $4,000, its owners' equity must be $6,000.

Because (1) any assets not claimed by creditors will be claimed by equity investors, and (2) the total amount of claims (liabilities + owners' equity) cannot exceed what there is to be claimed, it follows that the total amount of assets will always be equal to the total amount of liabilities plus owners' equity.

The fact that total assets must equal, or **balance,** total liabilities plus owners' equity is why the statement is called a *balance sheet*. This equality tells nothing about the entity's financial condition; it always exists unless the accountant has made a mistake.

This fact leads to what is called the **dual-aspect concept.** The two aspects that this concept refers to are (1) assets and (2) liabilities plus owners' equity. The concept states that these two aspects are always equal. (This equality exists even if liabilities are greater than assets. For example, if assets in an unprofitable business were $100,000 and liabilities were $120,000, owners' equity would be a *negative* amount of $20,000.)

The dual-aspect concept is 1 of 11 basic accounting concepts we shall describe in Chapters 2 and 3. The concept can be written as an equation:

$$\text{Assets} = \text{Liabilities} + \text{Owners' equity}$$

This equation is fundamental. It governs all accounting. We can write a similar equation in a form that emphasizes the fact that owners' equity is a residual interest:

$$\text{Assets} - \text{Liabilities} = \text{Owners' equity}$$

For example, if the assets of Violet Company total $19,000 and its liabilities total $3,000, its owners' equity must total $16,000.

The term *net assets* is sometimes used instead of owners' equity. It refers to the fact that owners' equity is always the difference between assets and liabilities.

Every accounting transaction can be described in terms of its effect on this fundamental accounting equation. For example, the Violet Company spends $15,000 cash for a new car. The company's accountant would record a reduction in the asset Cash (−$15,000) and an increase in the asset Cars (+$15,000). After recording this transaction, the fundamental equation is still in balance. Similarly, if the company had bought the car on credit rather than for cash, the equation would be in balance because the liability Accounts Payable would have increased (+$15,000) and the asset Cars would have increased by a like amount (+$15,000).

The amounts of an entity's assets and liabilities will change from day to day. Any balance sheet reports the amounts of assets, liabilities, and owners' equity at one point in time. The balance sheet therefore must be dated. (From here on we shall sometimes use the term *19x1* to refer to the first year, *19x2* for the next year, and so on. Thus, a balance sheet as of December 31 of the first year is dated "as of December 31, 19x1." It refers to the close of business on that day.

Returning to Illustration 1–3, if the Holden Company prepared a balance sheet as of the beginning of business the next day, January 1, 1998, it would be the same as the one in Illustration 1–3 because nothing changes between the close of business on one day and the beginning of business on the next day.

The Income Statement

Illustration 1–4 shows the Holden Company's 1998 income statement. The amount added to Retained Earnings as a result of profitable operations during a period is the **income** of the period. An income statement explains how this income was earned. There is no standard format for an income statement. Illustration 1–4 shows one common format. (The income statement is discussed in greater detail in Chapter 3.)

The basic income statement equation is:

Revenues − Expenses = Net Income

The first item on this income statement is Sales Revenue, which is the amount of products (i.e., goods and services) sold or delivered to customers during the period.

The item on the second line is labeled Cost of Sales. It reports the cost of the goods or services whose revenue is reported on the first line.

ILLUSTRATION 1–4
The income statement

HOLDEN COMPANY
Income Statement
For the Year 1998
(000 omitted)

Sales revenue	$75,478
Less cost of sales	52,227
Gross margin	23,251
Less operating expenses	10,785
Income before taxes	12,466
Provision for income taxes	6,344
Net income	$ 6,122

The difference between sales and cost of sales is called *gross margin*. Thus,

Gross margin = Sales revenue − Cost of sales

Operating expenses are subtracted from gross margin, leaving **income before taxes.** These expenses include costs related to the current period and costs that do not benefit future periods.

The next item in Illustration 1–4, provision for income taxes, is shown separately because it is an especially important expense.

The final item (the bottom line) on an income statement is called **net income** (or **net loss,** if expenses were larger than revenues).

"Package" of Financial Reports

Illustration 1–5 is a "package" of financial reports for the Holden Company consisting of two balance sheets and an income statement. (A complete package of financial reports would also include a cash flow statement.) The illustration shows how the balance sheet, statement of retained earnings, and income statement relate to each other through the Retained Earnings account.

An income statement is a summary of certain changes in Retained Earnings that have taken place during an accounting period. In other words, an income statement reports certain changes in Retained Earnings that have taken place between two balance sheet dates.

Thus, a useful accounting "report package" consists of a balance sheet *at the beginning of* the accounting period, an income statement *for* the period, and a balance sheet *at the end of* the period.

The statement of retained earnings at the bottom of Illustration 1–5 shows that the Retained Earnings on December 31, 1997, was $13,640,000. During 1998 profitable operations resulted in net income of $6,122,000, which increased Retained Earnings by this amount. (Net income is the bottom line on the income statement.) Retained Earnings was decreased by $4,390,000, representing a distribution to the shareholders in the form of dividends. As a result, the total Retained Earnings on December 31, 1998, was $15,372,000 ($13,640,000 + $6,122,000 − $4,390,000).

Dividends are deducted from Retained Earnings because dividends are a distribution of earnings to owners. Dividends are *not* an expense.

Financial Statement Objectives

We indicated earlier that financial accounting statements, while also of use to management, are intended primarily to provide relevant information to parties external to the business. The Financial Accounting Standards Board (FASB) issued a formal statement of financial reporting objectives. The entire statement is too lengthy to describe here in detail. We will simply highlight the key objectives. (The numbering is ours, not that of the FASB.)

Financial reporting should provide information:

1. Useful to present and potential investors and creditors in making rational investment and credit decisions.
2. Comprehensible to those who have a reasonable understanding of business and economic activities and are willing to study the information with reasonable diligence.
3. About the economic resources of an enterprise, the claims to those resources, and the effects of transactions and events that change resources and claims to those resources.
4. About an enterprise's financial performance during a period.

ILLUSTRATION 1–5 A "Package" of Accounting Reports

HOLDEN COMPANY
(000 OMITTED)

Condensed Balance Sheet
As of December 31, 1997

Assets	
Current assets	$22,651
Buildings and equipment	13,412
Other assets	2,176
Total assets	$38,239
Liabilities and owners' equity	
Liabilities	$12,343
Owners' equity:	
Paid-in capital	12,256
Retained earnings	13,640
Total liabilities and owners' equity	$38,239

Condensed Balance Sheet
As of December 31, 1998

Assets	
Current assets	$24,062
Buildings and equipment	14,981
Other assets	3,207
Total assets	$42,250
Liabilities and owners' equity	
Liabilities	$14,622
Owners' equity:	
Paid-in capital	12,256
Retained earnings	15,372
Total liabilities and owners' equity	$42,250

Income Statement
For the Year 1998

Sales revenue	$75,478
Less cost of sales	52,227
Gross margin	23,351
Less operating expenses	10,785
Income before taxes	12,466
Provision for income taxes	6,344
Net income, 1998	$ 6,122

Statement of Retained Earnings

Retained earnings, 12/31/97	$13,640
Add net income	6,122
	19,762
Less dividends	4,390
Retained earnings, 12/31/98	$15,372

5. To help users assess the amounts, timing, and uncertainty of prospective cash receipts from dividends or interest and the proceeds from the sale or redemption of securities or loans.

Objectives 1 and 2 apply to all financial accounting information. Note that the intended users are expected to have attained a reasonable level of sophistication in using the statements; the statements are not prepared for uninformed persons. Objective 3 is related to the balance sheet, objective 4 to the income statement, and objective 5 to the cash flow statement. As the five objectives collectively suggest, financial statements provide information about the *past* to aid users in making predictions and decisions related to the *future* financial status and flows of the business.

Income Tax Reporting

The Internal Revenue Service (IRS) specifies the ways in which taxable income is calculated for the purpose of assessing income taxes. Because the tax laws' purposes differ from the objectives of financial reporting, the IRS regulations differ in some respects from GAAP. These differences mean that the amount of pretax income or loss shown

on the taxpayer's income statement prepared according to GAAP will probably not be equal to the taxable income or loss shown on the taxpayer's income tax return.[6]

Thus, in the United States, financial accounting, management accounting, and income tax accounting are essentially separate processes. GAAP provides the principles for financial accounting; top management for management accounting; and the IRS and Congress for income tax accounting. The underlying operating information that is the basic data for all three processes is the same. The pieces or building blocks of operating information simply are put together in different ways for these three different processes. Though differences among the three processes do exist, in practice the similarities are greater than the differences.

Summary

An organization has four types of accounting information: (1) operating information, which has to do with the details of operations; (2) management accounting information, which is used internally for planning, implementation, and control; (3) financial accounting information, which is used both by management and by external parties; and (4) tax accounting information, which is used to file tax returns with taxing authorities.

Financial accounting is governed by ground rules that are referred to as generally accepted accounting principles. These ground rules may be different than the reader believes them to be, based on previous exposure to accounting information. They are prescribed by the Financial Accounting Standards Board. They attempt to strike a balance between the criterion of relevance on the one hand and the criteria of objectivity and feasibility on the other.

The end products of the financial accounting process are three financial statements: the balance sheet, the income statement, and the cash flow statement. The balance sheet is a report of status or stocks as of a moment of time, whereas the other two statements summarize flows over a period of time.

In the United States, calculating taxable income for income tax purposes differs from the process of calculating income for the financial accounting income statement.

The basic accounting equation is

$$\text{Assets} = \text{Liabilities} + \text{Owners' equity}$$

Problems

Problem 1–1.

As of December 31, Charles Company had $12,000 in cash, held $95,000 of inventory, and owned other items that originally cost $13,000. Charles Company had also borrowed $40,000 from First City Bank. Prepare a balance sheet for Charles Company as of December 31. Be sure to label each item and each column with appropriate terms.

Problem 1–2.

Selected balance sheet items are shown for the Microtech Company. Compute the missing amounts for each of the four years. What basic accounting equation did you apply in making your calculations?

[6] In contrast to the United States, the governments of many countries require a company's financial accounting and tax accounting to be identical. This is changing. In many countries listed companies are now being allowed to use International Accounting Standards (IAS) in reports to stockholders. Private companies do not qualify for this exemption.

	Year 1	Year 2	Year 3	Year 4
Current assets	$ 113,624	$?	$ 85,124	$?
Noncurrent assets	?	198,014	162,011	151,021
Total assets	$ 524,600	$?	$?	$220,111
Current liabilities	$ 56,142	$40,220	$?	$?
Noncurrent liabilities	?	?	60,100	30,222
Paid-in capital	214,155	173,295	170,000	170,000
Retained earnings	13,785	(3,644)	1,452	2,350
Total liabilities and owners' equity	$ 524,600	$ 288,456	$?	$220,111

Problem 1–3.

Selected income statement items are shown for Astrotech Company. Compute the missing amounts for each of the four years. What basic accounting equation did you apply in making your calculations?

(*Hint:* To *estimate* the Year 4 missing numbers compute the typical percentage each expense item is of sales for Years 1 to 3 and apply the percentage figure for each expense item to Year 4's sales.)

	Year 1	Year 2	Year 3	Year 4
Sales	$12,011	$?	$ 11,545	$10,000
Cost of goods sold	3,011	2,992	?	?
Gross margin	?	8,976	8,659	?
Other expenses	6,201	5,152	?	?
Profit before taxes	2,799	?	2,363	?
Tax expense	?	1,019	945	?
Net income	$ 1,679	$ 1,528	$ 1,418	?

Problem 1–4.

An analysis of the transactions made by Acme Consulting for the month of July is shown below.

	Cash	+	Accounts Receivable	+	Supplies Inventory	+	Equipment	=	Accounts Payable	+	Owners' Equity	Description of Transaction
1.	+$20,000										+$20,000	Investment
2.	−$ 5,000						+$7,000		+$ 2,000			
3.	−$ 1,000				+$1,000							
4.	−$ 4,500										−$ 4,500	Salaries
5.	+$ 5,000		+$5,000								+$10,000	Revenues
6.	−$ 1,500								−$ 1,500			
7.	+$ 1,000		−$1,000									
8.	−$ 750										−$ 750	Rent
9.	−$ 500										−$ 500	Utilities
10.									+$ 200		−$ 200	Travel
11.					−$ 200						−$ 200	

Required:

a. Explain each transaction.
b. Prepare a balance sheet as of the end of the month.
c. Prepare an income statement for the month (ignore taxes).
d. Explain the changes in the Cash account.
e. Explain why the change in the Cash account and the month's income are not the same.

Problem 1–5.

During the month of June, Bon Voyage Travel recorded the following transactions:

1. Owners invested $25,000 in cash to start the business. They received common stock.
2. The month's rent of $500 was prepaid in cash.
3. Equipment costing $8,000 was bought on credit.
4. $500 was paid for office supplies.
5. Advertising costing $750 was paid for with cash.
6. Paid $3,000 employee salaries in cash.
7. Earned travel commissions of $10,000 of which $2,000 was received in cash.
8. Paid $5,000 of the $8,000 owed to the equipment supplier.
9. Used $100 of the office supplies.
10. Charged $1,000 of miscellaneous expenses on the corporate credit card.

Required:

a. Prepare an analysis of the month's transactions using the same tabular format as shown in Problem 1–4 (ignore taxes).
b. Prepare a balance sheet as of the end of the month.
c. Prepare an income statement for the month.
d. Explain the changes in the Cash account.
e. Explain why the change in the Cash account and the month's income are not the same.

Cases

CASE 1–1 Kim Fuller*

In the early fall of 1997, Kim Fuller was employed as a district sales engineer for a large chemical firm. During a routine discussion with plant chemists, Fuller learned that the company had developed a use for the recycled material, in pulverized form, made from plastic soda pop bottles. Because the state had mandatory deposits on all beverage bottles, Fuller realized that a ready supply of this material was available. All that was needed was an organization to tap that bottle supply, grind the bottles, and deliver the pulverized plastic to the chemical company. It was an opportunity Fuller had long awaited—a chance to start a business.

In November 1997 Fuller began checking into the costs involved in setting up a plastic bottle grinding business. A used truck and three trailers were ac-

*© Professor Robert N. Anthony, Harvard Business School.

quired to pick up the empty bottles. Fuller purchased one used grinding machine but had to buy a second one new; supplies and parts necessary to run and maintain the machines were also purchased. Fuller also purchased a personal computer with the intention of using it to keep company records. These items used $65,000 of the $75,000 Fuller had saved and invested in the company.

A warehouse costing $162,000 was found in an excellent location for the business. Fuller was able to interest family members enough in this project that three of them, two sisters and a brother, invested $30,000 each. These funds gave Fuller the $50,000 down payment on the warehouse. The bank approved a mortgage for the balance on the building. In granting the mortgage, however, the bank official suggested that Fuller start from the beginning with proper accounting records. He said these records would help not only with future bank dealings but also with tax returns and general management of the company. He suggested Fuller find a good accountant to provide assistance from the start, to get things going on the right foot.

Fuller's neighbor, Marion Zimmer, was an accountant with a local firm. When they sat down to talk about the new business, Fuller explained, "I know little about keeping proper records." Zimmer suggested Fuller should buy an "off-the-shelf" accounting system software package from a local office supply retailer. Zimmer promised to help Fuller select and install the package as well as learn how to use it. In order to select the right package for Fuller's needs, Zimmer asked Fuller to list all of the items purchased for the business, all of the debts incurred, and the information Fuller would need to manage the business. Zimmer explained that not all of this information would be captured by the accounting records and displayed in financial statements. Based on what Fuller told Zimmer, Zimmer promised to create files to accommodate accounting and nonaccounting information that Fuller could access through the company's personal computer. As Fuller's first lesson in accounting, Zimmer gave Fuller a brief lecture on the nature of the balance sheet and income statement and suggested Fuller draw up an opening balance sheet for the company.

Confident now that the venture was starting on solid ground, Kim Fuller opened the warehouse, signed contracts with two local bottling companies, and hired two grinding machine workers and a truck driver. By February 1998 the new firm was making regular deliveries to Fuller's former employer.

Questions

1. What information will Fuller need to manage the business? Classify this information in two categories: accounting information and nonaccounting information.
2. See what you can do to draw up a beginning of business list of the assets and liabilities of Fuller's company making any assumptions you consider useful. How should Fuller go about putting a value on the company's assets? Using your values, what is the company's opening owners' equity?
3. Now that Fuller has started to make sales, what information is needed to determine "profit and loss"? What should be the general construction of a profit and loss analysis for Fuller's business? How frequently should Fuller do such an analysis?
4. What other kinds of changes in assets, liabilities, and owners' claims will need careful recording and reporting if Fuller is to keep in control of the business?

CASE 1–2 Baron Coburg*

Once upon a time many, many years ago, there lived a feudal landlord in a small province of Western Europe. The landlord, Baron Coburg, lived in a castle high on a hill. He was responsible for the well-being of many peasants who occupied the lands surrounding his castle. Each spring, as the snow began to melt, the Baron would decide how to provide for all his peasants during the coming year.

One spring, the Baron was thinking about the wheat crop of the coming growing season. "I believe that 30 acres of my land, being worth five bushels of wheat per acre, will produce enough wheat for next winter," he mused, "but who should do the farming? I believe I'll give Ivan and Frederick the responsibility of growing the wheat." Whereupon Ivan and Frederick were summoned for an audience with Baron Coburg.

"Ivan, you will farm on the 20-acre plot of ground and Frederick will farm the 10-acre plot," the Baron

began. "I will give Ivan 20 bushels of wheat for seed and 20 pounds of fertilizer. (Twenty pounds of fertilizer are worth two bushels of wheat.) Frederick will get 10 bushels of wheat for seed and 10 pounds of fertilizer. I will give each of you an ox to pull a plow, but you will have to make arrangements with Feyador the Plowmaker for a plow. The oxen, incidentally, are only three years old and have never been used for farming, so they should have a good 10 years of farming ahead of them. Take good care of them because an ox is worth 40 bushels of wheat. Come back next fall and return the oxen and the plows along with your harvest."

Ivan and Frederick genuflected and withdrew from the Great Hall, taking with them the things provided by the Baron.

The summer came and went, and after the harvest Ivan and Frederick returned to the Great Hall to account to their master for the things given them in the spring. Ivan said, "My Lord, I present you with a slightly used ox, a plow, broken beyond repair, and 223 bushels of wheat. I, unfortunately, owe Feyador the Plowmaker three bushels of wheat for the plow I got from him last spring. And, as you might expect, I used all the fertilizer and seed you gave me last spring. You will also remember, my Lord, that you took 20 bushels of my harvest for your own personal use."

Frederick spoke next. "Here, my Lord, is a partially used ox, the plow, for which I gave Feyador the Plowmaker 3 bushels of wheat from my harvest, and 105 bushels of wheat. I, too, used all my seed and fertilizer last spring. Also, my Lord, you took 30 bushels of wheat several days ago for your own table. I believe the plow is good for two more seasons."

"You did well," said the Baron. Blessed with this benediction, the two peasants departed.

After they had taken their leave, the Baron began to contemplate what had happened. "Yes," he thought, "they did well, but I wonder which one did better?"

Questions

1. For each farm, prepare balance sheets as of the beginning and end of the growing season and an income statement for the season. (Do not be concerned that you do not have much understanding of what a balance sheet and income statement are; just use your intuition as best you can.)
2. Which peasant was the better farmer?

Chapter Four

Accounting Records and Systems

As we emphasized in Chapter 2, each individual accounting transaction can be recorded in terms of its effect on the balance sheet. For example, the Music Mart illustration in Chapter 2 starts with the item "Cash, $25,000" on the January 1 balance sheet and then records the transaction on January 2 involving an increase of $12,500 in cash in effect by erasing the $25,000 and entering the new number, $37,500. Although this procedure was appropriate as an explanatory device, it is not a practical way of handling the many transactions that occur in the actual operations of an organization.

This chapter describes some of the accounting procedures that are used in practice. *No new accounting concepts are introduced.* The procedures described here provide the mechanical means for making it easier to record and summarize transactions. Although most organizations use computer-based accounting systems, we describe the procedures used in a manual system because the basic steps in either type of system are the same and it is easier to visualize these steps in a manual system.

Recordkeeping Fundamentals

We are not concerned here with recordkeeping procedures for the purpose of training bookkeepers. Nevertheless, some knowledge of these procedures is useful for at least two reasons. First, as is the case with many subjects, accounting is something that is best learned by doing—by solving problems. Although any accounting problem can be solved without the aid of the tools discussed in this chapter, using these tools will often speed up the problem-solving process considerably. Second, the debit-and-credit mechanism, which is the principal technique discussed here, provides an analytical framework that is similar in function to and offers the same advantages as the symbols and equations used in algebra.

In all except the smallest companies, the bookkeeping work is done on a computer. However, the computer records much detail about most transactions, and describing this detail would obscure the description of what is going on. Therefore, we focus on what is actually happening by assuming that the records are kept manually.

The Account

Assume that the item "Cash, $10,000" appears on a balance sheet. Subsequent cash transactions can affect this amount in only one of two ways: They can increase it or they can decrease it. Instead of increasing or decreasing the item by erasing the old amount and entering the new amount for each transaction, considerable effort can be saved by collecting all the increases together and all the decreases together and then periodically calculating the *net* change resulting from all of them. This can be done by adding the sum of the increases to the beginning amount and then subtracting the sum of the decreases. The difference is the new cash balance.

In accounting the device called an **account** is used for calculating the net change. The simplest form of account, called a **T account,** looks like the account shown in Illustration 4–1. Because this account is for a brand-new entity (to be described later in this chapter) its beginning balance is zero.

The saving in effort made possible by T accounts can be seen even from this brief illustration. If the balance were changed for each of the eight items listed, four additions and four subtractions would be required. By using the account device, the new balance is obtained by only two additions (to find the 21,200 and 15,750) and one subtraction (21,200 − 15,750).

ILLUSTRATION 4–1 Example of a T Account

Cash

(Increases)		(Decreases)
Beginning balance	-0-	
	5,000	750
	4,000	7,200
	200	4,800
	12,000	3,000
	21,200	15,750
New balance	5,450	

Permanent Accounts and Temporary Accounts

The accounts maintained for the various items on the balance sheet are called **permanent** (or **real**) **accounts.** At the end of each accounting period the balance of each permanent account is determined—each account is "balanced." These balances are the numbers reported in the balance sheet as of the end of the period. The period-ending balance in a permanent account is carried forward into the next accounting period as that period's beginning balance.

Recall that revenues and expenses are respectively increases and decreases in retained earnings arising from the entity's earnings activities. Although revenue and expense transactions could be entered directly in the Retained Earnings account, this is not done in practice. Entering revenue and expense items directly to Retained Earnings would result in an intermingling of the many specific items that are required to prepare the income statement. All of these items would have to be "sorted out"—classified by income statement categories—if they were intermingled.

To avoid cluttering the Retained Earnings account a **temporary account** is established for each revenue and expense item that will appear on the income statement. Thus, there are temporary accounts for sales revenues, cost of sales, selling expenses, and so on. Revenue and expense transactions are recorded in their respective temporary accounts as the period progresses. This procedure creates a "sort as you go" routine for these transactions instead of leaving them to be sorted at the end of the period. For example, all of the entries to the Sales Revenue account can be added at the end of the period to arrive at the amount of net sales for the income statement. At the end of the accounting period, all of the income statement temporary account sums are combined into one *net income* amount, which is then entered in the Retained Earnings account. Thus, in practice Retained Earnings has *fewer* entries made to it than almost any other permanent account. (The process of combining the temporary account sums into one amount for the net change in retained earnings will be illustrated later in the chapter.)

The Ledger

A **ledger** is a group of accounts. In a manual system it may be a bound book with the title "general ledger" printed on the cover. Inside are pages, one (or more) for each account. All the accounts of a small business could be maintained in such a book. The ledger is not necessarily a bound book, however. It may consist of a set of loose-leaf pages, or, with computers, a set of impulses on a magnetic disk or tape.

The Chart of Accounts

The accounts included in a company's system are listed in a **chart of accounts.** The list often is arranged according to the items reported on the balance sheet, that is, with Cash at the beginning, and Retained Earnings at the end.

For most items, there are detailed accounts, and there may be several levels of this detail. For example, beneath the Cash account there will be an account for each bank with which the company has deposits and for each bank, there may be an account for checking account, money market account, and other cash equivalents. The entries are made only to the accounts in the lowest level in this hierarchy, for example, the checking account at Bank A. In most systems, amounts are automatically added to accounts in the highest levels of the hierarchy when an entry at the lowest level is recorded. For example, a deposit of $1,000 in the checking account of Bank A would be recorded in Checking Account, Bank A; it would also add $1,000 to the Cash Bank A account, and $1,000 to the Cash account.

In developing the chart of accounts, the system designer must anticipate all the information that management might at some time want. If, for example, management wanted to know the respective level of activity of the checking account and the money market account at Bank A, and the system of accounts could not provide this information, the system would be inadequate. A code number is assigned to each account; this simplifies the task of recording.

> **Example** Financial information of sales revenue is often recorded in considerable detail: the item sold, the product line containing that item, the branch that made the sale, and even the responsible salesperson. Accounts are established for each of these possibilities. Consequently, many large companies have tens of thousands of accounts.

The accounts for balance sheet and income statement items are often referred to as *general ledger* accounts, a holdover from the manual system in which these accounts were recorded in a bound book called a *ledger.*

Debit and Credit

The left-hand side of any account is arbitrarily called the **debit side,** and the right-hand side is called the **credit side.** Amounts entered on the left-hand side are called **debits,** and amounts entered on the right-hand side are called **credits.** The verb *to debit* means to make an entry in the left-hand side of an account, and the verb *to credit* means to make an entry in the right-hand side of an account. *The words* debit *and* credit *have no other meaning in accounting*.

In ordinary usage these words do have other meanings. *Credit* has a favorable connotation (such as, "she is a credit to her family") and *debit* has an unfavorable connotation (such as, "chalk up a debit against him"). In accounting these words do not imply any sort of value judgment; they mean simply "left" and "right." Debit and credit are usually abbreviated as **dr.** and **cr.**[1]

If each account were considered by itself without regard to its relationship to other accounts, it would make no difference whether increases were recorded on the debit side or on the credit side. In the 15th century a Franciscan monk, Lucas Pacioli, described a method of arranging accounts so that the *dual aspect* present in every accounting transaction would be expressed by a debit amount and an equal and offsetting credit amount.

This method made possible the following rule, to which there is absolutely no exception: *For each transaction the debit amount* (or the sum of all the debit amounts, if

[1]The noun *debit* is derived from the Latin *debitur,* which means debtor. *Credit* is derived from the Latin *creditor,* which means lender. Apparently the dr. and cr. abbreviations came from the first and last letters of these Latin words. In accounting, debit and credit do *not* mean debtor and creditor.

there are more than one) *must equal the credit amount* (or the sum of all the credit amounts). This is why bookkeeping is called *double-entry* bookkeeping. It follows that the recording of a transaction in which debits do not equal credits is incorrect. For all the accounts combined, the sum of the debit balances must equal the sum of the credit balances; otherwise something has been done incorrectly. Thus, the debit and credit arrangement used in accounting provides a useful means of checking the accuracy with which the transactions have been recorded.

Pacioli based his procedures on the fundamental equation, Assets = Liabilities + Owners' equity. He arbitrarily decided that *asset* accounts should *increase* on the left-hand, or *debit,* side. That decision immediately led to the rule that *asset* accounts must *decrease* on the right-hand, or *credit,* side. Given those rules for asset accounts, it followed that (1) in order for debits to equal credits and (2) in order to maintain the fundamental accounting equation, then the rules for liability and owners' equity accounts had to be the opposite from those for assets. *Liability and owners' equity* accounts *increase* on the right-hand—*credit*—side, and they *decrease* on the left-hand—*debit*—side. Schematically, these rules are:

Assets		=	**Liabilities**		+	**Owners' Equity**	
Debit	Credit		Debit	Credit		Debit	Credit
+	−		−	+		−	+

The rules for recording revenues and expenses are derived from the rules for owners' equity. By definition a revenue increases owners' equity (more specifically, retained earnings in a corporation), and owners' equity increases on the credit side. It necessarily follows that *revenues are credits.* If revenues decrease, such as for a sales return, the *decrease in revenues* must therefore be a *debit.*

Expenses are the opposite of revenues in that expenses decrease owners' equity. Therefore, the rule for expenses must be the following: *Expenses are debits.* It is also commonly said that an expense account has been **charged** when it has been debited. If an expense needs to be reversed (such as when returned goods are put back into inventory, thus reversing the cost of sales entry that was made when the goods were originally sold), the *decrease in expenses* is a *credit.*

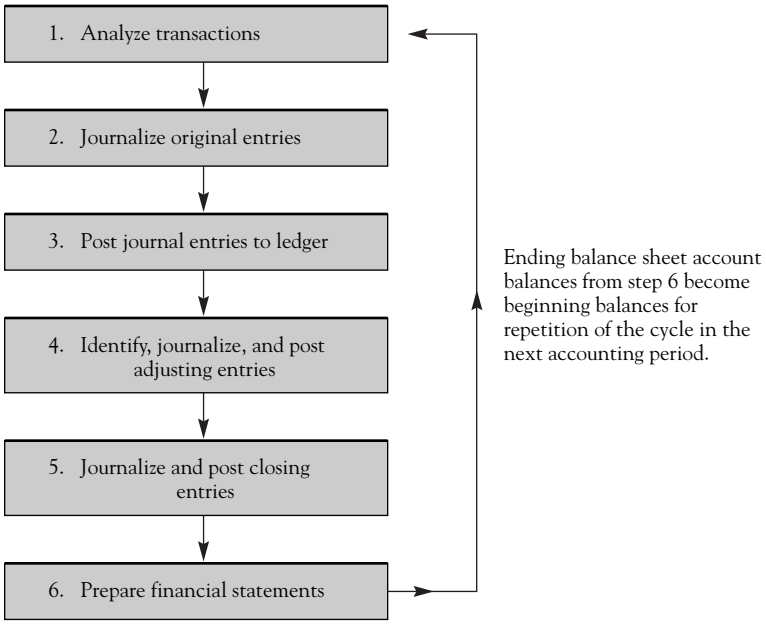
Mastering these rules requires practice in using them rather than sheer memorization. We will therefore begin that practice by introducing you to the accounting process and first recording a simple set of transactions.

The Accounting Process

The next section of the chapter describes the accounting process. It consists of these six steps:

1. The first and most important part of the accounting process is the *analysis of transactions.* This is the process of deciding which account or accounts should be debited, which should be credited, and in what amounts, in order to reflect events in the accounting records. This requires both a knowledge of accounting concepts and judgment.
2. Next comes the purely mechanical step of *journalizing original entries*—recording the results of the transaction analysis in the journal.
3. *Posting* is the process of recording changes in the ledger accounts exactly as specified by the journal entries. This is also purely mechanical.
4. At the ending of the accounting period judgment is involved in deciding on the *adjusting entries.* These are journalized and posted in the same way as original entries.

ILLUSTRATION 4–2
The accounting cycle



5. The *closing entries* are journalized and posted. This is a purely mechanical step.
6. *Financial statements* are prepared. This requires judgment as to the best arrangement and terminology, but the numbers that are used result from the judgments made in steps 1 and 4.

These six steps are taken sequentially during an accounting period and are repeated in each subsequent period. The steps are therefore commonly referred to as the **accounting cycle.** Illustration 4–2 depicts the accounting cycle schematically. Note that the ending balance sheet account balances from step 6 became the beginning balances for the next repetition of the cycle. Some accountants use a *worksheet* in the latter steps of the accounting cycle. Worksheets are described in the appendix to this chapter.

Transaction Analysis

In order to record a transaction it must be analyzed to determine its dual effect on the entity's accounts. This analysis results in a decision as to which account is to be debited and which is to be credited. The result of the transaction analysis must preserve the two basic identities: (1) Assets = Liabilities + Owners' equity; and (2) Debits = Credits. The beginner often finds that half of the accounting entry—particularly a change in cash—is relatively obvious, but that the other half—often a change in retained earnings—is less obvious. Our advice is to first record whichever half of the entry is more obvious, whether it is the debit or the credit portion, and then figure out the less obvious half.

Example: Campus Pizzeria, Inc.

Meredith Snelson started Campus Pizzeria, Inc., on August 1. Snelson was the sole owner of the corporation. The following transactions all took place in August. Revenue and expense transactions represent *summaries* of sales and expenses for the entire month; in practice such entries could be made every day. We will present each trans-

action, analyze it, and show how it would be entered in the accounts. Each transaction is numbered and its number is shown parenthetically beside the entry in the account. (This is a good practice for the reader to employ when working on similar problems.)

1. On August 1, Snelson invested $5,000 in the business as owner.

Analysis: This transaction increased **Cash** (a debit). Liabilities were not affected because the $5,000 was not a loan; rather, it was contributed capital. Thus, the owner's equity account, **Paid-In Capital,** increased (a credit). This is an equity financing transaction.

Cash			
(1)	**5,000**		

Paid-In Capital			
		(1)	**5,000**

2. On August 1, the firm paid $750 rent for the month of August.

Analysis: **Cash** decreased (a credit). The rent has been paid in advance; thus, it is an asset, because the benefits of using the rented space have not yet been received. **Prepaid Expenses** is increased (a debit). This is an asset acquisition transaction: prepaid rent was acquired in exchange for cash.

Cash			
(1)	5,000	**(2)**	**750**

Prepaid Expenses			
(2)	**750**		

3. The firm borrowed $4,000 from a bank on a 9 percent note payable, with interest payable quarterly and the principal due in full at the end of two years.

Analysis: This was a debt financing transaction. **Cash** increased (a debit) by the $4,000 proceeds of the loan. The liability, **Notes Payable,** increased by an equal amount (a credit).

Cash			
(1)	5,000	(2)	750
(3)	**4,000**		

Notes Payable			
		(3)	**4,000**

4. Equipment costing $7,200 was purchased for cash. The expected life of the equipment was 10 years.

Analysis: **Cash** decreased by $7,200 (a credit). The equipment will provide benefits for several years, so it is an asset. The account **Equipment, at Cost,** is increased by $7,200 (a debit). This was an asset acquisition transaction: The equipment was acquired in exchange for cash.

Cash			
(1)	5,000	(2)	750
(3)	4,000	**(4)**	**7,200**

Equipment, at Cost			
(4)	**7,200**		

5. An initial inventory of pizza ingredients and boxes was purchased on credit for $800.

Analysis: These items will be used in the future, so they are an asset. **Inventory** is increased by $800 (a debit). The firm has not yet paid for these items but is obligated to do so at some future time. Thus, the liability, **Accounts Payable,** is increased by $800 (a credit).

Inventory			
(5)	**800**		

Accounts Payable			
		(5)	**800**

6. In August pizza sales were $12,000, all for cash.

Analysis: **Cash** increased by $12,000. This cash increase did not arise from a liability; nor did the owner make an additional investment. The cash was earned by selling pizzas to customers. This is an earnings transaction, which increases retained earnings. Rather than directly increasing Retained Earnings (a credit), we will increase **Sales Revenues,** a temporary account.

Cash			
(1)	5,000	(2)	750
(3)	4,000	(4)	7,200
(6)	**12,000**		

Sales Revenues			
		(6)	**12,000**

7. During August the pizzeria's employees were paid $3,000 in wages.[2]

Analysis: **Cash** was decreased (a credit) by $3,000. Wages represent labor resources consumed in providing the pizzeria's services to its customers. This is therefore an earnings transaction that reduces retained earnings. Rather than directly decreasing Retained Earnings (a debit), we will enter the expense in a temporary account, **Wage Expense.**

Cash			
(1)	5,000	(2)	750
(3)	4,000	(4)	7,200
(6)	12,000	**(7)**	**3,000**

Wage Expense			
(7)	**3,000**		

8. During the month an additional $5,750 of ingredients and boxes was purchased on credit.

Analysis: Except for the amount, this transaction is identical to transaction 5 above. Thus, **Inventory** is increased (debited) and **Accounts Payable** is increased (credited) by $5,750.

Cash			
(5)	800		
(8)	**5,750**		

Accounts Payable			
		(5)	800
		(8)	**5,750**

[2] Because this is an introductory example, we are disregarding certain real-world complications such as payroll taxes.

9. August sales consumed $6,000 of ingredients and boxes.

Analysis: These items have been removed from **Inventory,** so that asset account is reduced (credited). Resources consumed in generating sales revenues are expenses. Again, rather than directly reducing Retained Earnings, the $6,000 debit is made to a temporary account, **Cost of Sales.** This is an earnings transaction.

Inventory

(5)	800	**(9)**	**6,000**
(8)	5,750		

Cost of Sales

(9)	**6,000**		

10. At the end of the month, bills for various utilities used in August were received, totaling $450.

Analysis: The bills have not yet been paid, so **Accounts Payable** is increased by $450 (a credit). This liability is an expenditure for the utilities that were used (consumed) in August's earnings activities. These resources are thus an expense of August, and are debited to **Utilities Expense,** a temporary account.

Accounts Payable

		(5)	800
		(8)	5,750
		(10)	**450**

Utilities Expense

(10)	**450**		

11. During the month $4,800 of accounts payable was paid.

Analysis: Paying bills obviously decreases **Cash** (a credit). It also reduces the obligation the entity has to its vendors, so **Accounts Payable** is also reduced (a debit).

Cash

(1)	**5,000**	(2)	750
(3)	**4,000**	(4)	7,200
(6)	**12,000**	(7)	3,000
		(11)	**4,800**

Accounts Payable

(11)	**4,800**	(5)	800
		(8)	5,750
		(10)	450

12. On August 13, the firm catered a party for a fee of $200. Because the customer was a friend of Snelson's, the customer was told that payment could be made some time later in the month.

Analysis: Because services have been rendered, revenues have been earned. Thus, increase (credit) the temporary **Sales Revenues** account by $200. Since this was not a cash sale, the asset increased (debited) is **Accounts Receivable.** This is an earnings transaction.

Sales Revenues

		(6)	12,000
		(12)	**200**

Accounts Receivable

(12)	**200**		

13. On August 29, a check was received from Snelson's friend for the party of August 13.

Analysis: Payment (collection) of a receivable increases **Cash** (a debit). It also eliminates the receivable asset, so **Accounts Receivable** is decreased by $200 (a credit).

Cash

(1)	5,000	(2)	750
(3)	4,000	(4)	7,200
(6)	12,000	(7)	3,000
(13)	**200**	(11)	4,800

Accounts Receivable

(12)	20	**(13)**	**200**

This completes—for the moment—the August transactions for Campus Pizzeria, Inc.

Balancing Accounts

The transactions we recorded above are called **original entries.** Such entries are those that obviously need to be made because a check has been written, an invoice has been received, sales have been made, and so on. After recording these original entries a balance is taken in each account.

An asset account is balanced as illustrated earlier in the chapter for Cash: The entries on each side are added up; then the sum of the credits is subtracted from the sum of the debits to get the new balance. An asset account's balance is a debit amount. (Asset accounts are thus called **debit-balance accounts.**) The balance in Cash is $5,450. (Because Cash is an asset account, it is understood that the balance is a debit amount.)

Illustration 4–3 shows the formal procedure for **ruling and balancing** an asset account. This is similar to what was shown in Illustration 4–1, except that there the line "To Balance 5,450" was omitted because we were just introducing the idea of an account. The "To Balance" entry goes with the new "Balance" entry, thus preserving the rule that no debit (here, for the new balance) is made without making an equal credit (here, "To Balance"). The double rules under the two $21,200 totals indicate that all of the information appearing above the double rules has been captured in the new balance that appears below the double rules. The procedure for ruling and balancing a liability account is completely analogous to that just described for an asset account.

ILLUSTRATION 4–3 Balancing an Account

Cash

Balance	*-0-*		*750*
	5,000		*7,200*
	4,000		*4,800*
	200		*3,000*
	12,000	*To Balance*	*5,450*
	21,200		*21,200*
Balance	*5,450*		

The formal procedure for the temporary revenue and expense accounts differs slightly from that for the permanent accounts, as will be described below. At this point all that is necessary is to find the sum of the credits in the Sales Revenues account and the sum of the debits in each expense account (which is trivial here because no expense account had more than one debit).

The Trial Balance

After determining the balance of each account a trial balance is taken. A **trial balance** is simply a list of the account names and the balances in each account as of a given moment of time, with debit balances shown in one column and credit balances in another column. The preparation of a trial balance serves two principal purposes: (1) it shows whether the equality of debits and credits has been maintained, and (2) it provides a convenient summary transcript of the ledger records as a basis for making the adjusting and closing entries (described in the next section) that precede the preparation of the period's financial statements.

Campus Pizzeria's trial balance is shown in Illustration 4–4. Because Campus Pizzeria was a new entity as of August 1, all the permanent (balance sheet) accounts had a zero beginning balance. As a result, the August 31 balances are based entirely on the 13 entries thus far recorded. In successive accounting periods the entity's permanent accounts will have non-zero beginning balances. (We suggest, as practice, that the reader verify each amount in Illustration 4–4.)

Although the trial balance shows that total debits equal total credits and thus indicates that the integrity of the basic accounting equation has been maintained, it does not prove that errors have not been made. Entries may have been omitted entirely, or they may have been posted to the wrong account. Offsetting errors may have been made, or a transaction may have been analyzed incorrectly. For example, if the debit for the purchase of a piece of equipment were made incorrectly to an

ILLUSTRATION 4–4 A Trial Balance

CAMPUS PIZZERIA, INC.
TRIAL BALANCE
AS OF AUGUST 31

Account	Balance	
	Debit	Credit
Cash	$ 5,450	
Accounts receivable	–0–	
Inventory	550	
Prepaid expenses	750	
Equipment, at cost	7,200	
Accounts payable		$ 2,200
Notes payable		4,000
Paid-in capital		5,000
Sales revenues		12,200
Cost of sales	6,000	
Wage expense	3,000	
Utilities expense	450	
Totals	$23,400	$23,400

expense account rather than correctly to an asset account, the totals of the trial balance would not be affected.

The Adjusting and Closing Process

Adjusting Entries

Most entries to be made in the accounts are original entries. However, some events that affect the accounts are not evidenced by the obvious documents associated with original entries. The effects of these events are recorded at the end of the accounting period by means of **adjusting entries.** The purpose of the adjusting entries is to modify account balances so that they will reflect fairly the situation as of the end of the period.

Continuous transactions

Most adjusting entries are made in connection with events that are, in effect, continuous transactions. Consider a tankful of fuel oil purchased for $1,000. On the day of delivery the $1,000 of fuel oil was an asset. But each day thereafter some fuel oil was consumed in the furnace, whereupon part of the $1,000 became an expense. Rather than record this consumption daily, a single adjusting entry is made at the end of the accounting period to show how much of the fuel oil is still an asset at that time and how much has become expense during the period. For example, if $600 was consumed and hence became an expense, $400 remains as an asset.

There are two ways of handling these events, both of which give the same result. Under one method, the $1,000 expenditure is originally recorded as an asset, Fuel Oil Inventory, as in the following entry:

Fuel Oil Inventory		Accounts Payable	
1,000			1,000

At the end of the accounting period the Fuel Oil Inventory asset account is adjusted by subtracting the cost of fuel oil consumed, thus:

Fuel Expense		Fuel Oil Inventory	
600			600

Under the other method, the $1,000 expenditure for fuel oil is originally recorded in an expense account (instead of an inventory account). Then the fuel oil remaining at the end of the period is subtracted from expense and shown as a Fuel Oil Inventory asset, thus:

Fuel Oil Inventory		Fuel Expense	
400			400

Although neither method reflects the correct facts *within* the period (with the trivial exception that the first method does reflect the facts on the day the oil was delivered), both reflect a correct statement of the facts as of the *end* of the accounting period. Because accounting focuses on deriving the proper amounts for the statements that are prepared at the end of the accounting period, the choice between these methods depends solely on which is more convenient.

Types of adjusting entries

Events that require adjusting entries essentially relate to the difference between expense and expenditure and between revenue and receipts, discussed in Chapter 3. Four types of such events, together with examples of each, are given below:

1. *Recorded costs to be apportioned among two or more accounting periods*. The fuel oil transaction given above is one example. Another is insurance protection, originally recorded as Prepaid Insurance (an asset), $800 of which becomes an expense in the current period:

Insurance Expense	
800	

	Prepaid Insurance
	800

When an asset is reduced, as prepaid insurance was here, it is said that there has been a **write-off** of part (or all) of the asset.

2. *Unrecorded expenses*. These expenses were incurred during the period, but no record of them has yet been made. Example: For $150 of wages earned by an employee during the period but not yet paid to the employee:

Wage Expense	
150	

	Accrued Wages
	150

3. *Recorded revenues to be apportioned among two or more accounting periods*. As was the case with recorded costs, these amounts were initially recorded in one account, and at the end of the accounting period must be properly divided between a revenue account and a liability account. For example, rent collected during the period and recorded as rent revenue, $600 of which is applicable to the next period and hence is a liability at the end of the current period:

Rent Revenue	
600	

	Unearned Rent Revenue
	600

4. *Unrecorded revenues*. These revenues were earned during the period, but no record of them has yet been made. For example, $120 of interest earned by the entity during the period but not yet received:

Accrued Interest Receivable	
120	

	Interest Revenue
	120

Depreciation

Most long-lived assets give up their benefits to the entity in a continuous stream. Thus, the cost of these assets is continuously being converted to an expense (written off) in the same manner as the current assets—fuel oil and prepaid insurance—that were discussed above. The item that shows the portion of such long-lived asset costs that has become expense *during an accounting period* is called **depreciation expense.** Instead of subtracting the depreciation expense for the period directly from the asset amount—instead of crediting depreciation to the account for the asset being depreciated—the credit is made to a separate account, **Accumulated Depreciation.** The adjusting entry to record the depreciation expense for a period is therefore in the following form:

Depreciation Expense	
2,000	

	Accumulated Depreciation
	2,000

There is a reason for crediting depreciation to Accumulated Depreciation rather than directly to the asset. Generally accepted accounting principles (GAAP) require separate disclosure of (1) the original cost of the entity's depreciable assets and (2) the

depreciation that has been accumulated on these assets from the time they were acquired until the date of the balance sheet. Keeping these two items separate in the accounts facilitates the necessary disclosure, which appears on the balance sheet as the following:

Equipment, at cost	$10,000	
Less: Accumulated depreciation	4,000	
Net equipment		$6,000

Accumulated depreciation is called a **contra asset account** because it is subtracted from some other asset account. Another contra asset account is Allowance for Doubtful Accounts, described below.

Other adjustments

Accountants make a variety of other adjusting entries in order to make the accounts reflect fairly the results of the entity's operations during the period and its status as of the end of the period. An example, discussed in more detail in Chapter 5, is **bad debt expense.** This is an adjustment made in order to recognize the likelihood that not all credit customers will pay their bills, and, thus, the Accounts Receivable account may overstate the *realizable* amount of those bills. An adjusting entry that records the write-off of receivables for the estimated amount of bad debts is as follows:

Bad Debt Expense	
300	

	Allowance for Doubtful Accounts
	300

On the balance sheet the accumulated allowance for doubtful accounts is subtracted from accounts receivable, thus:

Accounts receivable, gross	$10,000	
Less: Allowance for doubtful accounts	400	
Net accounts receivable		$9,600

A caution

When the student is given a problem involving the preparation of accounting statements, the precise nature of the original entries must be described, since the student has no other way of finding out about them. Information about the *adjusting* entries will not necessarily be given, however. Students, like practicing accountants, are expected to be on the lookout for situations that require adjustment.

Campus Pizzeria adjusting entries

A review of Campus Pizzeria's trial balance indicates three items that will generate adjusting entries: the write-off of prepaid expenses (rent), depreciation on the equipment, and accrued interest on the note payable.

14. Adjusting entry for rent expense.

Analysis: As of the end of August, the benefits from the $750 prepaid rent have all been received. Thus, the asset, **Prepaid Expenses,** is reduced by $750 (a credit). This rent applied to August operations, so it is an expense of August: debit **Rent Expense** for $750. This is an earnings transaction.

Prepaid Expenses			
(2)	750	**(14)**	**750**

Rent Expense			
(14)	**750**		

15. Adjusting entry for depreciation expense.

Analysis: The equipment cost $7,200 and is expected to provide benefits for 10 years (120 months). One month's benefits have now been received, so $\frac{1}{120}$ of the original cost, $60, is debited to **Depreciation Expense.**[3] The corresponding credit is to **Accumulated Depreciation,** a contra asset account. This is an earnings transaction.

Depreciation Expense			
(15)	**60**		

Accumulated Depreciation			
		(15)	**60**

16. Adjusting entry for accrued interest expense (interest payable).

Analysis: The bank has earned one month's interest on the note. The interest rate is 9 percent a year, so one month's interest on $4,000 will be $\frac{3}{4}$ percent, or $30. This amount is debited to I**nterest Expense.** Because the interest has not yet been paid, the credit is to the liability account, **Accrued Expenses** (or Interest Payable). This is an earnings transaction because the interest is in the nature of "rent" on the borrowed funds used this month.

Interest Expense			
(16)	**30**		

Accrued Expenses			
		(16)	**30**

Closing Entries

The temporary revenue and expense accounts are actually subdivisions of owners' equity (retained earnings). At the end of the period the temporary accounts are *closed* to Retained Earnings in order to determine the net effect of all the revenue and expense transactions—the net income or loss. Rather than closing each temporary account directly to Retained Earnings, however, each is first closed to an intermediate account whose purpose is to summarize the revenue and expense transactions. This account is variously called **Income Summary, Profit and Loss,** or **Expense and Revenue Summary.** This

[3]This method of charging the cost of an asset to expense in a level stream over the asset's life is called *straight-line depreciation*. Other methods will be described in Chapter 7.

account reflects the net income or loss for a given accounting period. Income Summary is a *clearing* account that in turn is closed to Retained Earnings to complete the closing process.

The **closing** process consists of transferring the balance of each temporary account to the clearing account. To close a revenue account, the sum of the credits is found, and then this sum is debited to the revenue account and credited to Income Summary. This gives the revenue account a balance of zero, and transfers its former credit balance to Income Summary. The result is as though the credit balance in the revenue account were "picked up and moved" to the credit side of Income Summary without making any entry. But in an accounting system such informality is not permitted, and the transfer of the revenue balance to Income Summary must be accomplished with an equal debit and credit. For Campus Pizzeria this is done as follows (we use letters to label the closing entries to distinguish them from the original and adjusting entries):

A. Closing the Sales Revenues account.

Explanation: The balance in **Sales Revenues** is a credit of $12,200. A debit of $12,200 will thus give the account a zero balance (i.e., close it). The corresponding credit is to **Income Summary.**

Sales Revenues

(A)	**12,200**	(6)	12,000
		(12)	200
		Balance	**12,200**

Income Summary

		(A)	**12,200**

The double rule intersecting the stem of the T account designates that it has been closed. All the information it contained is now residing, in summary form, in Income Summary. As far as preparing the financial statements is concerned, the Sales Revenue page of the ledger could now be thrown away—that is the sense in which this is a temporary account. (Of course, in practice such an accounting record would not be destroyed.)

Closing an expense account is the mirror image of closing a revenue account. There are six expense accounts to be closed (the letters continue the labeling of the closing entries): (B) Cost of Sales, (C) Wage Expense, (D) Utilities Expense, (E) Rent Expense, (F) Depreciation Expense, and (G) Interest Expense.[4] Since all of these closing entries are the same in substance, we will illustrate only one of them:

B. Closing the Cost of Sales account.

Explanation: The balance in **Cost of Sales** is a debit of $6,000; a credit of $6,000 will thus close this account. The corresponding debit is to **Income Summary.**

Cost of Sales

(9)	6,000	**(B)**	**6,000**

Income Summary

(B)	**6,000**	(A)	12,200

[4] In actual accounting practice another trial balance would be taken after the adjusting entries were made and before the closing entries commence.

At this stage the only accounts remaining open are the permanent accounts (which are always balanced at the end of the period, but are never closed) and Income Summary (which is a temporary account). Income Summary is closed in exactly the same manner as other temporary accounts, except that first the debits and credits have to be summed and netted (as in balancing a permanent account). This net amount, which is the period's *income before income taxes*, is $1,910 (explained below). It generates one more adjusting entry—the entry needed to record the estimated income tax liability arising from the period's income. Assuming that the applicable income tax rate is 20 percent, the amount of estimated tax liability is $382 ($1,910 * 0.20). This amount is debited to Income Tax Expense (a temporary account created for recording this final adjusting entry), and is credited to Income Tax Liability. Income Tax Expense is then closed to Income Summary, which completes the closing of all the expense accounts. (For simplicity we will make the income tax expense debit directly to Income Summary so that we do not have to illustrate creating and closing another expense account that has only one entry made to it.)

To complete the closing process, Income Summary is closed. Its balance is credited (if a net profit) or debited (if a net loss) to Retained Earnings, which can then be balanced to complete the balancing of the permanent accounts.

H. Closing the Income Summary account to Retained Earnings.

Explanation: After closing all of the temporary accounts (except Income Tax Expense) to Income Summary, the sum of its debits, $10,290, is netted against the sum of its credits, $12,200. This leaves a net credit balance in the account of $1,910, which is the pretax income for August. After the income tax adjusting entry for $382 is made, **Income Summary** is closed by debiting it for $1,528; the corresponding credit is to **Retained Earnings**. Since this was a new entity as of August 1, Retained Earnings had a zero beginning balance. To complete the process, Retained Earnings is balanced in the same manner as other balance sheet accounts. Next month, any profit (or loss) for September will be added to (subtracted from) this $1,528 new beginning balance.

Income Summary

(B)	**6,000**	(A)	12,200
(C)	**3,000**		
(D)	**450**		
(E)	**750**		
(F)	**60**		
(G)	**30**		
	10,290		12,200
(17)	**382**		
(H)	**1,528**		

Income Tax Liability

		(17)	**382**

Retained Earnings

		Balance	–0–
To Balance	**1,528**	**(H)**	**1,528**
		Balance	1,528

Statement Preparation

After the adjusting and closing entries have been made, the period's financial statements can be prepared. The numbers for the income statement can be thought of as coming from either of two equivalent sources: (1) the balances in the temporary accounts just prior to their closing or (2) the credit (revenue) and debit (expense) entries to the Income Summary account. Amounts for the balance sheet are the balances

ILLUSTRATION 4–5 **Financial Statements**

CAMPUS PIZZERIA, INC.
Balance Sheet
As of August 31

Assets*		Liabilities and Owner's Equity	
Cash	$ 5,450	Accounts payable	$ 2,200
Accounts receivable	0	Notes payable	4,000
Inventory	550	Accrued expenses	30
Prepaid expenses	0	Income tax liability	382
Total current assets	6,000	Total liabilities	6,612
Equipment, at cost	7,200	Paid-in capital	5,000
Less: Accumulated depreciation	60	Retained earnings	1,528
Equipment, net	7,140	Total owner's equity	6,528
Total assets	$13,140	Total liabilities and owner's equity	$13,140

Income Statement
For the Month of August

Sales revenues		$12,200
Cost of sales		6,000
Gross margin		6,200
Operating expenses:		
Wages	$ 3,000	
Rent	750	
Utilities	450	
Depreciation	60	
Interest	30	4,290
Income before income taxes		1,910
Income tax expense		382
Net income		$ 1,528

*Ordinarily, accounts with zero balances are not shown. Two are included here for completeness, since both did have entries made to them during the period.

in the permanent accounts. In most companies the accounts reported in the financial statements are summaries of more detailed accounts in the ledger.

The August financial statements for Campus Pizzeria, Inc., are shown in Illustration 4–5. Since the accounting period was one month, these are interim statements. It is also important to remember that the August net income and the August 31 retained earnings amounts are the same in this case only because (1) this is the first accounting period for a new entity and (2) the entity did not pay any dividends in this period.

The Journal

In the preceding illustration of the accounting process we recorded transactions directly in T accounts. In practice transactions are initially recorded in a journal and then T account entries are made at the end of the period based on the transactions recorded in the journal.

A **journal** is a chronological record of accounting transactions showing the names of accounts that are to be debited or credited, the amounts of the debits and credits,

ILLUSTRATION 4–6

JOURNAL

Date		Accounts	LF	Debit	Credit
Aug.	1	Cash	10	5,000.00	
		Paid-In Capital	30		5,000.00
	1	Prepaid Expenses	14	750.00	
		Cash	10		750.00
	1	Cash	10	4,000.00	
		Notes Payable	21		4,000.00
	2	Equipment	15	7,200.00	
		Cash	10		7,200.00
	2	Inventory	13	800.00	
		Accounts Payable	20		800.00

and any useful supplementary information about the transaction. A journal is analogous to a diary.

The traditional format for writing a **journal entry** is as follows:

dr. Cash 5,000

cr. Paid-In Capital 5,000

In practice the notations dr. and cr. are not used because the accountant distinguishes debits from credits on the basis of the order (debits first) and indentation (credits indented) of the accounts. We will use the dr. and cr. in this chapter and Chapter 5 as a reminder to the reader but will follow common practice in subsequent chapters.

Illustration 4–6 shows a journal that records the first few transactions for Campus Pizzeria. With respect to format, note the following: (1) the debit entry is listed first, (2) the debit amounts appear in the left-hand money column, (3) the account to be credited appears below the debit entry and is indented, and (4) the credit amounts appear in the right-hand money column. "LF" is an abbreviation for ledger folio, which is the page reference to the ledger account where the entry is to be made. This reference is inserted at the time the entry is **posted** to (i.e., entered in) the appropriate T account in the ledger. Thus, the presence of numbers in the LF column indicates that the entries have been posted to the appropriate T accounts. They also provide an **audit trail,** a way of tracing the amounts in the ledger back to their sources. In some bookkeeping systems a brief explanation is written beneath each journal entry.

The *journal* thus contains explicit instructions on the revenue and expense items to be recorded in the temporary accounts and the changes to be made to the balances in the permanent accounts. No account balance is ever changed except on the basis of a journal entry. The *ledger* is a device for *reclassifying* and *summarizing,* by accounts, information originally listed in chronological order in the journal. Entries are first made in the journal and are later posted to ledger accounts.

Accounting Systems

The simple journals and ledgers described in the preceding pages, together with the rules for using them, constitute an accounting system. But this particular system would not usually be the best system for a given organization. The best system is that one that best achieves the following objectives:

1. To process the information efficiently—at low cost.
2. To obtain reports quickly.
3. To ensure a high degree of accuracy.
4. To minimize the possibility of theft or fraud.

Designing a good accounting system is a specialized job requiring a high degree of skill.

Internal Accounting Controls

Two objectives of an accounting system stated above—accuracy and protection against theft or fraud—cannot be attained absolutely without conflicting with the other two—speed and economy. A system that can't be "beaten" would be prohibitively expensive and time-consuming. A basic principle of internal accounting control, therefore, is that the system should make it *as difficult as is practical* for people to be dishonest or careless. Such a principle is based not on a cynical view of people in general but rather on the realistic assumption that a few people will be dishonest or careless if it is easy for them to do so.

Some of the devices used to ensure reasonable accuracy have been touched on already; for example, the idea of verifying one set of figures against another. The idea of divided responsibility is another important one. Whenever feasible, one person should not be responsible for recording all aspects of a transaction, nor should the custodian of assets (e.g., the storekeeper or the cashier) be permitted to do the accounting for these assets. Thus, one person's work is a check on another's. Although this does not eliminate the possibility that two people will steal through collusion, the likelihood of dishonesty is greatly reduced.

These brief comments indicate only the nature of the problem of internal accounting control, which is a big subject. Furthermore, a book that focuses on accounting *principles*, as this one does, cannot detail the complexities involved in the *operation* of accounting systems. For example, cash transactions are very easy to analyze, whereas some textbooks on auditing contain a dozen pages of questions that should be considered in connection with the internal accounting control of the single item, cash.

Computer-Based Accounting Systems

Most organizations do their accounting work with an electronic computer. In this section we give a brief overview of computer-based accounting systems.

What a Computer-Based System Does

As noted above, some steps in the accounting cycle involve judgment, whereas others are primarily mechanical. These mechanical steps are usually referred to as **bookkeeping.** A computer-based system performs some or all of the bookkeeping steps—that is, it records and stores data, performs arithmetic operations on data, sorts and summarizes data, and prepares reports. These functions are described below as inputs, processing, and outputs.

Inputs

In some computer systems data are entered by a data-entry clerk (using a keyboard) who copies them from a paper record such as a sales order or purchase order. In other systems the computer accepts input data from equipment located at the point of origin. Examples are factory time records; inventory counts, when the person counting uses a hand-held recording device; and receiving records, when a similar device is used.

An especially striking and familiar example of direct computer data input is the scanning device used at the supermarket or department store checkout stand. The

scanner reads a bar code printed on the item (or on a tag attached to the item); this code specifically identifies the item. The computer to which the scanner is connected then uses stored information on each item's selling price to calculate an itemized list of the amount owed by the customer. A summary of sales revenue, cost of goods sold (also stored for each item in the computer), gross margin by items or categories of items, and the status of inventories is available for use by store management at any time they desire to access the system.

The inputs to one business's computer may be the outputs of the computer of another business. For example, a factory computer may generate purchase orders for parts to be supplied by a vendor. These outputs are transmitted electronically to the vendor, where they become sales orders inputs, without a paper purchase order ever being produced. Similarly, a wholesaler's salesperson may record orders placed by a retail store on a hand-held device; the information is then transmitted to a central computer by a wireless phone.

Processing

Once data are in machine-readable form, the chance for bookkeeping errors is reduced. The computer will not accept an entry in which debits do not equal credits. However, if a human makes an error in selecting the account, or enters the wrong number for both the debit and credit, there will be errors.

Data in machine-readable form can be used in a number of ways. For example, an airline reservation system has a record of the availability of seats in each of several fare categories for every flight the airline will operate over the next several months. Any travel agent connected to the system by a terminal can request information about flight availability and price; the computer can process hundreds of such inquiries every minute. If the agent wishes to book a seat, the computer decreases availability on the flight and sends information to the travel agency's printer, which prepares a ticket, boarding pass, itinerary, and customer invoice. Computer systems also sort data in ways that may be of interest and use to management.

Outputs

Computer-based systems can prepare reports that include either tables of numbers or graphs. These can be generated at regular intervals in a prescribed format or prepared in a form specified by an individual user. In some systems the user produces customized reports locally by using a personal computer or terminal that can retrieve data from a central computer-based system.

Modules

Computer-based accounting systems are usually operated by several interconnected software programs, each of which is called a *module*. There may be a module for any of the following: sales orders, shipments, and the related accounts receivable (often called an *order-entry module*); manufacturing costs; purchase orders, inventory, and related accounts payable (a *purchasing module*); payroll and other personnel records; fixed asset acquisitions, location, and depreciation; income taxes; cash; and the general ledger.

Hundreds of software programs are available. Some provide a complete set of modules for a small enterprise for a few hundred dollars; for a larger company the cost may be several thousand dollars. Some programs are designed for a specific industry (for example, time-intensive professional service businesses such as law, accounting, and architectural firms). These software programs can handle quantitative nonmonetary data as well as monetary data. Manual accounting systems, by contrast, are limited primarily to monetary data.

Problems with Computer Systems

Despite their many advantages, computer-based systems are not without their problems. Although a small company can purchase "off-the-shelf" software and have its system up and running in a few days, system development and installation in a larger, more complex organization may take many months and cost millions of dollars. Such systems usually require an outside consultant for their design and implementation. Moreover, technological advances make existing systems obsolete within a few years, and much time and money must be spent to update them. Nevertheless, the advantages of a computer-based system are so great that almost every organization needs one.

Unlike a manual system, a computer-based system does not leave a paper trail that can be readily audited. The system must therefore rely on the internal controls described above. In a few spectacular instances the lack (or circumvention) of such controls has resulted in business frauds and resultant failure; but the number of such events is very small relative to the number of computer-based systems in use.

Finally, a computer-based system will not be fully effective until its developers learn to design reports that the system's users need and can understand. This job of education, for both developers and users, can be substantial. If it is not done properly the system will spew out reports that no one uses, and the potential users will not appreciate the information that they could receive if only they knew how to ask for it.

Summary

The account is a device for collecting information about each item that is to be accounted for. It has two sides: the left-hand, or debit, side and the right-hand, or credit, side. The rules are such that asset and expense accounts increase on the debit side, whereas liabilities, owners' equity, and revenue accounts increase on the credit side. This maintains both the equation: Assets = Liabilities + Owners' equity, and the equation: Debits = Credits.

A ledger is a group of accounts. Entries are made to ledger accounts on the basis of instructions given in a journal, which is a chronological record of transactions.

At the end of an accounting period, adjusting entries are made so that after adjustment the revenue and expense accounts will show the appropriate amounts for the period. These temporary accounts are then closed to the Income Summary account, which in turn is closed to Retained Earnings.

In manual accounting systems, special journals, subsidiary ledgers, and other devices facilitate the process of recording accounting data. A computer-based system performs the same functions more rapidly, and it can provide a variety of useful management reports if it has been designed thoughtfully and its users have been properly trained.

Appendix: Additional Accounting Cycle Procedures

Errors Revealed by the Trial Balance

Following are four suggested aids in detecting errors revealed by differences between the debit and credit totals of the trial balance in a manual system. (Computerized systems are usually programmed to reject entries that would create a debit–credit imbalance.)

1. If the difference between the totals is 0.01, 1.00, 100, 1,000, and so forth, the error is probably in addition. Such an error is usually detected by re-adding the columns of the trial balance, or, if necessary, the columns in the ledger accounts.

2. When the discrepancy is an even number, the error may be the result of making a debit entry in a credit column or vice versa. Divide the difference in totals by 2 and look through first the trial balance and then the ledger accounts for an amount corresponding to this quotient. The difference is divided by 2 because an item placed in the wrong column results in a difference of twice its amount.

3. If the difference is divisible by 9, the error is probably either a transposition or a transplacement, and the search can be narrowed down to numbers where these errors might have been made. A **transposition** occurs when 79 is written for 97, 318 for 813, and so on. A **transplacement,** or **slide,** occurs when the digits of the number are moved to the left or right, as when $6,328.00 is written as $632.80 or $63.28.

4. When the source of error is not readily discernible, it is advisable to check the trial balance against the ledger to determine whether all the account balances have been copied properly. This check may reveal that certain accounts have been omitted. As a last resort it may be necessary to check all of the numbers in the ledger with the journal and to check all additions and subtractions in the several accounts.

Care in making the entries—such as writing legibly, double-checking additions and subtractions as journalizing and posting proceed, and making sure all entries are entered properly—will save much time otherwise spent in hunting for errors.

The Worksheet

A worksheet is a preliminary compilation of figures that facilitates recording or analysis. A worksheet is often used prior to the formal journalizing and posting of the adjusting and closing entries. Its use permits the accountant to make a dry run of the whole process. Since a pencil is ordinarily used, any errors detected on the worksheet can be easily corrected, whereas alterations to the formal records are to be avoided. The worksheet also classifies account balances according to the financial statements in which they are to appear.

A worksheet is often used instead of, rather than preliminary to, the adjusting and closing process. Many entities formally close their books only once a year but nevertheless prepare monthly financial statements. These interim statements are prepared from a worksheet listing the account balances at the end of the month together with the adjustments necessary to reflect revenue and expense in that month. Statements are prepared from the adjusted account balances developed on this worksheet. The income statement figures on such a worksheet would be cumulative for the year to date. An income statement for the current month can be derived from the cumulative figures simply by subtracting the corresponding figures on the preceding month's worksheet.

Illustration 4–7 shows a worksheet for Campus Pizzeria, Inc. The four adjustments shown thereon reflect the preclosing adjusting entries for prepaid expenses, depreciation, and accrued interest and the final adjusting entry for income taxes. Note that additional accounts are added as needed at the bottom of the worksheet.

The last item on this worksheet, $1,528, is the net income for the period. It is found by subtracting the sum of the other debits to Income Statement from the sum of the credits to Income Statement. Showing the same amount in the Balance Sheet credit column has the effect of closing the net income to Retained Earnings. After this amount has been entered, each column of a pair should add to the same total; this is a check on the arithmetic accuracy of the whole closing process.

ILLUSTRATION 4–7 A Worksheet

	Trial Balance August 31		Adjustments		Income Statement		Balance Sheet	
	Dr.	*Cr.*	*Dr.*	*Cr.*	*Dr.*	*Cr.*	*Dr.*	*Cr.*
Cash	5,450						5,450	
Accounts receivable	–0–						–0–	
Inventory	550						550	
Prepaid expenses	750			750			–0–	
Equipment, at cost	7,200						7,200	
Accounts payable		2,200						2,200
Notes payable		4,000						4,000
Paid-in capital		5,000						5,000
Retained earnings		–0–						–0–
Sales revenues		12,200				12,200		
Cost of sales	6,000				6,000			
Wage expense	3,000				3,000			
Utilities	450				450			
	23,400	23,400						
Rent expense			750		750			
Depreciation expense			60		60			
Accumulated depreciation				60				60
Interest expense			30		30			
Accrued expenses				30				30
Income tax expense			382		382			
Income tax liability				382				382
Net income					1,528			1,528
			1,222	1,222	12,200	12,200	13,200	13,200

Problems

Problem 4–1.

Set up the following in T account form and determine the ending balances insofar as these accounts are concerned. (Not all balance sheet accounts are shown.)

Account	*Beginning Balances* Dr.	Cr.
Cash	$900	
Accounts receivable	3,000	
Inventory	5,700	
Accounts payable		$3,600
Note payable		950

Transactions:

1. Purchased inventory on account	$2,350
2. Sold goods on account: sales revenues	6,350
Cost of goods sold	4,150
3. Paid vendors	3,400
4. Collected from customers	5,350
5. Paid off note payable	950

Problem 4–2.

Write journal entries for the following transactions that occurred at Woodside Company during May, and explain how each would be disclosed in Woodside's financial statements.

1. The company prepaid $14,340 rent for the period May 1–October 31.
2. Sales discounts and allowances were $34,150.
3. A loan for $3,500 at 12 percent interest continued to be owed to the company by one of its employees, who made no payments related to this loan during May.
4. Depreciation expense was $13,660.
5. Customers paid $2,730 for services they will not receive until sometime in June.
6. Purchased $172 worth of stamps, and used $100 worth of them.
7. The Allowance for Doubtful Accounts was increased by $1,350, reflecting a new estimate of uncollectible accounts.

Problem 4–3.

Luft Corporation's accounts had the following beginning balances:

Account	Dr.	Cr.
Accounts payable		$ 3,070
Accounts receivable	$ 2,160	
Accumulated depreciation		2,800
Allowance for doubtful accounts		70
Cash	1,440	
Fixed assets (at cost)	6,200	
Inventories	1,730	
Note payable (current)		600
Owners' equity		4,990
	$11,530	$11,530

During the period, the following transactions occurred:

1. Purchased inventory on account, $1,300.
2. Paid employees, $730.
3. Sold goods for cash, $1,940.
4. Sold goods on credit, $1,810.
5. Overhead and other expenses paid in cash, $900.
6. Collection of accounts receivable, $1,510.
7. Paid certain accounts payable, $1,720.

8. Received cash for revenue applicable to the *next* period, $650.
9. Increased the current note payable by $200.
10. Physical inventory showed ending balance of $1,750.
11. Depreciation expense, $300.

Required:

a. Journalize the transactions.
b. Set up T accounts and post beginning balances and transactions.
c. Determine the cost of goods sold.
d. Prepare an ending balance sheet.
e. Prepare an income statement for the period (ignore taxes).

Problem 4–4.

The account balances in the ledger of the Dindorf Company on January 31 (the end of its fiscal year), before adjustments, were as follows:

Debit Balances		Credit Balances	
Cash and equivalents	$ 119,115	Accumulated depreciation on store equipment	$ 37,300
Accounts receivable	162,500	Accounts payable	118,180
Merchandise inventory	700,680	Notes payable	143,000
Store equipment	215,000	Common stock	300,000
Supplies inventory	15,475	Retained earnings	122,375
Prepaid insurance	38,250	Sales revenues	716,935
Selling expense	24,900		
Sales salaries	105,750		
Miscellaneous general expenses	31,000		
Sales discounts	6,220		
Interest expense	9,300		
Social security tax expense	9,600		
Total	$1,437,790	Total	$1,437,790

The data for the adjustments are:

1. Cost of merchandise sold, $302,990.
2. Depreciation on store equipment, $12,750.
3. Supplies inventory, January 31, $5,210. (Purchases of supplies during the year were debited to the Supplies Inventory account.)
4. Expired insurance, $4,660.
5. Interest accrued on notes payable, $3,730.
6. Sales salaries earned but not paid to employees, $3,575.
7. Interest earned on savings accounts, but not recorded, $390.

Required:

a. Set up T accounts with the balances given above.
b. Journalize and post adjusting entries, adding other T accounts as necessary.
c. Journalize and post closing entries.
d. Prepare an income statement for the fiscal year and a fiscal year-end balance sheet.

Cases

CASE 4–1 PC Depot*

PC Depot was a retail store for personal computers and hand-held calculators, selling several national brands in each product line. The store was opened in early September by Barbara Thompson, a young woman previously employed in direct computer sales for a national firm specializing in business computers.

Thompson knew the importance of adequate records. One of her first decisions, therefore, was to hire Chris Jarrard, a local accountant, to set up her bookkeeping system.

Jarrard wrote up the store's preopening financial transactions in journal form to serve as an example (Exhibit 1). Thompson agreed to write up the remainder of the store's September financial transactions for Jarrard's later review.

At the end of September, Thompson had the following items to record:

*© Professor Robert N. Anthony, Harvard Business School.

EXHIBIT 1 General Journal

Entry Number	Account	Amount Dr.	Amount Cr.
(1)	Cash	165,000	
	Bank Loan Payable (15%)		100,000
	Proprietor's Capital		65,000
(2)	Rent Expense (September)	1,485	
	Cash		1,485
(3)	Merchandise Inventory	137,500	
	Accounts Payable		137,500
(4)	Furniture and Fixtures (10-year life)	15,500	
	Cash		15,500
(5)	Advertising Expense	1,320	
	Cash		1,320
(6)	Wages Expense	935	
	Cash		935
(7)	Office Supplies Expense	1,100	
	Cash		1,100
(8)	Utilities Expense	275	
	Cash		275
(9)	Cash sales for September		$38,000
(10)	Credit sales for September		14,850
(11)	Cash received from credit customers		3,614
(12)	Bills paid to merchandise suppliers		96,195
(13)	New merchandise received on credit from supplier		49,940
(14)	Ms. Thompson ascertained the cost of merchandise sold was		38,140
(15)	Wages paid to assistant		688
(16)	Wages earned but unpaid at the end of September		440
(17)	Rent paid for October		1,485
(18)	Insurance bill paid for one year (September 1–August 31)		2,310
(19)	Bills received, but unpaid, from electric company		226
(20)	Purchased sign, paying $660 cash and agreeing to pay the $1,100 balance by December 31		1,760

Questions

1. Explain the events that probably gave rise to journal entries 1 through 8 of Exhibit 1.
2. Set up a ledger account (in T account form) for each account named in the general journal. Post entries 1 through 8 to these accounts, using the entry number as a cross-reference.
3. Analyze the facts listed as 9 through 20, resolving them into their debit and credit elements. Prepare journal entries and post to the ledger accounts. (Do not prepare closing entries.)
4. Consider any other transactions that should be recorded. Why are these adjusting entries required? Prepare journal entries for them and post to ledger accounts.
5. Prepare closing entries and post to ledger accounts. What new ledger accounts are required? Why?
6. Prepare an income statement for September and a balance sheet as of September 30.

CASE 4–2 Save-Mart*

Save-Mart was a retail store. Its account balances on February 28 (the end of its fiscal year), before adjustments, were as shown below.

Debit Balances		Credit Balances	
Cash	$ 88,860	Accumulated depreciation on store equipment	$ 11,420
Accounts receivable	127,430	Notes payable	88,500
Merchandise inventory	903,130	Accounts payable	88,970
Store equipment	70,970	Common stock	100,000
Supplies inventory	17,480	Retained earnings	33,500
Prepaid insurance	12,430	Sales	988,700
Selling expense	10,880		
Sales salaries	47,140		
Miscellaneous general expense	18,930		
Sales discounts	3,340		
Interest expense	7,100		
Social security tax expense	3,400		
Total	$1,311,090	Total	$1,311,090

The data for the adjustments are:

1. Cost of merchandise sold, $604,783.
2. Store equipment had a useful life of seven years. (All equipment was less than seven years old.)
3. Supplies inventory, February 28, $3,877. (Purchases of supplies during the year were debited to the Supplies Inventory account.)
4. Expired insurance, $7,125.
5. The note payable was at an interest rate of 9 percent, payable monthly. It had been outstanding throughout the year.
6. Sales salaries earned but not paid to employees, $2,340.
7. The statement sent by the bank, adjusted for checks outstanding, showed a balance of $88,110. The difference represented bank service charges.

Questions

1. Set up T accounts with the balances given above.
2. Journalize and post adjusting entries, adding other T accounts as necessary.
3. Journalize and post closing entries.
4. Prepare an income statement for the year and a balance sheet as of February 28.

*© Professor Robert N. Anthony, Harvard Business School.

CASE 4–3 Copies Express*

Copies Express was incorporated on November 20, 1997, and began operating on January 2, 1998. The balance sheet as of the beginning of operations is shown in Exhibit 1.

In preparing financial statements for the first year of operations, the accountant reviewed the record of cash receipts and cash disbursements for Copies Express. This information appears in Exhibit 2.

In addition the accountant examined certain other information relative to operations. These additional items appear in Exhibit 3.

*© Professor Robert N. Anthony, Harvard Business School.

Questions

1. Prepare an income statement for 1998 and a balance sheet as of December 31, 1998.
2. Be prepared to explain the derivation of each number on these financial statements.

EXHIBIT 1 Copies Express, Inc.

BALANCE SHEET
As of January 2, 1998

Assets	
Cash	$ 2,000
Supplies	24,400
Building and equipment	300,000
Land	12,000
Total	$338,400
Liabilities and Owners' Equity	
Accounts payable	$ 10,400
Bank loan	24,000
Capital stock	304,000
Total	$338,400

EXHIBIT 2 Copies Express, Inc.

Cash Receipts and Disbursements: 1998	
Cash receipts:	
Cash sales	$176,450
Collect accounts receivable	64,750
Total	$241,200
Cash disbursements:	
Wages and salaries	$ 85,750
Heat, light, power	15,000
Additional supplies	52,600
Selling and administration	28,375
Interest (Note 1)	2,880
Payment—bank loan (12/31)	12,000
Payment—accounts payable	10,400
Total	$207,005

Note 1. Interest at 12 percent per annum on the bank loan was payable June 30 and December 31 [($24,000 * .12) = $2880]. Interest payments for 1998 were made when due.

EXHIBIT 3 Other Information Relative to Operations

1. At the end of 1998 Copies Express owed $9,875 to suppliers for the purchase of photocopy supplies for which it had not yet paid.
2. The yearly depreciation expense on the buildings and equipment was $15,000.
3. At the end of 1998 Copies Express was owed $11,000 for copying services by customers who had not yet paid. Copies Express expected that all of these customers would pay within 30 days.
4. An inventory taken of the supplies at year-end revealed that the year's cost of supplies was $60,250.
5. Income taxes for 1998 were expected to be $11,593. They were unpaid as of December 31, 1998.

CASE 4–4 Octane Service Station*

On March 15, Julio Trevino signed a lease agreement to operate a gasoline service station that was owned by the Octane Oil Company (hereafter, simply "Octane"). Trevino had contacted the regional sales manager of Octane in response to an advertisement that solicited applicants "with $25,000 to invest" to lease and operate a newly erected Octane gasoline service station. Trevino had been able to accumulate approximately $32,000 for investment purposes as a result of a $25,000 inheritance and savings on the salary of $865 per week he earned as manager of a service station operated as a separate department of a J. C. Penney store. Most of this $32,000 was held in government bonds.

The regional sales manager for Octane was impressed with Trevino's personal and financial qualifications, and after several interviews, a lease agreement was signed. During one of these meetings the sales manager informed Trevino that the new station would be ready for occupancy on May 1 at a total investment cost of $300,000. Of this amount, $100,000 had already been paid for land, and a total of $200,000 would be spent for a building that would be "good for about 40 years." In discussing profit potential, the sales manager pointed out that Octane's national advertising program and the consumer appeal generated by the attractive station "will be worth at least $30,000 a year to you in consumer goodwill."

The lease agreement stipulated that Trevino pay a rental of $1,250 per month for the station plus $0.04 for each gallon of gasoline delivered to the station by Octane.[5] A separate agreement was also signed whereby Octane agreed to sell and Trevino agreed to buy certain minimum quantities of gasoline and other automotive products for the service station operation.

As both an evidence of good faith and as a prepayment on certain obligations that he would shortly incur to Octane, Trevino was required to deposit $20,000 with Octane at the time the lease was signed. Trevino raised the cash for this deposit by liquidating government bonds. Octane used most of this money to defray certain obligations incurred by Trevino to the oil company prior to the opening of the new station. The deductions from the $20,000 deposit were applied as follows:

1. Inventories of gasoline, oil, grease, tires, batteries, and accessories	$13,250
2. Rental fee ($1,250 flat rental for the month of May and $170 figured as $0.04 per gallon for the gasoline delivered in the opening inventory)	1,420
3. Downpayment (on Trevino's behalf) on equipment costing $12,875	2,575
	$17,245

The equipment, including floor and hydraulic jacks, a battery charger, tune-up sets, and oil and grease guns, became Trevino's property. A representative of the oil company stated that this equipment would last about five years. The unpaid, noninterest-bearing balance of $10,300 Trevino owed Octane for

*Copyright © by the President and Fellows of Harvard College. Harvard Business School case 198-059.

[5]The lease, which covered a period of one year beginning May 1, was automatically renewable unless notice of cancellation was given by either party at least 30 days prior to an anniversary date. The regional sales manager of the Octane Oil Company estimated that approximately 150,000 gallons of gasoline would be delivered to Trevino's Service Station during the first 12 months of operation. Subsequently, Trevino's records revealed that 27,000 gallons (including the initial inventory) were actually delivered during the first two months of operation.

equipment was to be paid in five semiannual installments of $2,060 each. The first such payment was due November 1. The $2,755 remaining from the $20,000 originally deposited with Octane was returned to Trevino on April 30. He deposited this money in a special checking account he had set up for his service station venture.

Just before opening for business on May 1, Trevino converted some additional government bonds into $7,000 cash which he also placed in the service station account. Prior to May 1, he wrote the following checks: $1,650 for office furniture that had an expected life of 10 years, and $900 for a fire and casualty insurance policy providing coverage for a one-year period beginning May 1. On April 30, Trevino transferred $200 from the service station checking account to the cash drawer at the service station. It was Trevino's intention to deposit in the bank all but $200 of the cash on hand at the close of each business day. The balance in the service station checking account at the start of business was, therefore, $7,005. In addition, Trevino had $2,700 in a savings account.

On May 1, the service station was opened for business. In his effort to build up a clientele, Trevino worked approximately 60 hours per week compared with 40 in his previous job. In addition, three other people were employed on either a full- or part-time basis. Trevino was reasonably satisfied with the patronage he was able to build up during the first two months the station was open. At the end of June, however, he felt it would be desirable to take a more careful look at how he was making out in his new business venture. Trevino felt that he should record his progress and present position in a form that would be useful not only at the present time but also for comparative purposes in the future, perhaps at six-month intervals ending on June 30 and December 31.

Trevino maintained a simple recordkeeping system in which cash receipts and cash payments were itemized daily in a loose-leaf notebook. Separate pages were reserved for specific items in this notebook. During the months of May and June, the following cash receipts and payments had been recorded:

Cash receipts (May and June):	
Sales of gasoline, motor oil, tires, batteries, and accessories and the revenue from lubrications, washing and polishing, and miscellaneous sales and services	$69,510
Rental from parking area on service station land	500
	$70,010
Cash payments (May and June):	
Purchases (including gasoline, motor oil, grease, tires, batteries, and accessories)	$44,694
Rent (does not include $1,420 deduction from $20,000 deposit)	2,018
Payroll (does not include any payments to Trevino)	9,450
Utilities	445
Advertising	690
Miscellaneous	355
Withdrawals by Trevino (June 1 and June 19)	6,750
	$64,402

The $500 listed in cash receipts as rental from parking area had been received from an adjacent business establishment that used one portion of the service station site as a parking space for certain of its employees. The rental received covered a period extending from May 15 to July 15.

In addition to the record of cash receipts and payments, a detailed listing was kept of the amounts

of money that were due from, or owed to, other individuals or companies. An analysis of these records revealed that $143 was due the business for gas, oil, and car servicing from a wealthy widow friend of the Trevino family who preferred to deal on a credit basis. Also, on the evening of June 30, one of the employees completed waxing a car for a regular customer who was out of town and would be unable to call for his car until July 3. Trevino had quoted a price of $56 for this job. Trevino recalled that when he once worked at an automobile agency, he had heard that setting up a reserve for bad debts equal to two percent of all outstanding accounts was a good idea. Trevino had also jotted down the fact that he and his family had used gas and oil from the service station worth $101 at retail prices, for which no payment had been made. Approximately $79 had been paid to Octane Oil Company for this merchandise.

A further summary of his records revealed the following unpaid bills resulting from operations in June:

Octane Oil Company for merchandise	$1,804
Rent payable (figured at $0.04 per gallon on most recent delivery of gasoline)	75
Utilities for the month of June	425
	$2,304

The service station's employees had last been paid on Saturday, June 28, for services rendered through Saturday evening. Wages earned on June 29 and 30 would amount to $232 in the following Saturday's payroll.

Trevino took a physical inventory on the evening of June 20, and he found gasoline, motor oil, grease, tires, batteries, and accessories on hand that had cost $10,018. While Trevino was figuring his inventory position, he compared his recorded gallonage sales of gasoline on hand at the end of the period against the volume of gasoline at the beginning inventory plus deliveries. In this manner, Trevino ascertained that shrinkage due to evaporation, temperature changes, waste, and other causes amounted to 302 gallons of gasoline that he estimated had cost $360.

Late in June, Trevino's married son realized that he would be unable, because of prolonged illness, to make payment of $192 for interest expense and $800 for principal repayment on a $2,400 bank loan. Trevino, who had acted as cosigner on the note, would be obligated to meet this payment on July 1.

Questions

1. Prepare a May 1 and a June 30 balance sheet for Julio Trevino's service station and an income statement for the intervening period.
2. Has Julio Trevino's investment in the gasoline station been a good one for him? Has his return on his investment been greater or less than he would have received had he invested his funds at 15 percent elsewhere?

Chapter Eight

Sources of Capital: Debt

Chapter 8 begins a more detailed description of the liabilities and owners' equity portion of the balance sheet. In this chapter we discuss liabilities and the related interest expense, while Chapter 9 discusses owners' equity. As mentioned in Chapter 2, liabilities and owners' equity represent the sources of the funds that have been used to finance the entity's investments in assets.

Identifying the needs for new funds and acquiring these funds is part of the function known as *financial management*. The financial executives in an organization need to have extensive knowledge about the various means of raising money and the legal and tax rules that relate to financing. Other members of management should have a general understanding of these matters even though they need not be familiar with all the details. This chapter discusses the accounting and financial analysis aspects of liabilities at a level that is intended to give the nonfinancial manager a general understanding of the subject.

In the typical organization, arranging new sources of long-term liabilities is an event that occurs infrequently; but when it does occur, it is likely to have a major impact on the financial statements. The Appendix to this chapter introduces the concept of present value, a fundamental concept in the balance sheet valuation of liabilities.

Nature of Liabilities

In Chapter 2 a *liability* was defined as an obligation to an outside party arising from a transaction or an event that has already happened. This definition is approximately correct. However, some accounting liabilities are not legally enforceable obligations, and some legal obligations are not liabilities in the accounting meaning of this word.

An estimated allowance for future costs under a warranty agreement is an example of a liability that is not a definite obligation at the time it is set up. When a warranty agreement applies, the liability account Allowances for Warranties is set up by a credit entry in the period in which the revenue is recognized, the offsetting debit being a charge to an expense account such as Estimated Warranty Expense. Later on, when repairs or replacements under warranty are made, the liability account will be debited and other balance sheet accounts such as Parts Inventory will be credited.

Executory Contracts

An example of a legal obligation that is not an accounting liability is an **executory contract**—a contract in which *neither* party has as yet performed. Understanding the nature of such agreements is important, not only in determining accounting liabilities but also in determining revenues and expenses. Five examples follow that illustrate the concept.

1. A sales order is placed for the future delivery of certain goods to the buyer. If the goods are not shipped in the current period, neither party has performed: The buyer has not paid anything and the seller has not shipped the goods. Thus, in accounting the sales order is not recognized—neither party has a liability and no revenue is recognized.

2. A baseball club signs a contract to pay a certain player $1 million per year for five years. The player works in the year in which the contract is signed; in this first year, the player has performed, so the contract is not an executory contract. If the baseball club has not paid all of the $1 million by the end of the first year, it has a liability for the unpaid amount. However, the agreement is currently an executory contract for the other four years; the remaining $4 million obligation is not recorded as a liability (or as anything) in the current year.

3. A law firm signs a contract in which it agrees to provide legal services next year. This is an executory contract in the current year; signing the contract does not constitute performance. This is conceptually the same as the sales order example, except that future provision of services is involved rather than future delivery of goods.

4. A law firm signs a contract in which it agrees to provide legal services next year on an as-needed basis; it receives a $50,000 retainer fee for so agreeing. This is not an executory contract because the client has performed by paying the $50,000. However, because the law firm has not yet performed, it records a liability of $50,000 in the current year; the $50,000 is not yet revenue. The law firm does earn $50,000 revenue in the following year, whether or not it is actually called upon by the client to perform any services.

5. The seller of a house receives $10,000 as a nonrefundable deposit from the buyer of the house; subsequently, the would-be buyer decides not to purchase the house after all. This is not an executory contract because the buyer has performed to the extent of $10,000. This $10,000 is a liability to the seller at the time the deposit is made; subsequently, when the buyer does not consummate the purchase, the $10,000 becomes revenue to the seller.

Important exceptions to the general rule that executory contracts do not create accounting liabilities are capital leases, discussed later in this chapter. Lease agreements are executory contracts. The lessor must provide the lessee with "quiet enjoyment" of the leased asset and the lessee must pay future lease payments. In the case of capital leases, the Financial Accounting Standards Board (FASB) decided the substance of the transaction rather than its legal form should dictate the accounting treatment.

Contingencies

A **contingency** is a set of circumstances involving uncertainty as to possible gain (a *gain contingency*) or loss (a *loss contingency*) that will ultimately be resolved when some future event occurs or fails to occur. Gain contingencies usually are not recorded because recording them would mean recognizing revenues before they are reasonably certain, which is not in accord with the conservatism concept. Accounting for loss contingencies is more judgmental. Examples of such contingencies include two items previously discussed—collectibility of receivables and future warranty costs—as well as threatened or pending litigation, guarantees of indebtedness to others, risk of damage or loss to property by fire, flood, earthquake, or other hazard, and actual or possible claims and assessments.

A loss contingency is recognized—recorded—as a liability (with an offsetting debit to an appropriate expense account to record the loss) only if *both* of the following conditions are met:

1. Information available prior to issuance of the financial statements indicates that it is probable that an asset had been impaired or a liability had been incurred.
2. The amount of loss can be reasonably estimated.

If one of the conditions is not met, the contingency must nevertheless be disclosed (but not recognized) if there is at least a reasonable possibility that a loss may have been incurred.[1]

For example, assume that during the period a lawsuit claiming damages has been filed against a company. If the company concludes that there is a reasonable possibility

[1] "Accounting for Contingencies," *FASB Statement No. 5*, par. 8.

of losing the lawsuit *and* if the amount can be reasonably estimated, a liability is recognized. If the amount of the probable loss can be estimated only within a range, the lower end of this range is the amount of the liability. The possible loss above this lower limit is disclosed in notes to the financial statements, but it is not recorded in the accounts.[2]

Example
A company's internal auditor discovered that an employee had made errors in calculating the amount of customs duties due on imported merchandise, resulting in underpayments totaling $100,000. The company immediately paid the $100,000 to the government. The penalty would be at the court's discretion, with a maximum of 10 times the value of the merchandise; in this instance, the maximum penalty could be $30 million. On the other hand, there would be no penalty if the court decided that the error was not willful. Based on the experience of other companies with similar violations, the company decided that the lower limit of the probable range of penalties was $300,000 and recorded this amount as a liability and an expense. It disclosed the possibility of paying up to $30 million in a note accompanying its balance sheet.

A company is said to be "contingently liable" if it has guaranteed payment of a loan made to a third party. But this is not a liability in the accounting sense unless available information indicates that the borrower has defaulted or will probably default.[3] The possibility of loss from future earthquakes or other natural catastrophes is not a liability because the events have not yet happened.

There are often practical difficulties in accounting for contingencies. *Statement No. 5* distinguishes among three degrees of uncertainty—*probable* ("likely to occur"), *remote* ("slight" chance of occurring), and *reasonably possible* ("more than remote but less than likely"). In practice, judgment must often be exercised in deciding whether a contingency loss is probable, thus requiring its recognition, or only reasonably possible, thus requiring disclosure of the contingency but not its recognition. The company's reported income for the period is affected by how this judgment is made, which raises the possibility that the judgment will be biased.

Liabilities as a Source of Funds

As described in Chapter 2, current liabilities are those that are to be satisfied in the near future. One noteworthy aspect of current liabilities is that they often provide funds (financial resources) to the company at no cost. For example, if suppliers permit a company to pay for materials or supplies 30 days after delivery, this credit policy results in an interest-free, 30-day loan to the company. Similarly, unearned subscription revenue prepaid to a magazine publisher is, in effect, an interest-free loan from subscribers to the publisher.

With these exceptions, a company pays for the use of the capital that others furnish. Capital obtained from borrowing is called **debt capital.** Capital obtained from shareholders, either as a direct contribution (paid-in capital) or indirectly as retained earnings, is called **equity capital.** The rest of this chapter deals with debt capital. (Equity capital is dealt with in Chapter 9.)

Debt Capital

The debt instruments that a firm uses to obtain capital can be classified generally as either term loans or bonds. We will describe these instruments in general terms; additional details can be found in texts on financial management.

---

[2] "Reasonable Estimation of the Amount of a Loss," *FASB Interpretation No. 14,* par. 3.

[3] Even though such a guarantee may not create a liability, the nature and amount of the guarantee must be disclosed in a note to the balance sheet. See *FASB Statement No. 5* and "Disclosure of Indirect Guarantees of Indebtedness to Others," *FASB Interpretation No. 34.*

Term Loans

A business loan repayable according to a specified schedule is a **term loan.** The lender is usually a bank or an insurance company. Ordinarily a company's obligation to repay a term loan extends over a period of several years, making the loan a noncurrent liability. However, short-term loans can also be arranged, particularly for businesses with seasonal sales patterns that need cash to finance a buildup of inventories prior to the selling season (e.g., toy manufacturers). For major corporations term loans are a less significant source of debt capital than bonds.

Bonds

A **bond** is a certificate promising to pay its holder (1) a specified sum of money at a stated date, called the **maturity date,** and (2) interest at a stated rate until the maturity date. Although bonds are usually issued in units of $1,000, the *price* of a bond is usually quoted as a percentage of this face value; thus, a price of 98 means $980. The stated interest rate is usually constant for the life of the bond. However, for some bonds, called **variable rate bonds,** the rate may be expressed in terms such as "the prime rate plus 2 percent"; the rate thus varies each interest period with that period's prime rate (the interest rate charged by banks on short-term loans to their best customers). Bonds may be issued to the general public through the intermediary of an investment banker, or they may be privately placed with an insurance company or other financial institution.

Long-term creditors usually require the borrowing entity to maintain certain minimum financial ratios (e.g., current ratio) and to refrain from taking actions that might endanger the safety of the money loaned. These requirements, called **covenants,** are spelled out in the loan or bond **indenture** (usually a lengthy document). If any of these covenants is not lived up to, the loan is technically in **default,** and the creditors can demand immediate repayment. In the event of default, however, creditors are more likely to require changes in the management or take other corrective action rather than demand immediate repayment.

A **mortgage bond** (or simply **mortgage**) is a bond secured by designated pledged assets of the borrower, usually land, buildings, and equipment. Should the firm default on the mortgage, the pledged assets may be sold to repay the mortgage. If the proceeds from the sale of the pledged assets are less than the amount of the mortgage, then the mortgage holder becomes a general creditor for the shortfall. If the bond is not secured by specific assets of the issuing entity it is referred to as a **debenture.**

Bond redemption

In an ordinary bond issue the principal amount is paid in one lump sum at the maturity date. This payment is said to **redeem** the bond. In order to accumulate cash for redemption, the borrower (bond issuer) may be required to deposit money regularly in an account restricted for this purpose. Bonds that have such a requirement are **sinking fund bonds.** Sinking funds may be used to redeem bonds at maturity, or to redeem outstanding bonds at regular intervals by buying them in the open market or by redeeming certain bonds that are randomly selected. Bond sinking funds are usually controlled by a trustee, such as a bank; they appear in the "investments" or "other assets" section of the balance sheet.

Serial bonds are also redeemed in installments, the redemption date for each bond in the bond issue being specified on the bond itself. The primary difference between a sinking fund bond and a serial bond is that holders of serial bonds know the date when their bonds will be redeemed, whereas holders of sinking fund bonds do not. The latter may end up holding their bonds to maturity, or their bonds may be randomly selected for redemption by the sinking fund at some earlier time.

A bond may also be **callable;** the issuing entity may, at its option, call the bonds for redemption before the maturity date. If this is done, the corporation usually must pay a premium for the privilege.

Zero-coupon bonds do not make periodic interest payments. Rather, they are sold at a deep discount from their face value. Over the life of the bond, interest is accrued and added to the bond's carrying value. At maturity, the bond's carrying value is equal to its face value.

Other features of bonds

Some bonds are **convertible;** they may be exchanged for a specified number of shares of the issuing corporation's common stock if the bondholder elects to do so. Sinking fund bonds and serial bonds may also be callable, convertible, or both.

Finally, some bonds (and also some term loans) are **subordinated.** In the event a company goes bankrupt and is liquidated, the claims of the subordinated debtholders are subordinate (i.e., inferior) to the claims of any general or secured creditors. However, subordinated creditors' claims take precedence over those of the company's shareholders (equity investors).

Accounting for Bonds

We will now describe how a bond is recorded in the accounts when it is issued, how bond interest expense is recorded while the bond is outstanding, and how the bond's redemption is recorded.

Recording a Bond Issue

To illustrate the entries typically made to record the proceeds from an issue of bonds, assume Mason Corporation issues 100 bonds, each with a **par value** (also called **principal** or **face value**) of $1,000. The bonds have a stated interest rate, called the **coupon rate**[4], of 10 percent. This means that the annual interest payment will be 10 percent of the par value—in this case, $100 per year.[5] The bonds will mature at the end of the 20th year after their issuance. They are not secured by any specific Mason Corporation assets. Such a bond would be called a "10 percent, 20-year debenture." If the corporation received $1,000 for each of these bonds, the following entry would be made:

Cash	100,000	
Bonds Payable		100,000

(In practice the liability account title describes the specific bond issue, with a separate account for each issue. The title is abbreviated here.)

Discount and premium

A fundamental concept in finance is the relationship between risk and return: The higher the risk an investment represents, the higher the return the investor expects to receive from making the investment. For example, if an investor can earn 8 percent

[4]Before computers were widely used for keeping bondholder records, a bondholder requested each periodic interest payment by mailing in a coupon, printed on sheets attached to the bond certificate, to the bond issuer. That is the origin of the term *coupon rate* and also of the expression *coupon clipper* to describe someone with substantial financial investments.

[5]In practice interest payments are usually made in semiannual installments, rather than annually—in this case, $50 every six months. For simplicity we will usually assume annual payments.

interest on a $1,000 investment in a federally insured certificate of deposit, the investor will expect a bond to provide more than an 8 percent return because there is some risk that either the bond's interest payments or its principal redemption will not be received in full by the bondholder. Similarly, if bonds of a given risk are currently providing a 12 percent return to their holders, investors will not be willing to pay $1,000 for a newly issued bond of comparable risk that has only a 10 percent coupon rate. By the same token, they would be willing to pay *more* than $1,000 for a bond having comparable risk and a 14 percent coupon rate.

There is always some delay between the time a bond's coupon rate is decided upon and when the bond is actually available to be issued to the public. During this delay the prevailing rate of return on bonds of comparable risk may have changed. For this reason bonds often are issued for *less* than their par value—at a **discount.** This occurs when the prevailing market rate is *higher* than the bond's coupon rate. Recall that the bond's par value is fixed at $1,000, and the annual interest payment is fixed once the coupon rate is set (interest payment = par value * coupon rate). Thus, in order to earn a return higher than the coupon rate, the bondholder must invest less than $1,000 in the bond. Similarly, if prevailing rates are *lower* than the bond's coupon rate, bondholders will be willing to invest *more* than the bond's par value, and the bond will be issued at a **premium.**[6]

Example

If the prevailing rate of interest in the bond market is more than 10 percent for bonds with a risk similar to those issued by Mason Corporation, potential investors will be unwilling to pay $1,000 for a Mason Corporation 10 percent bond. They would be willing to invest an amount such that the $100 annual interest payment on this bond would yield the market rate of interest. Assume that this market rate is 12 percent. The bond would therefore be sold at a price of $851, or at a discount of $149.[7]

The words *discount* and *premium* carry no connotation of bad or good. They reflect simply a difference between the coupon interest rate for the issue and the going market rate of interest at the time of issuance. The coupon rate is usually quite close to the market rate as of the date of issue.

From the standpoint of the bond issuer, the discount or premium on a bond is a function only of the interest rates prevailing at the time of issuance of the bonds. Subsequent changes in the level of interest rates (and hence in bond prices) do not affect the amount recorded in the accounts. To emphasize this fact, the discount or premium recorded by the bond issuer is often called **original issue discount** or **premium.**

Issuance costs

The offering of a bond issue to the public is usually undertaken by an investment banking firm that charges the issuer a fee for this service. In addition to this fee, the issuer also incurs printing, legal, and accounting costs in connection with the bond issue. These **bond issuance costs** are recorded as a deferred charge, which is

[6] Although it is colloquially said that an investor "pays" for a newly issued bond and that corporations "sell" their bonds, a bond is *not* an asset of the corporation that is sold, as are goods. Rather, bonds are evidence of a contribution of funds—a long-term loan—to the firm by investors. To the investor, the bond *is* an asset, and it can be sold to another investor. Such an exchange between investors has no impact on the flow of cash into or out of the firm, however. (Similar comments apply to shares of a corporation's common stock.)

[7] The $851 is formally called the **present value** of the bond; the method of calculating it is described in the Appendix to this chapter. The precise present value is $850.61. If the interest were received in $50 semiannual amounts, the present value would be $849.54.

an asset analogous to prepaid expenses. The issuance costs are *not* subtracted from the bond liability on the balance sheet, nor are they combined with any bond discount or premium.[8]

Example
Mason Corporation's bonds, for which investors paid $851 each, also had issue costs to Mason averaging $21 per bond, resulting in a net cash inflow to Mason of $830 per bond. The discount is $149 per bond, not $170 ($149 + $21).

Accounting entries
If the conditions of the preceding examples are assumed, and Mason Corporation received $83,000 net cash proceeds from the issuance of $100,000 face amount of bonds, the following entry would be made:

Cash	83,000	
Bond Discount	14,900	
Deferred Charges	2,100	
Bonds Payable		100,000

By contrast, if prevailing rates for similar bonds had been 9 percent, the bonds would have been issued at a premium of $91 per bond, and the entry would have been:

Cash	107,000	
Deferred Charges	2,100	
Bond Premium		9,100
Bonds Payable		100,000

Balance Sheet Presentation

Bonds payable are shown in the long-term liabilities section of the balance sheet until one year before they mature, when ordinarily they become current liabilities. The description should give the principal facts about the issue—for example, "10 percent debentures due 2017." When a bond issue is to be *refunded* with a new long-term liability, however, it is not shown as a current liability in the year of maturity since it will not require the use of current assets. If the bonds are to be retired in installments (as with serial bonds), the portion to be retired within a year is shown in the current liabilities section.

Bond discount or premium is shown on the balance sheet as a direct deduction from, or addition to, the face amount of the bond, as illustrated:

If a Discount:		*If a Premium:*	
Bonds payable:		Bonds payable:	
Face value	$100,000	Face value	$100,000
Less: Unamortized discount	14,900	Plus: Unamortized premium	9,100
	$ 85,100		$109,100

The principal amount less unamortized discount (or plus unamortized premium) is called the **book value** (or **net book value**) of the bond. It is the basis of calculating the bond's periodic interest expense, as described below. Note in the above two examples that the initial book value of a bond is equal to the proceeds from its issuance, ignor-

[8] "Interest on Receivables and Payables," *APB Opinion No. 21*, par. 16.

ing any issuance costs. The book value less unamortized issuance costs (deferred charges) is called the **net carrying amount** of the bond.

Bond Interest Expense

To the *investor,* the return on a bond is made up of two components: (1) the periodic cash interest payments and (2) the difference between the bond's par value (received in cash at redemption) and the amount paid for the bond. The second component is a gain if the bond was purchased at a discount or a loss if purchased at a premium.

From the standpoint of the bond *issuer,* a bond's interest expense also has two components that are the mirror image of the investor's return components. **Bond interest expense** is made up of (1) the periodic cash interest payments to the bondholder and (2) amortization of original issue discount or premium. The amount of the issuer's interest expense when related to the initial proceeds from issuing the bond (ignoring issuance costs) determines the **effective rate of interest** on the bond. The effective rate is higher than the coupon rate for bonds issued at a discount; the effective rate is lower than the coupon rate for bonds issued at a premium.[9] (Calculation of the effective rate is described in the Appendix to this chapter.)

Discount/premium amortization

Bond discount or premium is amortized using the **compound interest method**, also called the **effective interest method** or simply the **interest method.** (This method also is described in the Appendix.) Straight-line amortization is not permitted unless the results would not differ materially from those obtained with the interest method.[10] With the interest method of amortization, the discount or premium is written off in such a way that each period's interest *expense* (as opposed to the cash interest payment) bears a constant ratio to the beginning-of-the-period book value of the bonds over the entire life of the issue. This ratio is the effective interest rate on the bonds. In the Mason example, if the bonds were issued for $851 each, this rate is 12 percent.[11]

Example

The first year's interest expense for the 10 percent Mason Corporation bonds that were assumed to have been issued for $851 each would be calculated as follows: *Interest expense is equal to the book value of the bonds at the start of the year* ($85,100) *times the effective interest rate* (12 percent), which equals $10,212. Of this total interest expense for the year, $10,000 is the fixed cash interest payment (based on the bonds' par value and coupon rate) and the remaining $212 is the amortization of original issue discount. The entry is:

Bond Interest Expense	10,212	
Bond Discount		212
Cash		10,000

This entry reduces the unamortized bond discount by $212 to a new balance of $14,688 ($14,900 − $212). Thus, at the beginning of the second year the bond's book value will be $85,312 ($100,000 − $14,688). Next year's interest expense will be 12 percent of this book value, or $10,237; of this total, $237 is the second year's discount amortization and $10,000 is the fixed cash interest payment.

---

[9] *APB Opinion No. 21* also requires disclosure of this effective rate of interest on the bond.

[10] *APB Opinion No. 21,* par. 15.

[11] Readers checking our numbers with calculators may get slightly different results for our illustrative Mason bonds. Recall (from footnote 7) that the precise present value for a 12 percent return was $850.61 per bond, which we rounded to $851. This rounding changes the precise return to 11.994 percent, but we still use 12 percent.

Continuing this process for the entire 20 years will completely amortize the original bond discount. Over the 20 years, the bonds' book value will gradually increase up to the $100,000 par value that must be paid to Mason's bondholders at maturity. Thus, the effect of bond discount/premium accounting procedures is that (1) when the bond is issued, its book value equals the cash proceeds received by the issuer (ignoring issuance costs) and (2) at maturity, the book value equals the amount of cash that must be paid out to fulfill the bond payable liability obligation. In other words, there is a matching of the cash flows and liability amounts at bond issuance and maturity, which would not be the case without the systematic amortization of discount or premium.

Adjusting entries

If the interest payment date does not coincide with the closing of the company's books, an adjusting entry is made to record accrued interest expense and the amortization of discount or premium.

Example

Mason Corporation bonds are issued for $851 each on October 1. The interest date is September 30, and the fiscal year ends on December 31. The following entries would be made:

1. Adjustment on December 31 to record one-fourth year's interest accrued since October 1:

Bond Interest Expense	2,553	
Bond Discount		53
Accrued Interest Payable		2,500

2. Payment of annual interest on September 30; entry to record three-fourths of a year's interest expense and one year's payment:

Bond Interest Expense	7,659	
Accrued Interest Payable	2,500	
Bond Discount		159
Cash		10,000

Bond issuance costs, which are treated as a deferred charge, usually are amortized using the straight-line method. Thus, for Mason's bonds, the annual issuance cost amortization would be $105 ($2,100 ÷ 20 years).

Retirement of Bonds

Bonds may be retired in total, or they may be retired in installments over a period of years (i.e., as with sinking fund or serial bonds). In either case the retirement is recorded by a debit to Bonds Payable and a credit to Cash (or to a sinking fund that has been set up for this purpose). The bond discount or premium will have been completely amortized by the maturity date, so no additional entry is required for discount or premium at that time.

Refunding a Bond Issue

Callable bonds can be paid off before their maturity dates by paying investors more than the bonds' par value. In periods when interest rates have declined, a company may consider it advantageous to **refund** a bond issue, that is, to call the old issue and issue a new one with a lower rate of interest. At that point the company must account for the **call premium** (the difference between the call price and par value), any other costs of the refunding, and any unamortized issue costs and discount (or premium) on the old bonds.

Recall that the bonds' face amount, adjusted for unamortized premium or discount and costs of issuance, is called the **net carrying amount** of the debt to be refunded. The amount paid on refunding, including the call premium and miscellaneous costs of re-

funding, is called the **reacquisition price.** The difference between these two amounts must be reported as a separate loss or gain on the income statement for the period in which the refunding takes place.[12]

Example
Suppose that the 100 Mason Corporation bonds are called at the end of five years by paying the call price of the bonds at that time, $1,050 per bond, to each bondholder. Assume that miscellaneous refunding costs are $1,000 in total. Also, much of the bond discount and issuance costs will not have been amortized. The $13,553 of unamortized discount is determined using the compound interest method. Unamortized bond issuance costs after five years (one-quarter of the bonds' scheduled life) would be: 3/4 * $2,100 = $1,575. The loss is determined as follows:

Reacquisition price ($105,000 + $1,000)		$106,000
Net carrying amount:		
Face value	$100,000	
Less: Unamortized discount	(13,553)	
Less: Unamortized issuance costs	(1,575)	84,872
Loss on retirement of bonds		$ 21,128

The accounting entry is:

Bonds Payable	100,000	
Loss on Retirement of Bonds	21,128	
Cash		106,000
Bond Discount		13,553
Deferred Charges (Issuance Costs)		1,575

Leased Assets

In a **lease** agreement the owner of property, the **lessor,** conveys to another party, the **lessee,** the right to use property, plant, or equipment for a stated period of time. Leases are a form of lessee financing. For many leases this period of time is short relative to the total life of the asset. Agencies lease—or **rent,** which is another term for lease—automobiles for a few hours or days, and space in an office building may be leased on an annual basis. These leases are called **operating leases.** The lease payments are expenses of the accounting period to which they apply. The entry to record a period's operating lease payments of, say, $10,000 is thus:

Rental Expense	10,000	
Cash		10,000

Capital Leases

Other leases cover a period of time that is substantially equal to the estimated life of the asset, or they contain other provisions that give the lessee almost as many rights

[12]"Early Extinguishment of Debt," *APB Opinion No. 26,* par. 20, as amended by "Extinguishment of Debt," *FASB Statement No. 76. FASB Statement No. 4,* "Reporting Gains and Losses from Extinguishment of Debt," as amended by *FASB Statement No. 64,* "Extinguishment of Debt Made to Satisfy Sinking-Fund Requirements," requires that in most instances such a gain or loss be reported on the income statement as an *extraordinary* gain or loss, below income from operations. (Extraordinary items are discussed in Chapter 10.)

to the use of the asset as if the lessee owned it. Such leases are called **capital leases** or **financial leases.** Assets acquired under a capital lease are treated as *if they had been purchased*. The lease obligation is a liability, which is treated in the same manner as long-term debt.

The Financial Accounting Standards Board (FASB) has ruled that a lease is a capital lease if one or more of the following criteria are met: (1) ownership is transferred to the lessee at the end of the term of the lease, (2) the lessee has an option to purchase the asset at a "bargain" price, (3) the term of the lease is 75 percent or more of the economic life of the asset, or (4) the present value of the lease payments is 90 percent or more of the fair value of the property (subject to certain detailed adjustments).[13] The idea of these criteria is to establish the substance (as opposed to the form) of the lease transaction. Even if only one of the four criteria is met, the transaction is viewed in substance as a sale of the asset to the lessee, with the lessor acting both as a seller of assets and as a finance company. In sum, a capital lease is, in effect, just another name for an installment loan.

The lease payments in a capital lease are usually set so that over the life of the lease the lessor will recover (1) the cost of the asset and (2) interest and a profit on the lessor's capital that is tied up in the asset. The amount debited as the cost of the asset acquired with a capital lease, and the offsetting liability for lease payments, is the *smaller* of (1) the fair value of the asset or (2) the present value of the stream of minimum lease payments required by the lease agreement. *Fair value* means the cash price that the acquirer of the leased item would have to pay for it if the seller were not providing financing to the acquirer in the form of a lease. The method of calculating the present value of the lease payments is described in the Appendix to the chapter. These two amounts are approximately the same in most lease transactions.

The asset amount is depreciated just as would be any item of plant or equipment owned by the organization. When lease payments are made to the lessor, part of the payment reduces the liability, and the remainder is interest expense of the period.

Example

A company leases an item of equipment whose useful life is 10 years. Lease payments are $1,558 per year payable at the end of each of the next 10 years. This is a capital lease because the lease term exceeds 75 percent of the asset's life. The fair value of the equipment is $10,000 (as is the present value of the lease payments). When the equipment is acquired, the entry is:

Equipment	10,000	
Capital Lease Obligations		10,000

Assume that the first annual lease payment consists of $900 of interest expense and $658 to reduce the liability. The entry for this payment is as follows:

Interest Expense	900	
Capital Lease Obligations	658	
Cash		1,558

Also, depreciation on the asset would be charged as an expense each year, just as if the entry had bought the asset for cash. Assuming the straight-line method is used, the entry is:

Depreciation Expense	1,000	
Accumulated Depreciation		1,000

[13] "Accounting for Leases," *FASB Statement No. 13*.

At the end of the 10 years, all of the $10,000 asset cost will have been charged to expense via the depreciation mechanism. Also, the capital lease obligation will have been reduced to zero, and the annual interest expense will have been recognized in each of the 10 years via entries such as the one shown above. Note that once the leased item is acquired and the initial equipment asset and lease obligation liability entry is made, accounting for the leased asset and for the lease obligation are separate, unrelated processes.

Most assets of an entity are legally owned by that entity. Assets acquired by a capital lease are an exception to this general rule. They are legally owned by the lessor, but they are accounted for as if they were owned by the lessee. In this way the lease obligation, which is in substance a long-term loan, is disclosed as a liability.[14]

Sale and Leaseback

A sale and leaseback is a financing transaction whereby the owner of the property sells it and simultaneously leases it back from the buyer. Any losses on the sale are recognized in income immediately. Gains on the sale are deferred and in most cases are recognized over the life of the lease.

Other Liabilities

This chapter thus far has focused on debt capital—long-term loans, bonds, and leases. For completeness, two other liabilities will be discussed briefly.

Current Liabilities

As explained in Chapter 2, these are obligations that are expected to be satisfied either by the use of current assets (usually by cash) or by the creation of other current liabilities within one year or less. The largest current liability for most entities is accounts payable (i.e., amounts owed to suppliers of goods and services). These amounts are recorded based on an invoice (i.e., a bill) from the supplier of the goods or services. Entries to other current liability accounts usually arise from adjusting entries; accrued wages payable, accrued interest payable, and estimated taxes payable are examples that have previously been described.

Deferred Taxes

Another liability section item of significant size for many corporations is *deferred income taxes*. This is a complicated topic and its mechanics are described in Chapter 10. Suffice it to say here that deferred taxes arise when a company uses different accounting methods in preparing its corporate income tax return than is used in preparing its financial statements for shareholder reporting purposes. For example, most corporations use straight-line depreciation over an asset's useful life for shareholder reporting but use the tax law's accelerated cost recovery provisions for income tax reporting.

Analysis of Capital Structure

Debt Ratios

The relative amount of a company's capital that was obtained from various sources is a matter of great importance in analyzing the soundness of the company's financial

[14]The lease accounting prescribed by International Accounting Standards is similar to *FASB Statement No. 13*. Outside of the United States some countries treat all leases as operating leases for accounting purposes. Others give companies the option of accounting for capital-type leases as either operating or capital leases.

position. In illustrating the ratios intended for this purpose, the following summary of the liabilities and owners' equity side of a company's balance sheet will be used:

	$ millions	Percent
Current liabilities	$1,600	23%
Long-term liabilities	1,800	26
Shareholders' equity	3,600	51
Total liabilities and owners' equity	$7,000	100%

Attention is often focused on the sources of **invested capital** (also called **permanent capital**): **debt capital** (long-term liabilities) and **equity capital** (owners' equity). From the point of view of the company, debt capital is risky because if bondholders and other creditors are not paid promptly, they can take legal action to obtain payment. Such action can, in extreme cases, force the company into bankruptcy. Equity capital is much less risky to the company because shareholders receive dividends only at the discretion of the directors and the shareholders cannot force bankruptcy.[15] Because the shareholders have less certainty of receiving dividends than the bondholders have of receiving interest, investors usually are unwilling to invest in a company's stock unless they see a reasonable expectation of making a higher return (dividends plus stock price appreciation) than they could obtain as bondholders. Investors would be unwilling to give up the relatively certain prospect of receiving 8 percent or 9 percent interest on bonds, unless the probable, but less certain, return on an equity investment were considerably higher, say, 12 percent or more.

Leverage

From the company's standpoint the greater the proportion of its invested capital that is obtained from shareholders, the less worry the company has in meeting its fixed obligations. But in return for this lessened worry, the company must expect to pay a higher overall cost of obtaining its capital. Conversely, the more funds that are obtained from bonds, the more the company can use debt funds obtained at relatively low cost in the hopes of earning more on these funds for the shareholders.

The relatively low cost of debt capital arises not only from the fact that investors typically are willing to accept a lower return on bonds than on stocks but also because debt interest (including bond interest payments) is tax deductible to the corporation, whereas dividends are not. Assuming a 40 percent tax rate, for every $1 that a company pays out in interest, it receives a tax saving of $0.40. Thus, its net cost is only 60 percent of the stated interest rate. For example, debt capital obtained from a bond issue with a yield of 10 percent costs the company only about 6 percent. By contrast, if equity investors require a return of 12 percent, the cost of obtaining equity capital is the full 12 percent.

[15] Note that risk is here viewed from the standpoint of the company. From the viewpoint of *investors*, the opposite situation prevails. Thus, bondholders have a relatively low risk of not receiving their payments, whereas stockholders have a relatively high risk. Based on this latter perspective, equity capital is called **risk capital.**

Debt/equity ratio

A company with a high proportion of long-term debt is said to be highly **leveraged.** The **debt/equity ratio** shows the balance that the management of a particular company has struck between these forces of risk versus cost. This is often called simply the **debt ratio.** It may be calculated in several ways. Debt may be defined as total liabilities, as interest-bearing current liabilities plus noncurrent liabilities, or as only noncurrent liabilities. The user must always be careful to ascertain which method is used in a given situation. Including current liabilities, the debt/equity ratio for the illustrative company is:

$$\frac{\text{Total liabilities}}{\text{Shareholders' equity}} = \frac{\$3{,}400}{\$3{,}600} = 94 \text{ percent}$$

Excluding current liabilities, the ratio is:

$$\frac{\text{Long-term liabilities}}{\text{Shareholders' equity}} = \frac{\$1{,}800}{\$3{,}600} = 50 \text{ percent}$$

Debt/capitalization ratio

The mix of debt and equity in the capital structure may also be expressed as the ratio of long-term debt to total invested capital (debt plus equity). This ratio is called the **debt/capitalization ratio.** For our illustrative company, it is the ratio of $1,800 to $5,400, or 33 percent. Note that this ratio is based on the same data as is the debt/equity ratio; it is just another way of expressing the relationship. (As an analogy, one can say that the female/male ratio in a class is 100 percent, or that females make up 50 percent of the total enrollment in the class.) The debt/capitalization ratio varies widely among industries but is less than 50 percent in the majority of industrial companies.

Times Interest Earned

Another measure of a company's financial soundness is the **times interest earned,** or **interest coverage ratio.** This is the relationship of a company's income to its interest requirements. The numerator of this ratio is the company's *pretax* income *before* subtraction of interest expense. Assuming that for our illustrative company this amount was $1,000, and that interest expense was $200, the calculation is:

$$\text{Times interest earned} = \frac{\text{Pre-tax income before interest}}{\text{Interest expense}} = \frac{\$1{,}000}{\$200} = 5.0 \text{ times}$$

Bond Ratings

Organizations such as Standard & Poor's and Moody's provide ratings on bonds to indicate their probability of going into default. A number of factors are considered in rating a corporation's bonds, including various financial ratios and evaluation of the prospects of the company's industry and the company's market position in that industry. The debt/capitalization ratio and interest coverage ratio are especially important. For example, the typical industrial company meriting Standard & Poor's top "AAA" rating might have a debt/capitalization ratio in the preceding three years of about 22 percent and interest coverage of about 17 times. (Standard & Poor's debt/capitalization ratio definition includes interest-bearing current liabilities, as well as long-term debt.) An AAA rating indicates a company's capacity to pay interest and repay principal is extremely strong.

Summary

Liabilities and owners' equity represents the sources of the funds that are invested in the firm's assets. Liabilities and owners' equity consists of current liabilities, other liabilities (primarily long-term debt), and owners' equity. Current liabilities are distinguished from other liabilities by their time horizon (one year or less). Liabilities are distinguished from owners' equity by their nature as obligations to outside parties. Executory contracts are not liabilities (except for capital leases) because neither party has performed. Loss contingencies create liabilities only if it is probable that a liability has been incurred and the amount of loss can be reasonably estimated.

The liability arising from the issuance of bonds is shown at its face amount (par value), adjusted for any difference between this face amount and the amount of cash actually paid by investors for the bonds; this difference is recorded as bond premium or discount. Premium or discount is amortized over the life of the issue using the interest method. This amortization plus the periodic cash interest payments equal the bonds' interest expense of each period. No gain or loss results when a bond is redeemed at maturity, but early retirement will lead to such a gain or loss.

If a company has leased equipment but the lease is, in effect, a vehicle to finance the purchase of the equipment, then this capital lease obligation is reported as a liability. Other liabilities include current liabilities and deferred income taxes.

Debt/equity ratios and interest coverage indicate the level of risk associated with the amount of a company's debt capital.

Appendix: Present Value

The concept of present value underlies the valuation of many liabilities. The concept is also applied in valuing many monetary assets (which is the nature of most of a bank's assets). Related to these liability and asset valuations is the interest method, which is used to amortize discount, premium, and the principal amount of all long-term debt, including capital leases. Finally, the present value concept is used in analyzing proposals to acquire new long-lived assets and to measure the fair value of impaired long-lived assets. These asset acquisition proposals are called *capital investment decisions* and are described in detail in Chapter 27.

Concept of Present Value

Many people have difficulty understanding the present value concept because it differs from what we were taught as children—that it is a good thing to put money into a piggy bank. We are congratulated when the bank is finally opened and the accumulated coins are counted. Children are taught that it is better to have a given amount of money in the future than to use that money today. More formally, children are taught that a dollar received at some future time is more valuable than a dollar received today.

Business managers think differently, however. They expect a dollar invested today to *increase* in amount as time passes, because they expect to earn a profit on that investment. It follows that an amount of money available for investment today is *more* valuable to the manager than an equal amount that will not be available until some future time. Money available today can be invested to earn still more money, whereas money not yet received obviously cannot be invested today. To the manager, therefore, the value of a given amount of money today—its *present value*—is more than the value of the same amount received at some future time.

Compound interest

To make the idea of present value more concrete, consider first the idea of **compound interest.** Suppose we invest $1,000 in a savings account that pays interest of 5 percent compounded annually. (Interest is invariably stated at an annual rate; thus, "5 percent" means 5 percent per year.) *Compounded annually* means that the interest earned the first year is retained in the account and, along with the initial $1,000, earns interest in the second year, and so on for future years. If we make no withdrawals from this account, over time the account balance will grow as shown below:

Year	Beginning-of-Year Balance	Interest Earned*	End-of-Year Balance
1	$1,000.00	$50.00	$1,050.00
2	1,050.00	52.50	1,102.50
3	1,102.50	55.13	1,157.63
4	1,157.63	57.88	1,215.51
5	1,215.51	60.78	1,276.28
·	·	·	·
·	·	·	·
10	1,551.33	77.57	1,628.89

*Some amounts may appear to be off by one cent, because the actual calculations were carried to 4 decimal places and then rounded.

Based on this table, one can make the following statement: "$1,000 invested today at 5 percent interest, compounded annually, will accumulate to $1,628.89 after 10 years." An equivalent statement is that the *future value* of $1,000 invested for 10 years at 5 percent interest is $1,628.89.[16]

Rather than obtaining a future value (*FV*) from a table, it can be calculated using the compound interest formula:

$$FV = p(1 + i)^n$$

where

p = Principal (initial investment)
i = Interest rate
n = Number of periods

Thus, the future value of $1,000 invested at 5 percent for 10 years is given by:

$$FV = \$1{,}000(1 + 0.05)^{10} = \$1{,}628.89$$

[16]Interest may be compounded more frequently than once a year. Interest on savings accounts, for example, may be compounded quarterly, monthly, or even daily. In such a case both the number of periods and the rate per period must be converted to the period used in compounding. For example, with quarterly compounding, the number of periods is 40 (i.e., 40 quarters in 10 years), and the interest rate *per quarter* would be 1.25 percent (5 percent ÷ 4). Thus, the future value of $1,000 invested for 10 years at 5 percent compounded quarterly is $\$1{,}000(1.0125)^{40} = \$1{,}643.62$. The results of the formulas given in this chapter are available in published tables and are programmed into many handheld calculators and personal computers.

Discounting

To arrive at *present* values we reverse the future value concept. The reverse of interest compounding is called **discounting.** For example, if the future value of $1,000 at 5 percent interest for 10 years is $1,628.89, then we can also say that the *present value* of $1,628.89 *discounted* at 5 percent for 10 years is $1,000. The interest rate (5 percent in the example) in present value problems is commonly referred to as the **discount rate** or the **rate of return.** This illustration leads to a more formal definition of **present value:**

> The present value of an amount that is expected to be received at a specified time in the future is the amount that, if invested today at a designated rate of return, would cumulate to the specified amount.

Thus, assuming a 5 percent rate of return, the present value of $1,628.89 to be received 10 years hence is $1,000, because (as we have illustrated) if $1,000 were invested today at 5 percent, it would cumulate to $1,628.89 after 10 years.

Finding Present Values

The present value (*PV*) of an amount *p* to be received *n* years hence, discounted at a rate of *i*, is given by the formula:

$$PV = \frac{p}{(1 + i)n}$$

Appendix Table A (at the back of the book) is a table of present values that were derived from this formula. The amounts in such a table are expressed as the present value of $1 to be received some number of years hence, discounted at some rate. To find the present value of an amount other than $1, we multiply the amount by the appropriate present value factor from Table A.

Example

To find the *PV* of $400 to be received 10 years hence, discounted at a rate of 8 percent, we first find the 10 year/8 percent factor from Table A, which is 0.463. Hence the *PV* of $400 is $400 * 0.463 = $185.20. This means that $185.20 invested today at a return of 8 percent will cumulate to $400 by the end of 10 years.

Inspection of Table A reveals two basic points about present value:

1. Present value decreases as the number of years in the future in which the payment is to be received increases.
2. Present value decreases as the discount rate increases.

Present Value of a Series of Payments

In many business situations the entity expects to receive a series of annual payments over a period of several years, rather than simply receiving a single amount at some future point. The present value of a series of payments is found by summing the present values of the individual payments. Computational procedures generally assume that each payment in the series is to be received at the *end* of its respective period rather than in a continuous flow during the period.

Example
Using a 10 percent discount rate, what is the present value of the following series of payments: year 1, $1,000; year 2, $1,500; year 3, $2,000; and year 4, $2,500?

Solution:

Present Year	Payment	Discount Factor (Table A)	Value
1	$1,000	0.909	$ 909
2	1,500	0.826	1,239
3	2,000	0.751	1,502
4	2,500	0.683	1,708
Present value of the series			$5,358

Equal Payments
In many situations, such as the repayment of loans, the series of payments is comprised of equal amounts each period. (Technically, such a series of equal payments is called an **annuity.**) If the payments are $1,750 per year for four years, then the present value of the series discounted at 10 percent would be:

Year	Payment	Discount Factor	Present Value
1	$1,750	0.909	$1,591
2	1,750	0.826	1,446
3	1,750	0.751	1,314
4	1,750	0.683	1,195
Present value of the series			$5,546

Rather than look up discount factors for each year in such a problem, one can use a table such as Appendix Table B. In that table the factor shown for four years at 10 percent is 3.170. This number is the same (except for rounding error) as the sum of the individual years' factors in the previous example: 0.909, 0.826, 0.751, and 0.683; and 3.170 * $1,750 = $5,548. This example illustrates that each factor in Table B was obtained by cumulating the factors for the corresponding year and all preceding years in the same interest rate column of Table A. Thus, the present value of a level series can be found in one step using Table B.

The values in Table B can also be used to find the present value of a series of equal payments between any two points in time. The procedure is to subtract the Table B factor for the year *preceding* the year of the first payment from the factor for the last year of payment.

Example
What is the present value of $1,000 a year to be received in years 6 through 10, assuming a 12 percent discount rate?

Solution:

Time Period	PV Factor (Table B)
Years 1–10	5.650
Years 1–5	3.605
Difference (years 6–10)	2.045
PV = $1,000* 2.045 =	$2,045

Present Values and Liabilities

The amount shown on the balance sheet for a liability such as a loan is often thought of as being the amount the borrower must repay to satisfy the obligation. This is only partly true. Certainly, the borrowing entity must repay the amount borrowed, called the *principal* in the case of a term loan or bond; and the amount shown on the balance sheet of the borrower *is* the amount of unpaid principal. However, the borrower's future payments to satisfy the obligation far exceed the amount of unpaid principal because interest must be paid on the amount of outstanding principal over the life of the loan.

In many cases the balance sheet liability is properly interpreted as meaning not the dollar amount of the principal but rather the *present value* of the series of future interest payments plus the *present value* of the future principal payments.

Example
Kinnear Company borrowed $25,000, with interest at 10 percent (i.e., $2,500) to be paid annually and the principal to be repaid in one lump sum at the end of five years. The balance sheet liability would be reported as $25,000. This can be interpreted as the sum of the present values, as follows:

	Present Value
Interest, $2,500 * 3.791 (Table B)	$ 9,478
Principal, $25,000 * 0.621 (Table A)	15,525
Total present value	$25,003*

*Does not add exactly to $25,000 because of rounding.

If the annual repayments are of a constant amount, with each payment including both interest and a reduction of principal, Table B can be used to find the amount of these payments.

Example
Kinnear Company borrowed $25,000 with interest at 10 percent to be repaid in equal annual amounts at the end of each of the next five years. The present value of this obligation is $25,000. The amount of the annual installments is $6,595. It is found by dividing $25,000 by the 5 year/10 percent factor in Table B, which is 3.791.

Each payment of $6,595 in the above example consists of two components: (1) interest on the amount of principal outstanding during the year and (2) reduction of that principal. These two components of each payment can be calculated as shown in Illustration 8–1, which is called a **loan amortization schedule.**

ILLUSTRATION 8–1 Loan Amortization Schedule*

Year	(a) Principal Owed at Beginning of Year	(b) Annual Payment	(c) Interest Portion of Payment (a) * 10%	(d) Reduction of Principal (b) − (c)	(e) Ending Principal (a) − (d)
1	$25,000	$ 6,595	$2,500	$ 4,095	$20,905
2	20,905	6,595	2,091	4,504	16,401
3	16,401	6,595	1,640	4,955	11,446
4	11,446	6,595	1,145	5,450	5,995
5	5,995	6,595	600	5,995	0
Totals		$32,975	$7,976	$20,000	

*Some numbers may appear to be off by 1 owing to rounding.

Column *c* of the schedule shows how much interest expense on this loan Kinnear Company should recognize each year. Column *e* shows the proper balance sheet valuation of the loan liability as of the end of each year (or, equivalently, as of the beginning of the next year, as shown in column *a*). The amounts in columns *c* and *d* represent the only conceptually correct way to divide each year's payment between interest expense and principal reduction (amortization). This approach is called the **compound interest method** (or **effective interest method** or simply **interest method**) of debt amortization.

Note how the amounts in column *c* decrease over time, whereas the amounts in column *d* increase. Someone not familiar with the compound interest method might assume that each year's $6,595 payment reflects a principal reduction of $5,000 ($25,000 ÷ 5 years) and interest expense of $1,595 ($6,595 − $5,000). Such an assumption is incorrect.

Note also that the compound interest method amounts are calculated such that the interest expense is always a constant *percentage* of the principal outstanding during the year (10 percent in the illustration). This means that Kinnear Company's interest expense on this loan is a true 10 percent in *every* year the loan is outstanding and that the true interest rate on the loan over its entire life is 10 percent. This is the same principle mentioned in the chapter text in the illustration of bond discount amortization. The interest expense, the sum of the cash interest costs and the discount amortization on Mason Corporation's 10 percent bonds issued for $851, will be a constant rate (12 percent) of the book value of the bonds for each of the 20 years they are outstanding, provided that the initial discount is amortized using the compound interest method.

Present Values and Assets

Accounting for interest-bearing receivables and similar monetary assets is the mirror image of accounting for monetary liabilities. For example, in the Kinnear Company loan illustration above, column *c* in Illustration 8–1 shows how much interest *revenue* Kinnear's lender should report each year on this loan. Similarly, column *e* shows the proper year-end valuation of the loan *receivable* asset on the lender's balance sheet. We can therefore conclude that the amount shown for a loan receivable or similar monetary asset is the present value of the future payments the asset holder will receive in satisfaction of the credit the asset holder has extended to the borrower (Kinnear Company in the illustration).

Calculating Bond Yields

The **yield** on a bond is the rate of return that the bondholder earns as a result of investing in the bond. The investor's return is made up of two parts: (1) the bond's interest payments and (2) any difference between what the investor paid for the bond

and the proceeds she or he receives upon selling the bond. This difference is referred to as the investor's **capital gain** or **loss** on the bond. Both the interest stream and future proceeds must be adjusted to present values to be comparable with the current market price.

Current yield

The yield to maturity on a bond (described below) should not be confused with the **current yield,** which is the annual interest payment divided by the current price.

Example

If at a given point in time Mason Corporation's 10 percent bonds were selling on a bond market at a price of 94 (i.e., $940), then the current yield at that time would be $100 ÷ $940 = 10.6 percent.

Yield to maturity

The yield on a bond actually is investor-specific because the capital gain (or loss) portion of the yield depends on what a specific investor paid for the bond and how much he or she sells it for. Thus, in calculating a bond's yield to maturity, it is assumed that (1) the bond will be purchased at the current market price and (2) the bond will then be held until maturity. Also, income tax effects are ignored in calculating bond yields. The **yield to maturity** of a bond is the discount rate that will make the sum of (1) the present value of the series of future interest payments plus (2) the present value of the bond redemption proceeds equal to the current *market price* of the bond.

Example

Exactly 10 years before their maturity, Mason Corporation 10 percent bonds have a market price of $887. Mason makes the $100 per year interest payments in a lump sum at year-end. The yield to maturity is the discount rate that will make the present value of the 10-year series of future $100 annual interest payments plus the present value of the $1,000 bond redemption proceeds 10 years hence equal to the bond's current market price of $887. This rate is 12 percent, which can be demonstrated as follows:

PV of interest stream ($100 * 5.650*)	$565
PV of redemption proceeds ($1,000 * 0.322*)	322
Sum of *PV*s (market price)	$887

*Ten-year/12 percent factors from Tables B and A, respectively.

This 12 percent yield to maturity is also called the **effective rate of interest** on the bond.

The calculation of yield to maturity can be a fairly cumbersome trial-and-error procedure if present value tables are used. This procedure is programmed into personal computers and relatively inexpensive business calculators, which can find the yield in a few seconds.

Bond prices

A similar calculation can be used to determine the "rational" market price of a bond, given current yields on bonds of similar quality (or risk).

Example

When Mason's 20-year, 10 percent bonds were *issued*, the prevailing market interest rate (yield) of similar bonds was 12 percent. The market price of Mason's bonds should be the price that would result in a yield of 12 percent to a Mason bondholder. This price will be the present value of the 20-year interest stream and the proceeds at maturity (20 years hence):

PV of interest stream ($100 * 7.469*)	$747
PV of redemption proceeds ($1,000 * 0.104*)	104
Market price for 12% yield	$851

*Twenty-year/12 percent factors from Tables B and A, respectively.

This $851 is the amount that was given in the text in the Mason Corporation example of 10 percent bonds that were issued at a discount because the prevailing market rate for comparable bonds was 12 percent.

Problems

Note: The problems may require the use of the present value tables found in the textbook Appendix. Handheld calculators may yield slightly different results due to the rounding of factors used in the tables.

Problem 8–1.

As a manager in charge of information processing for a fast-growing company, you realize that your current computer will only serve your needs for the next six years. At that time, you will replace it with a more efficient model, which at that time will cost an estimated $750,000. If the anticipated rate of interest is 8 percent for the next six years, how much money should you place in a special investment fund today so that you will have a balance of $750,000 six years from now? (Assume annual compounding and ignore taxes.)

Problem 8–2.

In 1991, a compact disc costs $14. If the price of CDs continues to increase at an annual compound rate of 4 percent, how much will a disc cost in 10 years? 25 years? 50 years?

Problem 8–3.

For each of the following situations, the present value concept should be applied:

1. Your wealthy aunt has just established a trust fund for you that will accumulate to a total of $100,000 in 12 years. Interest on the trust fund is compounded annually at a 8 percent interest rate. How much is in your trust fund today?
2. On January 1, you will purchase a new car. The automobile dealer will allow you to make increasing annual December 31 payments over the following four years. The amounts of these payments are: $4,000; $4,500; $5,000; $6,000. On this same January 1, your mother will lend you just enough money to enable you to meet these payments. Interest rates are expected to be 8 percent for the next five years. Assuming that you can earn annual compounding interest by depositing the loan from your mother in a bank, what is the minimum amount your mother must loan you to enable you to meet the car payments?
3. In settlement of a claim for your recently wrecked car, your insurance company will pay you either a lump sum today *or* three annual payments of $3,100 starting one year from now. Interest rates are expected to be 6 percent for the next five years. What is the least amount of money that you should be willing to accept today?

4. What is the present value of $3,000 a year to be received in years 3 through 11, assuming a 12 percent discount rate?

Problem 8–4.

Clearwater Company borrowed $164,440 with interest at 12 percent to be repaid in equal annual amounts at the end of each of the next six years. Prepare a loan amortization schedule (i.e., schedule showing principal outstanding after each annual payment) for the repayment of this obligation. Round to the nearest whole dollar.

Problem 8–5.

How would the following be disclosed on W&H Company's financial statements? The balance sheet was dated December 31, 1997, and the financial statements were issued February 14, 1998.

1. The Internal Revenue Service has claimed that W&H Company owes $450,000 of additional taxes for the first quarter of 1997; the claim was made in a suit filed on January 25, 1998. W&H Company's tax advisor estimates that the actual amount that will be paid is between $270,000 and $318,000.
2. On January 15, 1998, a fire destroyed one of W&H Company's warehouses. The warehouse had a net book value of $2,735,000 on the year-end balance sheet.
3. During 1997, a lawsuit was filed against W&H Company that claimed $750,000 in punitive damages and $400,000 for personal injury, which the plaintiff alleges occurred when using one of W&H Company's products. The suit was not settled as of December 31, 1998, but the company's attorney is convinced insurance would pay 75 percent of any award.
4. Several dissident shareholders had informed the company that they intended to sue the W&H board of directors for $5,000,000 because the board had rejected a merger offer proposed by a major supplier. The company has indemnified the directors; thus, any judgment against the directors would be paid by the company. W&H Company's attorney felt any such suit would be without merit.

Problem 8–6.

On April 1, 1998, the Texidor Company issued bonds with a face value of $250,000 for $260,000 cash. These bonds paid an annual interest of 8 percent. The interest was paid semiannually on April 1 and October 1. The bonds were to be repaid on April 1, 2008. Record the entries that should be made on the following dates: April 1, 1998; October 1, 1998; December 31, 1998; and April 1, 1999. (Assume for simplicity that the bond premium is to be amortized on a straight-line basis.)

Problem 8–7.

During the year, Shor Company issued several series of bonds. For each bond, record the journal entry that must be made upon the issuance date. (Round to the nearest dollar; a calculator is needed for 2 and 3.)

1. On March 15, a 20-year, $5,000 par value bond series with annual interest of 9 percent was issued. Three thousand of these bonds were issued at a price of 98. Interest is paid semiannually.

2. On January 20, a series of 15-year, $1,000 par value bonds with annual interest of 8 percent was issued at a price giving a current yield to maturity of 6.5 percent. Issuance costs for the 7,000 bonds issued were $250,000. Interest is paid annually.
3. On October 31, a 10-year, $1,000 par value bond series with annual interest of 7 percent was issued at a price to give a current yield to maturity of 8 percent. Interest on the 5,000 bonds issued is paid semiannually.

Problem 8–8.

On January 1, 1998, the Evans Company issued callable bonds with a face value of $5,000,000 for $4,750,000 cash. These bonds paid an annual interest of 10 percent payable semiannually on January 2 and July 1. The bonds were to be repaid on January 1, 2008. On January 1, 2003, the bonds were called and redeemed for $5,250,000. Make the journal entries for January 1, 1998, and January 1, 2003. (Assume that the bond discount was being written off on a straight-line basis. Ignore bond issuance and reacquisition costs.)

Problem 8–9.

On January 1, 1982, Jackson Corporation issued 4,000 bonds with face value of $1,000 each and a coupon rate of 5 percent. The bonds were purchased by investors at a price of $1,030. Jackson incurred costs of $80,000 in issuing the bonds. On January 1, 2002, which was five years prior to the bond's maturity date, Jackson redeemed the bonds at a call price of $1,080. Jackson also spent $75,000 in calling the bonds. What accounting entries should Jackson make to reflect this early redemption? (Assume that the bond premium was being written off on a straight-line basis.)

Cases

CASE 8–1 Norman Corporation (A)*

Until 1998, Norman Corporation, a young manufacturer of specialty consumer products, had not had its financial statements audited. It had, however, relied on the auditing firm of Kline & Burrows to prepare its income tax returns. Because it was considering borrowing on a long-term note and the lender surely would require audited statements, Norman decided to have its 1998 financial statements attested by Kline & Burrows.

Kline & Burrows assigned Jennifer Warshaw to do preliminary work on the engagement, under the direction of Allen Burrows. Norman's financial vice president had prepared the preliminary financial statements shown in Exhibit 1. In examining the information on which these financial statements were based, Ms. Warshaw discovered the facts listed below. She referred these to Mr. Burrows.

1. In 1998 a group of female employees sued the company, asserting that their salaries were unjustifiably lower than salaries of men doing comparable work. They asked for back pay of $250,000. A large number of similar suits had been filed in other companies, but results were extremely varied. Norman's outside counsel thought that the company probably would win the suit but pointed out that the decisions thus far were divided, and it was difficult to forecast the outcome. In any event, it was unlikely that the suit would come to trial in 1999. No provision for this loss had been made in the financial statements.

2. The company had a second lawsuit outstanding. It involved a customer who was injured by one of the company's products. The customer asked for $500,000 damages. Based on discussions with the customer's attorney, Norman's attorney believed that the

*© Professor Robert N. Anthony, Harvard Business School.

suit probably could be settled for $50,000. There was no guarantee of this, of course. On the other hand, if the suit went to trial, Norman might win it. Norman did not carry product liability insurance. Norman reported $50,000 as a Reserve for Contingencies, with a corresponding debit to Retained Earnings.

3. In 1998 plant maintenance expenditures were $44,000. Normally, plant maintenance expense was about $60,000 a year, and $60,000 had indeed been budgeted for 1998. Management decided, however, to economize in 1998, even though it was recognized that the amount would probably have to be made up in future years. In view of this, the estimated income statement included an item of $60,000 for plant maintenance expense, with an offsetting credit of $16,000 to a reserve account included as a noncurrent liability.

4. In early January 1998 the company issued a 5 percent $100,000 bond to one of its stockholders in return for $80,000 cash. The discount of $20,000 arose because the 5 percent interest rate was below the going interest rate at the time; the stockholder thought that this arrangement provided a personal income tax advantage as compared with an $80,000 bond at the market rate of interest. The company included the $20,000 discount as one of the components of the asset "other deferred charges" on the balance sheet and included the $100,000 as a noncurrent liability. When questioned about this treatment, the financial vice president said, "I know that other companies may record such a transaction differently, but after all we do owe $100,000. And anyway, what does it matter where the discount appears?"

5. The $20,000 bond discount was reduced by $784 in 1998, and Ms. Warshaw calculated that this was the correct amount of amortization. However, the $784 was included as an item of nonoperating expense on the income statement, rather than being charged directly to Retained Earnings.

6. In connection with the issuance of the $100,000 bond, the company had incurred legal fees amounting to $500. These costs were included in nonoperating expenses in the income statement because, according to the financial vice president, "issuing bonds is an unusual financial transaction for us, not a routine operating transaction."

7. On January 2, 1998, the company had leased a new Lincoln Town Car, valued at $35,000, to be used for various official company purposes. After three years of $13,581 annual year-end lease payments, title to the car would pass to Norman, which expected to use the car through at least year-end 2002. The $13,581 lease payment for 1998 was included in operating expenses in the income statement.

Although Mr. Burrows recognized that some of these transactions might affect the provision for income taxes, he decided not to consider the possible tax implications until after he had thought through the appropriate financial accounting treatment.

Questions

1. How should each of the above seven items be reported in the 1998 income statement and balance sheet?
2. (Optional—requires knowledge of Appendix material.) The bond described in item 4 above has a 15-year maturity date. What is the yield rate to the investor who paid $80,000 for this bond? Is the $784 discount amortization cited in item 5 indeed the correct first-year amount? (Assume that the $5,000 annual interest payment is made in a lump sum at year-end.)
3. (Optional) If the lease in item 7 is determined to be a capital lease, what is its effective interest rate?

EXHIBIT 1

NORMAN CORPORATION
Proposed Income Statement (condensed)
For the Year 1998

Net sales	$1,658,130
Cost of sales	1,071,690
Gross margin	586,440
Operating expenses	329,100
Operating income	257,340
Nonoperating income and expense (net)	9,360
Pretax income	247,980
Provision for income taxes	99,300
Net income	$ 148,680

Proposed Balance Sheet (condensed)
As of December 31,1998

Assets

Current assets:		
Cash and short-term investments		$ 107,026
Accounts receivable, gross	$262,904	
Less: Allowance for doubtful accounts	5,250	257,654
Inventories		376,006
Prepaid expenses		10,814
Total current assets		751,500
Plant and equipment, at cost	310,996	
Less: Accumulated depreciation	139,830	171,166
Goodwill		101,084
Development costs		124,648
Other deferred charges		166,878
Total assets		$1,315,276

Liabilities and Shareholders' Equity

Current liabilities	$ 421,770
Noncurrent liabilities	228,704
Total liabilities	650,474
Common stock (100,000 shares)	100,000
Capital surplus	82,500
Retained earnings	432,302
Reserve for contingencies	50,000
Total liabilities and shareholders' equity	$1,315,276

CASE 8–2 Stone Industries*

Larry Stone sat at his desk, feeling less than content. This was a direct result of Stone Industries' poor results for the third quarter of 19x2 and the even gloomier outlook for the final quarter.

Picking up *The Wall Street Journal*, Larry turned to the stock exchange listings. "Oh no!" he groaned. "We've slipped yet another 50 cents; that's $2 in the last month." Despondently he picked up his telephone and was just about to make a call when the name Stone caught his eye. This time it was in the bond listings. "That has lost us money as well," thought Larry, "They're only worth $750 each now, and we are going to have to pay $1,000 to redeem them."

For the rest of the morning Larry worried about the bond value. The more he thought about it, the less he felt it was Stone Industries that had lost. Suddenly Larry hit on a brilliant idea to generate additional income for Stone Industries. He hurriedly called in his assistant, Keith Edwards, and described his idea, which was to buy back all the bonds at $750, thus making $250 on each bond.

Keith returned to his desk and began to calculate the expected cash availability of Stone Industries as of late December, the date Larry wanted to repurchase the bonds. Very quickly it became obvious that $3 million was not available for the repurchase; in fact, $300,000 would have been difficult.

Walking into Larry's office, Keith informed him of the cash position and waited for the explosion. Instead, Larry smiled at his assistant and said, "I wondered how long it would take you to realize that; but I've already decided we can achieve my objective by selling some new bonds to buy back the old ones. In fact, we're going to sell $4 million worth so we can make that plant expansion I've been planning for the last two years."

Keith felt obliged to point out that the new issue would sell at the same price as the old issue. "No, no," said Larry. "I've already talked with the bank and they suggested we issue a 10% coupon bond issue[1] for late December, when the expected interest rate will still be 10%. That will net us $4,000,000 exactly. Funny thing was, they said that if we made them 12% bonds, we would get $4,498,000. That would mean an additional $498,000 profit, so, all in all, we could make over $1.5 million on that issue. That's not bad for one morning's work, is it?"

"Sounds OK to me," said Keith. "The only thing that's bothering me is that the figure on the balance sheet for the existing bonds is not $4,000,000 but about $3,749,000. There is a footnote, but that didn't help me understand the balance sheet number at all." (See Exhibit 1.) "I don't understand why it's not the full $4 million; after all, that's what we have to pay back, isn't it?"

"Let me have a look," said Larry. "Yes, you are right; I know these accountants have funny ways of doing things, but this really seems way out to me."

"Yes," said Keith, "and that's going to cut our profit down to $749,000 on the repurchase."

"Oh well, I guess we have to go with the 12% issue and make do with nearly $1.2 million in profit," chuckled Larry.

"Yes, I reckon we can get by on that," laughingly agreed Keith.

Questions

1. *a.* How would you explain to Larry and Keith the $3,749,000 on the balance sheet?
   b. How would you explain the $4,000,000 issue price of the 10% bond and the $4,498,000 issue price of the 12% bond? (No detailed calculations are necessary.)
2. *a.* If they choose to issue the 10% bonds, what amount would you treat as gain on the repurchase? Why?
   b. If they choose to issue the 12% bonds, what amount would you treat as gain? Why?
   c. How would you account for the purchase of the existing bonds and the issuance of the 12% bonds? Give the journal entries and the long-term debt portion of the balance sheets for Stone Industries as of December 31, 19x2, and 19x3. Assume that the old bonds were repurchased for $3,000,000 and the new bonds (12% coupon rate) were issued for $4,498,000 on January 1, 19x3. Ignore income taxes.
3. What will be the effect on the Cash account for the years 19x3, 19x4, and 19x5?

[1]Semiannual payments of $50 interest per $1,000 face value bond. Full payment of principal after 10 years.

EXHIBIT 1 **Stone Industries, Inc., Liabilities and Stockholders' Equity As of December 31 (thousands of dollars)**

	19x0	19x1
Current liabilities:		
Notes payable—banks	$ 0	$ 2,037
Accounts payable—trade	6,662	5,565
Accrued and other liabilities	1,811	1,894
Federal income and other taxes	2,122	2,010
Total current liabilities	10,595	11,506
Long-term debt (Note 1)	3,725	3,749
Shareholders' equity:		
Capital stock—par value $7.50 per share	9,305	9,305
Capital in excess of par value	7,464	7,464
Retained earnings	26,085	25,063
	42,854	41,832
Less: treasury stock	1,416	1,416
Total shareholders' equity	41,438	40,416
Total liabilities and shareholders' equity	$55,758	$55,671

Note 1: Long-term debt. On January 1, 19x0, the company issued 4,000 5% bonds payable that mature December 31, 19x9 (ten years after issuance). Interest of $25 per $1,000 bond is paid semiannually. The effective interest rate at issuance is 6%. As of December 31, 19x0, and 19x1, respectively, $275,000 and $251,000 of discount remained unamortized. These bonds are reflected on the accompanying balance sheets as follows:

	19x0	19x1
Bonds payable	$4,000	$4,000
Less: Unamortized discount	275	251
Bonds payable, net	$3,725	$3,749

CASE 8–3 Paul Murray*

Paul Murray would soon graduate from business school with his MBA. He had accepted a fine job offer. Paul's wife, Nancy, was an attorney with a local firm specializing in corporate law. Paul and Nancy were expecting their first child a few months after Paul's graduation. With the experience of paying for their own graduate educations fresh in their minds, Paul and Nancy recognized that they would have to plan early to accumulate enough money to send their child through four years of college.

Paul wanted to accumulate a fund equal to four times the first year's tuition, room, and board by the time his child entered college. Paul and Nancy assumed that these fees might increase, perhaps annually, through the four years of college. However, if they invested the funds appropriately, the investments would yield enough to cover the increase in fees through the four years of college.

Ideally, Paul and Nancy wanted their child to be able to choose among an array of public or private colleges with good academic reputations. A recent Newspaper article had indicated that the average tuition, room, and board at private four-year institutions was about $15,000. They felt that if their child were

*© Professor Robert N. Anthony, Harvard Business School.

entering college this coming fall, $18,000 per year for tuition, room, and board would provide the range of choice they sought.

Questions

1. In the recent past college fees had been increasing at about 8% per year. Because this rate of increase exceeded the general inflation rate, Paul and Nancy felt it would decline to a level closer to measures of general inflation, such as the Consumer Price Index. Thus, they decided to assume that college fees would increase 6% per year. At this rate, how much will one year of college cost 18 years from this fall?
2. Assume the Murrays want to accumulate a fund equal to four times the first year's tuition by the end of year 18. Assume further that they make a single payment into this fund at the end of each year, including the 18th year. How much would they have to contribute to this fund each year, assuming that their investments earn 6 percent per year?
3. How would their annual contributions differ if their investments earned 8 percent? 10 percent? 4 percent?

CASE 8–4 Joan Holtz (D)*

Having recently studied liabilities and the concept of present value, Joan Holtz was interested in discussing with the accounting professor several matters that had recently come to Joan's attention in the newspaper and on television. Each of these matters is described below.

1. On a late-night talk show a guest described having found a bond in the attic of his home in a small Missouri town. The bond had been issued in 1871 by the town, apparently to finance a municipal water system. The bond was payable to the bearer (whoever happened to have the bond in his or her possession), rather than to a specifically named individual. The face amount of the bond was $100, and the stated interest rate was 10 percent. According to the terms of the bond, it could be redeemed at any future time of the bearer's choosing for its face value plus accumulated *compound* interest. Joan was anxious to use the professor's calculator to determine what this bond was worth because only the amount "several million dollars" was mentioned during the show.

2. Joan also had read about "zero-coupon" bonds, which are bonds that pay no interest. Therefore, they are offered at a substantial discount from par value, since the investor's entire return is the difference between the discounted offering price and the par value. In particular, Joan had read that one company had issued eight-year, zero-coupon bonds at a price of $327 per $1,000 par value. Joan wanted to discuss the following with the accounting professor: (*a*) Was the yield on these bonds 15 percent, as Joan had calculated? (*b*) Assuming that bond discount amortization is tax deductible by the issuing corporation, that the issuer has a 40 percent income tax rate, and that for tax purposes a straight-line amortization of original discount is permissible, what is the effective or "true" after-tax interest rate to the issuer of this bond? And (*c*), if instead of issuing these zero-coupon bonds, the company had issued 15 percent coupon bonds with issue proceeds of $1,000 per bond (i.e., par value), what would the issuer's effective after-tax interest rate have been on these alternative bonds?

3. Joan had also read about a new financing gimmick called a "debt-for-equity swap." The technique works as follows: A company's bonds are currently trading on the New York Bond Exchange at a sizable discount because their coupon rate is well below current market interest rates. The company arranges with an investment banking firm to buy up these bonds on the open market. The company then issues new shares of common stock to the investment banker in exchange for the bonds (which are then retired). The shares issued have a value about 4 percent higher than the amount the investment banker has spent acquiring the bonds. Finally, the investment banker sells these shares on the open market, realizing the 4 percent profit. According to the article Joan had read, Exxon Corporation had swapped 1.4 million common shares valued at $43 million for bonds with a face value of $72 million, thereby realizing a

*© Professor Robert N. Anthony, Harvard Business School.

tax-free gain of $29 million. Joan wondered two things about such a transaction: (*a*) Why doesn't the company issue the shares directly and use the proceeds to buy back the bonds on the open market, instead of using an investment banker as an intermediary? And (*b*), should the gain on such a swap be treated as income for financial reporting purposes since, in a sense, the company has done nothing of substance to earn it?

4. Joan was aware that major airlines had "frequent flyer" plans, through which a traveler could earn upgrades from coach to first class, or tickets for free travel. Joan wondered how the airlines should account for upgrade and free travel coupons that had been issued to travelers but had not as yet been redeemed. Were they a liability? If so, how would the amount be determined, and what would be the offsetting debit?

5. Joan Holtz had noticed that many retailers, especially those dealing in high-ticket consumer goods like stereos, computers, and VCRs, offered to sell customers extended warranty contracts when they purchased the product. Joan had heard that retailers earned a much higher margin on an extended warranty contract than on the product it covered. For example, for a projection TV that cost $2,000, the customer might be offered the option to purchase a three-year warranty contract for $180. The margin on the projection TV might be 8 percent, or $160; the margin on the extended warranty contract might be 75 percent, or $135. Hence, when a customer purchased both the projection TV and the warranty, the margin on the total purchase was $295 or 13.5 percent. The proportion of customers purchasing extended warranty contracts depended on the product but, because consumers wanted to protect their investment in high-ticket items, the vast majority purchased extended warranty contracts, and the proportion was very predictable.

Joan Holtz wondered how to account for this combined purchase. One alternative, which she called Alternative A, was to treat the purchase of the projection TV and the purchase of the warranty contract completely separately. For the projection TV, revenue of $2,000 and cost of goods sold of $1,840 would be recognized immediately. For the three-year warranty, the payment received would be treated as deferred revenue, and one-third of the revenue ($60) and one-third of the cost of the service ($15) would be recognized each year for three years. Under this alternative, the accounting would reflect the immediate sale of a low-margin product followed by three years' sale of a high-margin service.

Joan Holtz was not satisfied with this alternative. She figured that the purchase of the projection TV and the service contract was really a single purchase, not two separate purchases, and thus the margin earned on the sale was really the 13.5 percent combined margin. Using this reasoning, Joan saw two alternative ways to treat the sale. First, all of the revenue from the sale of the projection TV and the three-year warranty ($2,180) as well as all of the cost associated with both ($1,885 = $1,840 + $45) could be recognized immediately (Alternative B). Retailers had reasonably accurate information regarding historical service costs to predict the $45 future service cost. However, if actual service costs differed from those estimated, a subsequent adjustment could be made.

Another approach (Alternative C) was to defer recognition of some proportion of the revenue until the warranty period expired. The proportion of the revenue to be recognized immediately would depend on the proportion of the costs associated with the product versus the proportion associated with the service contract. In this example, $1,840 ÷ $1,885 = 97.6 percent of the revenue (or $2,128) would be recognized immediately, with a cost of goods sold of $1,840, and a margin of 13.5 percent; similarly, $45 ÷ $1,885 = 2.4 percent of the revenue (or $52) would be deferred and recognized over the three-year life of the service contract, with an associated cost of $15 per year and a margin of 13.5 percent.

Joan was aware that the FASB had recently decided Alternative A was the appropriate accounting for extended warranty contracts, but she wondered from the point of view of management which alternative provided the most appropriate representation of the profitability of the sales of such retailers. She also wondered how the different choices would affect both the balance sheet and the income statement.

Notes				(S)

Chapter Thirteen

Financial Statement Analysis

In previous chapters the principal focus has been on conveying an understanding of the information contained in the three basic financial statements: the balance sheet, the income statement, and the cash flow statement. This chapter describes how this information is analyzed, both by parties outside the firm and by the company's own management.

All analyses of accounting data involve comparisons. An absolute statement, such as "Company X earned $1 million profit," is by itself not useful. It becomes useful only when the $1 million is compared with something else. The comparison may be quite imprecise and intuitive. For example, if we know that Company X is an industrial giant with tens of thousands of employees, we know intuitively that $1 million profit is a poor showing because we have built up in our minds the impression that such companies should earn much more than that. Or, the comparison may be much more formal, explicit, and precise, as is the case when the $1 million profit this year is compared with last year's profit. In either case, the process of comparison makes the number meaningful.

Business Objectives

Comparisons are essentially intended to shed light on how well a company is achieving its objectives. In order to decide the types of comparisons that are useful, we need first to consider what a business is all about—what its objectives are. Let us say as a generalization that *the overall objective of a business is to create value for its shareholders while maintaining a sound financial position*.[1] Implicit in this statement is the assumption that value creation can be measured. But if a company's equity securities are not publicly traded and hence the total market valuation of its equity securities cannot be calculated, then shareholder value creation cannot be directly measured. Nevertheless, profit and return on investment, which are indicators of value creation, can be measured in all cases. Of course, employee satisfaction, social responsibility, ethical considerations, and other nonmeasurable objectives are also important and must be taken into account whenever possible in appraising the overall success of an enterprise. The measurement of profit has already been discussed; below we briefly discuss return on investment and maintaining a sound financial position.

Return on Investment

Return on investment (ROI) is broadly defined as net income divided by investment.[2] The term *investment* is used in three different senses in financial analysis, thus giving three different ROI ratios: return on assets, return on owners' equity, and return on invested capital.

Return on assets (ROA) reflects how much the firm has earned on the investment of *all* the financial resources committed to the firm. Thus, the ROA measure is appropriate if one considers the investment in the firm to include current liabilities, long-term liabilities, and owners' equity, which are the total sources of funds invested in the assets. It is a useful measure if one wants to evaluate how well an enterprise has used its funds, without regard to the relative magnitudes of the sources of those funds

[1] This statement is not necessarily consistent with the *profit maximization* assumption often made in economics. The techniques in this chapter are equally applicable under a profit maximization assumption, however, so there is no point in arguing here whether the profit maximization assumption is valid and useful. Discussion of this point is deferred until Chapter 26.

[2] As described later net income may be subject to an adjustment for interest expense when calculating ROI.

(short-term creditors, long-term creditors, bondholders, and shareholders). The ROA ratio often is used by top management to evaluate individual business units within a multidivisional firm (e.g., the laundry equipment division of a household appliance firm). The division manager has significant influence over the assets used in the division but has little control over how those assets are financed because the division does not arrange its own loans, issue its own bonds or capital stock, or in many cases pay its own bills (current liabilities).

Return on owners' equity (ROE) reflects how much the firm has earned on the funds invested by the shareholders (either directly or through retained earnings). This ROE ratio is obviously of interest to present or prospective shareholders, and is also of concern to management because this measure is viewed as an important indicator of shareholder value creation. The ratio is not generally of interest to division managers, however, because they are primarily concerned with the efficient use of assets rather than with the relative roles of creditors and shareholders in financing those assets.

The third ROI ratio is **return on invested capital (ROIC).** Invested capital (also called **permanent capital**) is equal to noncurrent liabilities plus shareholders' equity and hence represents the funds entrusted to the firm for relatively long periods of time. ROIC focuses on the use of this permanent capital. It is presumed that the current liabilities will fluctuate more or less automatically with changes in current assets and that both will vary with the level of current operations.

Invested capital is also equal to working capital plus noncurrent assets. This equivalency points out that the owners and long-term creditors of the firm must in effect finance the plant and equipment, other long-term assets of the firm, and the portion of current assets not financed by current liabilities.

Some firms use ROIC to measure divisional performance, often labeling the ratio **return on capital employed (ROCE)** or **return on net assets (RONA).**[3] This measure is appropriate for those divisions whose managers have a significant influence on decisions regarding asset acquisitions, purchasing and production schedules (which determine inventory levels), credit policy (accounts receivable), and cash management and also on the level of their divisions' current liabilities.

Sound Financial Position

In addition to desiring a satisfactory return, investors expect their capital to be protected from more than a normal amount of business risk of capital loss. The return on the shareholders' investment could be increased if incremental investments in the assets for new projects were financed solely by liabilities, provided the return on these incremental investments exceeds the interest cost of the added debt. This "financial leverage" policy, however, would increase the shareholders' risk of losing their investment, because interest charges and principal repayments on the liabilities are fixed obligations and failure to make these payments could throw the company into bankruptcy. The degree of risk in a situation can be measured in part by the relative amounts of liabilities and owners' equity and by the funds available to discharge the liabilities. This analysis also involves the use of ratios.

Structure of the Analysis

Many ratios have been described in previous chapters. In this section these ratios and others are discussed in a sequence intended to facilitate an understanding of the total business. Thus, we shall assume here that one first looks at the firm's performance in

[3] In this context the companies are using *net assets* to mean assets less *current* liabilities, whereas the formal accounting meaning is assets minus *all* liabilities.

the broadest terms and then works down through various levels of detail in order to identify the significant factors that accounted for the overall results. If the values of the ratios used in this analysis are compared with their values for other time periods, this comparison is called a **longitudinal,** or **trend, analysis.**

Dozens of ratios can be computed from a single set of financial statements. Each analyst tends to have a set of favorite ratios, selected from those described below and probably from some we do not describe. (Certain ratios that are useful only in a specific industry, such as banking, are not described here.) Although we describe many frequently used ratios, the best analytical procedure is not to compute all of them mechanically but rather to decide first which ratios might be relevant in the particular type of investigation being made.

Illustration 13–1 shows some of the important ratios and other relationships that aid in the analysis of how satisfactory a company's performance was.[4] These ratios can be grouped into four categories: overall measures, profitability measures, tests of investment utilization, and tests of financial condition. The ratios calculated below are based on the Franklin Company's financial statements shown in Illustration 13–2. The Franklin Company's financial statements are typical of these companies with major market shares that produce and sell breakfast cereals and similar products.

Overall Measures

Return on Investment

As explained above, return on investment can be calculated in three different ways, depending on whether one views investment as being total assets, invested capital, or shareholders' equity. These ratios are calculated as follows:

$$\text{Return on assets} = \frac{\text{Net income} + \text{Interest}\,(1 - \text{Tax rate})}{\text{Total assets}}$$

$$= \frac{\$680.7 + \$33.3\,(.66)}{\$4{,}237.1} = 16.6 \text{ percent}$$

$$\text{Return on invested capital} = \frac{\text{Net income} + \text{Interest}\,(1 - \text{Tax rate})}{\text{Long-term liabilities} + \text{Shareholders' equity}}$$

$$= \frac{\$680.7 + \$33.3\,(.66)}{\$1{,}309.1 + \$1{,}713.4} = 23.2 \text{ percent}$$

$$\text{Return on shareholders' equity} = \frac{\text{Net income}}{\text{Shareholders' equity}} = \frac{\$680.7}{\$1{,}713.4} = 39.7 \text{ percent}$$

Treatment of interest

These formulas immediately raise a question: Why is aftertax interest expense added back to net income when figuring ROA or ROIC but not when calculating ROE? The answer is that in calculating these returns the analyst is attempting to determine how well management has used a pool of capital, whether that pool includes all liabilities plus shareholders' equity (which equal total assets), invested capital, or just shareholders' equity. The analyst can then compare these returns with the cost of using the

[4] Diagrams analogous to Illustration 13–1 can be drawn to show return on invested capital or return on assets, as alternative ROI measures.

Anthony–Hawkins–Merchant:

ILLUSTRATION 13–2

FRANKLIN COMPANY AND SUBSIDIARIES
Consolidated Balance Sheet
At December 31,

Dollars in millions	1997	1996
Current assets		
Cash and temporary investments	$ 98.1	$ 126.3
Accounts receivable, less allowances of $6.0 and $6.2	536.8	519.1
Inventories	403.1	416.4
Deferred income taxes	85.5	66.2
Prepaid expenses	121.6	108.6
Total current assets	1,245.1	1,236.6
Property		
Land	40.6	40.5
Buildings	1,065.7	1,021.2
Machinery and equipment	2,857.6	2,629.4
Construction in progress	308.6	302.6
Accumulated depreciation	(1,504.1)	(1,331.0)
Property, net	2,768.4	2,662.7
Intangible assets	59.1	53.3
Other assets	1,64.5	62.4
Total assets	$4,237.1	$4,015.0
Current liabilities		
Current maturities of long-term debt	$ 1.5	$ 1.9
Notes payable	386.7	210.0
Accounts payable	308.8	313.8
Accrued liabilities:		
Income taxes	65.9	104.1
Salaries and wages	76.5	78.0
Advertising and promotion	233.8	228.0
Other	141.4	135.2
Total current liabilities	1,214.6	1,071.0
Long-term debt	521.6	314.9
Nonpension postretirement benefits	450.9	407.6
Deferred income taxes	188.9	184.6
Other liabilities	147.7	91.7
Shareholders' equity		
Common stock, $.25 par value	77.6	77.5
Capital in excess of par value	72.0	69.2
Retained earnings	3,409.4	3,033.9
Treasury stock, at cost	(1,653.1)	(1,105.0)
Currency translation and pension adjustments	(192.5)	(130.4)
Total shareholders' equity	1,713.4	1,945.2
Total liabilities and shareholders' equity	$4,237.1	$4,015.0

ILLUSTRATION 13–2 (CONTINUED)

FRANKLIN COMPANY AND SUBSIDIARIES
Consolidated Earnings and Retained Earnings
Year ended December 31,

(Dollars in millions, except per share amounts)	1997	1996	1995
Net sales	**$6,295.4**	$6,190.6	$5,786.6
Cost of goods sold	**2,989.0**	2,987.7	2,828.7
Gross margin	**3,306.4**	3,202.9	2,957.9
Selling and administrative expense	**2,237.5**	2,140.1	1,930.0
Other expenses (revenue)	**1.5**	(36.8)	(14.6)
Interest expense	**33.3**	29.2	58.3
Earnings before income taxes and extraordinary item	**1,034.1**	1,070.4	984.2
Income taxes	**353.4**	387.6	378.2
Earnings before extraordinary item	**680.7**	682.8	606.0
Extraordinary item (net of income tax benefit of 144.6)		(251.6)	
Net income—$2.94, $1.81, $2.51 a share	**680.7**	431.2	606.0
Retained earnings, beginning of year	**3,033.9**	2,889.1	2,542.4
Dividends paid — $1.32, $1.20, $1.075 a share	**(305.2)**	(286.4)	(259.3)
Retained earnings, end of year	**$3,409.4**	$3,033.9	$2,889.1

Consolidated Statement of Cash Flows [Condensed]
Year ended December 31,

(Dollars in Millions)	1997	1996	1995
Operating activities			
Net income	**$ 680.7**	$ 431.2	$ 606.0
Depreciation	**265.2**	231.5	222.8
Net amount of other adjustments for noncash items included in calculation of net earnings	**(145.7)**	79.2	105.6
Cash provided by operating activities	**800.2**	741.9	934.4
Investing activities			
Additions to properties	**(449.7)**	(473.6)	(333.5)
Property disposals	**114.6**	133.8	25.2
Other	**(25.1)**	(10.6)	(11.6)
Cash used by investing activities	**(360.2)**	(350.4)	(319.9)
Financing activities			
New borrowings	**676.5**	504.0	186.4
Reduction of borrowings	**(293.2)**	(440.9)	(400.0)
Issuance of common stock	**2.9**	13.4	17.7
Purchase of treasury stock	**(548.1)**	(224.1)	(83.6)
Cash dividends	**(305.2)**	(286.4)	(259.3)
Other	**2.9**	11.4	1.1

(*continued*)

ILLUSTRATION 13–2 (CONCLUDED)

Cash used by financing activities	**(464.2)**	(422.6)	(537.7)
Effect of exchange rate changes on cash	**(4.0)**	(20.6)	0.7
Increase (decrease) in cash and temporary investments	**(28.2)**	(51.7)	77.5
Cash and temporary investments at beginning of year	**126.3**	178.0	100.5
Cash and temporary investments at end of year	**$ 98.1**	$ 126.3	$ 178.0

Notes:

1. Earnings per share amounts are based on the weighted-average number of shares outstanding—231.5, 238.9, and 241.2 million shares respectively for 1997, 1996, and 1995.
2. The market price of Franklin Company stock on December 31, 1997, 1996, and 1995 was respectively $65 3/8, $67, and $56 3/4.

pools of funds. However, in arriving at the net income amount, *part* of the cost of capital—the interest on the debt portion—was subtracted as an expense. The resulting net income therefore understates the earnings generated by using either the total equities pool or the invested capital pool.

Note that the amount of the adjustment is the *aftertax* interest cost of the firm. Because interest expense is tax deductible, the aftertax interest cost is the interest expense multiplied by the complement of the tax rate. Franklin's tax rate in 1997 was 34 percent ($353.4 ÷ $1,034.1).

On the other hand, in determining the return on the shareholders' investment, interest expense *should* be included in the earnings calculation, since the earnings accruing to the shareholders (i.e., net income) must reflect the fact that payments (in the form of interest) have been made to the creditors for the use of their funds.

Thus, the returns calculated using the above equations reflect the earnings generated by using a pool of funds, *excluding* the cost of the funds in the pool. This is the conceptually correct way to calculate the ratios. However, because making the interest adjustments adds complexity, some analysts ignore them in practice and simply use net income as the numerator in all three of the ROI ratios.

Average investment

In many situations a more representative return percentage is arrived at by using the *average* investment during the period rather than the year-end investment. Ordinarily, the average investment is found by taking one-half the sum of the beginning and ending investment. If, however, a significant amount of new debt or equity funds was obtained near the end of the year, using the beginning-of-year amounts rather than the simple average would be more meaningful. Ending balance sheet amounts have been used in the examples so that they can be easily traced back to Illustration 13–2.

Tangible assets

ROA is sometimes calculated on the basis of tangible assets rather than total assets—goodwill and other intangible assets are excluded. When so calculated, the return is clearly labeled **return on tangible assets.** A similar approach can be used for calculating ROIC or ROE.

Liabilities

The calculations above treated deferred income taxes as a liability. A few analysts include deferred taxes as well as minority interest as a component of owners' equity. (Franklin has no minority interest.) Some analysts include as a part of invested capi-

tal any short-term notes and long-term debt maturing in one year, even though these are classified as current liabilities. These analysts maintain that debt capital includes all funds supplied by investors who expect a return in the form of interest. In any event the description of the ratio should make clear which approach is used.

Investment Turnover and Profit Margin

Return on investment is equal to net income divided by investment. As Illustration 13–1 suggests, ROI can also be looked at as the combined effect of two factors: profitability and investment utilization. A ratio can be associated with each of these factors. Algebraically, it is clear that the following is in fact an equality:

$$\frac{\text{Net income}}{\text{Investment}} = \frac{\text{Net income}}{\text{Sales}} * \frac{\text{Sales}}{\text{Investment}}$$

Each of the two terms on the right-hand side of the equation has meaning of its own. Net income divided by sales is called **profit margin** or **return on sales (ROS);** it is an overall ratio for profitability. Sales divided by investment is called **investment turnover;** it is an overall ratio for investment utilization. Investment turnover is called, more specifically, **asset turnover, invested capital turnover,** or **equity turnover,** depending on which definition of investment is being used.

These relationships suggest the two fundamental ways that the ROI can be improved. First, it can be improved by increasing the profit margin—by earning more profit per dollar of sales. Second, it can be improved by increasing the investment turnover. In turn, the investment turnover can be increased in either of two ways: (1) by generating more sales volume with the same amount of investment or (2) by reducing the amount of investment required for a given level of sales volume.

As shown in Illustration 13–1, these two factors can be further decomposed into elements that can be looked at individually. The point of this decomposition is that no one manager can significantly influence the overall ROI measure, simply because an overall measure reflects the combined effects of a number of factors. However, the items on the left side of Illustration 13–1 do correspond with the responsibilities of individual managers. For example, the manager who is responsible for the firm's credit policies and procedures influences the level of accounts receivable. Thus, the outside analyst, as well as the firm's management, can use the ROI chart to identify potential problem areas in the business, as described in the separate sections on profitability ratios and investment utilization ratios.

The following equation is also often used by outside analysts and management to understand how a company achieved its ROI. Franklin's 1997 financial statement data is used to illustrate the equation's application.

Return on shareholders' equity	=	Pretax margin percentage	*	Asset turnover ratio	*	Financial leverage ratio	*	Tax retention rate
$\frac{\text{Net income}}{\text{Shareholders' equity}}$	=	$\frac{\text{Pretax profit}}{\text{Sales revenues}}$	*	$\frac{\text{Sales revenues}}{\text{Total assets}}$	*	$\frac{\text{Total Assets}}{\text{Shareholders' equity}}$	*	(1–Tax rate)
$\frac{\$680.7}{\$1{,}713.4}$	=	$\frac{\$1{,}034.1}{\$6{,}295.4}$	*	$\frac{\$6{,}295.4}{\$4{,}237.1}$	*	$\frac{\$4{,}237.1}{\$1{,}713.4}$	*	(1–.34)
.397	=	.164	*	1.49	*	2.47	*	.66

The above analysis shows that Franklin's 1997 39.7 percent return on shareholders' equity was achieved by a combination of operating results (pretax margin and

asset turnover) and financial policies (financial leverage and tax retention rate). The tax retention rate is the percentage of pretax income that flows down to net income.

Price/Earnings Ratio

The broadest and most widely used overall measure of performance is the **price/earnings,** or **P/E, ratio:**

$$\frac{\text{Market price per share}}{\text{Net income per share}} = \frac{\$65.375}{\$2.94} = 22 \text{ times}$$

This measure involves an amount not directly controlled by the company: the market price of its common stock. Thus, the P/E ratio is the best indicator of how *investors* judge the firm's future performance.[5] (We say *future* performance because, conceptually, the market price indicates shareholders' expectations about future returns—dividends and share price increases—discounted to a present value at a rate reflecting the riskiness of these returns.) Management, of course, is interested in this market appraisal, and a decline in the company's P/E ratio not explainable by a general decline in stock market prices is cause for concern. Also, management compares its P/E ratio with those of similar companies to determine the marketplace's relative rankings of the firms.

P/E ratios for industries vary, reflecting differing expectations about the relative rate of *growth in earnings* in those industries. At times, the P/E ratios for virtually all companies decline because predictions of general economic conditions suggest that corporate profits will decrease and/or interest rates will rise.

Franklin does not have a complex capital structure (i.e., it does not have potentially dilutive securities). Therefore, the net income per share figure used to compute its P/E ratio is its basic earnings per share. If Franklin's capital structure included potentially dilutive securities, its diluted earnings per share would typically be used to compute its P/E ratio. Often one-time charges and credits to income are excluded from the earnings per share figure used to compute P/E ratios on the grounds that the market price of a stock reflects investors' expectations about the company's future earnings power. (Franklin's 1996 extraordinary item charge is an example of a one-time item.) Since different earnings per share figures for the same company can be used to compute a company's P/E ratio, users of P/E ratios should always check to see which earnings per share figure is being used.

Profitability Ratios

Each of the items on the income statement in Illustration 13–2 can be expressed as a percentage of sales. Examining relationships within a statement in this way is called a **vertical analysis.** As noted in Chapter 3, net sales is usually taken as 100 percent. Of the percentages that can be calculated, gross margin ($3,306.4 ÷ $6,295.4 = 52.5 percent), income before taxes ($1,034.1 ÷ $6,295.4 = 16.4 percent), and net income ($680.7 ÷ $6,295.4 = 10.8 percent) are all important.[6] Retailing firms tend to pay particular attention to their gross margin percentage. A discount retailing strategy, for

[5] Major newspapers such as *The Wall Street Journal* print firms' P/E ratios along with the firm's daily stock quotations. These data are also available in many sites on the Internet.

[6] Financial analysts often exclude one-time items from income when calculating profitability ratios. In addition to extraordinary items, one-time items include restructuring changes, inventory write-downs, asset impairments, contingency losses and gains, and gains and losses on asset dispositions.

example, is based (in part) on the premise that selling goods at a lower gross margin percentage will generate more volume so that *total* gross margin will compare favorably with that of firms having a larger gross margin percentage but lower sales volume and lower asset turnover.

Profit Margin

As mentioned previously, the profit margin is a measure of overall profitability. Some people treat this measure as if it were the most important single measure of performance. Critics of the social performance of a company or an industry, for example, may base their criticism on its relatively high profit margin. This is erroneous. Net income, considered either by itself or as a percentage of sales, does not take into account the investment employed to produce that income. For example, utilities have a relatively high ROS, but their ROE is below average, reflecting the very large fixed asset base that a utility must finance. On the other hand, supermarkets have a low ROS, but their ROE is above average. This reflects the facts that (1) supermarkets do not have any accounts receivable to finance, (2) their inventory turnover is very rapid, and (3) many rent their premises, which therefore do not appear as balance sheet assets; that is, their investment turnover is high.

Illustration 13–1 suggests the things top management needs to examine if the profit margin is unsatisfactory. Perhaps dollar sales volume has declined, either because fewer items are being sold or because they are being sold at lower prices, or both. Perhaps the gross margin is being squeezed because cost of sales increases cannot be passed along to customers in the form of higher prices. Cost of sales may be up because of production inefficiencies. Perhaps other expenses have gotten out of control: Maybe management has gotten lax about administrative expenses or is spending more for marketing costs than the sales results would seem to justify.

Common-Size Financial Statements

Common-size financial statements are often used to obtain answers to the question raised in the above paragraph. A common-size income statement expresses each item on the income statement as a percentage of net sales. A common-size balance sheet uses total assets as the base. To identify changes in a company's operating results, investment mix and sources of capital common-size financial statements for two or more periods are prepared and the percentage figures for each line item are compared. For example, a comparison of Franklin's 1995–97 common-size income statements would show the company's selling and administrative expense as a percentage of net sales has risen from 33.3 percent in 1995 to 35.5 percent in 1997. The reason for this 2.2-percentage-point increase should be examined.

Investment Utilization Ratios

Ratios that deal with the lower branch of Illustration 13–1 represent tests of *investment utilization*. Whereas profitability measures focus on income statement figures, utilization tests involve both balance sheet and income statement amounts. We have already looked at the all-encompassing utilization ratio, return on investment (ROI). In this section less broad measures will be examined.

Investment Turnover

As with other ratios involving investment, three turnover ratios can be calculated:

$$\text{Asset turnover} = \frac{\text{Sales Revenue}}{\text{Total assets}} = \frac{\$6{,}295.4}{\$4{,}237.1} = 1.5 \text{ times}$$

$$\text{Invested capital turnover} = \frac{\text{Sales revenue}}{\text{Invested capital}} = \frac{\$6{,}295.4}{\$1{,}713.4} = 2.1 \text{ times}$$

$$\text{Equity turnover} = \frac{\text{Sales revenue}}{\text{Shareholders' equity}} = \frac{\$6{,}295.4}{\$1{,}713.4} = 3.7 \text{ times}$$

Because of industry disparities in investment turnover, judgments about the adequacy of a firm's turnover must be made carefully. ROI is profit margin multiplied by investment turnover. Thus, if two firms have different turnover ratios, the firm with the lower turnover will need to earn a higher profit margin to achieve a given level of ROI, as is the case with utilities. Comparing the turnover ratios of two similar companies in the same industry is valid, of course, and may help explain why one achieves a higher ROI than the other. Similarly, comparing profit margins of companies in the same industry is valid, provided the companies are similar enough that the implicit assumption of their having equal investment turnover is valid. (Gap and Kmart are in the same industry—nonfood retailing—but it is not valid to compare them solely on the basis of either profit margin or investment turnover, because their different marketing strategies should cause these ratios to differ.)

Capital Intensity

Several investment utilization ratios that are less encompassing than investment turnover can be calculated. One of these is the **capital intensity ratio:**

$$\text{Capital intensity} = \frac{\text{Sales revenue}}{\text{Property, plant, and equipment}} = \frac{\$6{,}295.4}{\$2{,}768.4} = 2.3 \text{ times}$$

The capital intensity ratio (sometimes called **fixed asset turnover**) focuses only on the property, plant, and equipment item. Companies that have a high ratio of plant to sales revenue, such as steel companies, are particularly vulnerable to cyclical fluctuations in business activity. Because the costs associated with this plant are relatively fixed, when these companies' sales revenue drops in a recession, they are unable to cover these costs. Conversely, a company that is not capital intensive, as is the case with many service businesses, can reduce its costs as its revenues decline and therefore has less difficulty in a recession.

Working Capital Measures

Management is interested in the velocity with which funds move through the various current accounts. Ratios for days' cash, days' receivables, days' inventory, and inventory turnover (described near the ends of Chapters 5 and 6) provide the information on these flows. The reader can review the calculations of these ratios by referring to Illustration 13–1.

Working capital turnover

In addition to the ratios that focus on specific working capital items (see below) it is often useful to look at the turnover of working capital (current assets − current liabilities) as a whole:

$$\text{Working capital turnover} = \frac{\text{Sales revenue}}{\text{Working capital}} = \frac{\$6{,}295.4}{\$30.5} = 206 \text{ times}$$

Some analysts prefer to look at working capital as a percentage of sales. For Franklin, this is 0.5 percent. Since this is simply the inverse of the working capital turnover ratio, it conveys the same information but in a slightly different way.

Days' payables

An analogous ratio can be calculated for days' payables:

$$\text{Days' payables} = \frac{\text{Operating payables}}{\text{Pretax cash expenses} \div 365}$$

Pretax cash expenses can be approximated by adding all expenses except taxes and then subtracting noncash expenses such as depreciation. (This is the same procedure as for the days' cash ratio, except that taxes usually are included there.) Operating payables include accounts payable, accrued wages and payroll taxes, and other items that represent deferred payments for operating expenses. A note payable would be included if its proceeds financed accounts receivable or inventories; otherwise, short-term debt is excluded. For Franklin, the ratio is:

$$\text{Days' payables} = \frac{\$308.8 + \$76.5 + \$233.8 + \$141.4}{\$4{,}996.1 \div 365} = 56 \text{ days}$$

Cash conversion cycle

Days' receivables, days' inventory, and days' payables can be combined to determine the **cash conversion cycle.** This is the length of time for cash to complete the operating cycle shown in Illustration 5–1, after incorporating payment deferrals. It is calculated as follows (using numbers for Franklin):

	Days
Receivables conversion period (days' receivables)	31
Plus: Inventory conversion period (days' inventory)	49
Operating cycle	80
Less: Payment deferral period (days' payables)	56
Cash conversion cycle	24

The result of this calculation is a measure of liquidity (discussed in the next section); it also indicates the time interval for which additional short-term financing might be needed to support a spurt in sales.

Each of these measures of turnover gives an indication of how well the firm is managing some particular subset of its assets. The investment turnover figures permit a comparison of similar firms' investment bases vis-à-vis the sales generated by those firms. The days' cash, receivables, and inventory ratios help identify whether a firm is tying up excessive amounts of funds in current assets. Excess levels of assets hurt performance because they require additional capital, and there is a cost associated with this capital. To the extent that debt could be reduced by cutting the level of assets, interest costs would fall, increasing net income, and the investment base would decrease, thus having a doubly favorable impact on ROI.

Financial Condition Ratios

Liquidity and Solvency

Whereas the ratios previously discussed are indicators of the firm's success in marketing management and operations management, financial condition ratios are related to the firm's financial management. Financial condition ratios look at the company's liquidity and solvency. **Liquidity** refers to the company's ability to meet its current obligations.

Thus, liquidity tests focus on the size of, and relationships between, current liabilities and current assets. (Current assets presumably will be converted into cash in order to pay the current liabilities.) **Solvency,** on the other hand, pertains to the company's ability to meet the interest costs and repayment schedules associated with its long-term obligations.

Most of the ratios used for this purpose have been discussed in previous chapters: current ratio, acid-test (or quick) ratio, debt/equity ratio, debt/capitalization ratio, times interest earned, and cash generated by operations/total debt. Also, the cash conversion cycle, described previously, is related to liquidity.

Dividend Policy

Two other ratios are related to another aspect of financial management: dividend policy. These ratios are the **dividend yield** and **dividend payout:**

$$\text{Dividend yield} = \frac{\text{Dividends per share}}{\text{Market price per share}} = \frac{\$1.32}{\$65.375} = 2.0 \text{ percent}$$

$$\text{Dividend payout} = \frac{\text{Dividends}}{\text{Net income}} = \frac{\$305.2}{\$680.7} = 45 \text{ percent}$$

A company must reach decisions as to how its growth should be financed. Each company has a target debt/equity ratio it attempts to maintain. To do so, it must raise a certain fraction of additional capital from debt sources and the remainder from equity sources. Equity capital can be raised either by issuing new stock or by retaining earnings. If a company finds it expensive to raise new equity capital directly from investors, it can obtain its additional equity capital by retaining earnings. The more of the net income it retains in this fashion, the less it can pay out to shareholders as dividends. Of course, this applies only to a profitable company. If a company is in financial difficulty, it simply may not be able to afford to pay dividends.

The dividend yield on stocks is often compared with the yield (interest) on bonds, but such a comparison is not valid. The earnings of bondholders consist entirely of their interest (adjusted for amortization of discount or premium), whereas the earnings of shareholders consist not only of their dividends but also of retained earnings. Although shareholders do not receive retained earnings, the fact that part of the net income has been retained in the business (and presumably invested in income-producing assets) should enhance future earnings per share and dividends. This, in turn, should increase the market value of the shareholders' investment.

The ratios described in this book are summarized in Illustration 13–3.

Growth Measures

Analysts are also interested in the growth rate of certain key items such as sales, net income, and earnings per share. These rates are often compared with the rate of inflation to see if the company is keeping pace with inflation or experiencing real growth. Common growth rate calculations include average growth rate and compound growth rate. Both involve looking at information over a period of years, typically 5 or 10. The calculations will be illustrated using Franklin's 1992–97 sales data (expressed in millions):

	1997	1996	1995	1994	1993	1992
Net sales.....	$6,295	$6,191	$5,787	$5,181	$4,652	$4,349

ILLUSTRATION 13–3 Summary of Ratios

Name of Ratio	Formula	State Results as	Discussed in Chapter
Overall performance measures:			
1. Price/earnings ratio	$\frac{\text{Market price per share}}{\text{Net income per share}}$	Times	13
2. Return on assets	$\frac{\text{Net income} + \text{Interest}(1 - \text{Tax rate})}{\text{Total assets}}$	Percent	13
3. Return on invested capital	$\frac{\text{Net income} + \text{Interest}(1 - \text{Tax rate})}{\text{Long-term liabilities} + \text{Shareholders' equity}}$	Percent	13
4. Return on shareholders' equity	$\frac{\text{Net income}}{\text{Shareholders' equity}}$	Percent	13
Profitability measures:			
5. Gross margin percentage	$\frac{\text{Gross margin}}{\text{Net sales revenues}}$	Percent	6,13
6. Profit margin	$\frac{\text{Net income}}{\text{Net sales revenues}}$	Percent	13
7. Earnings per share	$\frac{\text{Net income}}{\text{No. shares outstanding}}$	Dollars	9
Tests of investment utilization:			
8. Asset turnover	$\frac{\text{Sales revenues}}{\text{Total assets}}$	Times	13
9. Invested capital turnover	$\frac{\text{Sales revenues}}{\text{Long-term liabilities} + \text{Shareholders' equity}}$	Times	13
10. Equity turnover	$\frac{\text{Sales revenues}}{\text{Shareholders' equity}}$	Times	13
11. Capital intensity	$\frac{\text{Sales revenues}}{\text{Property, plant, and equipment}}$	Times	13
12. Days' cash	$\frac{\text{Cash}}{\text{Cash expenses} \div 365}$	Days	5
13. Days' receivables (or collection period)	$\frac{\text{Accounts receivable}}{\text{Sales} \div 365}$	Days	5
14. Days' inventory	$\frac{\text{Inventory}}{\text{Cost of sales} \div 365}$	Days	6
15. Inventory turnover	$\frac{\text{Cost of sales}}{\text{Inventory}}$	Times	6
16. Working capital turnover	$\frac{\text{Sales revenues}}{\text{Working capital}}$	Times	13
17. Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	Ratio	5
18. Acid-test (quick) ratio	$\frac{\text{Monetary current assets}}{\text{Current liabilities}}$	Ratio	5

(*continued*)

ILLUSTRATION 13–3 Summary of Ratios *(concluded)*

Name of Ratio	Formula	State Results as	Discussed in Chapter
Tests of financial condition:			
19. Financial leverage ratio	$\frac{\text{Assets}}{\text{Shareholders equity}}$	Times	13
20. Debt/equity ratio	$\frac{\text{Long-term liabilities}}{\text{Shareholders' equity}}$	Percent	8
	or $\frac{\text{Total liabilities}}{\text{Shareholders' equity}}$	Percent	8
21. Debt/capitalization	$\frac{\text{Long-term liabilities}}{\text{Long-term liabilities + Shareholders' equity}}$	Percent	8
22. Times interest earned	$\frac{\text{Pretax operating profit + Interest}}{\text{Interest}}$	Times	9
23. Cash flow/debt	$\frac{\text{Cash generated by operations}}{\text{Total debt}}$	Percent	11
Tests of dividend policy:			
24. Dividend yield	$\frac{\text{Dividends per share}}{\text{Market price per share}}$	Percent	13
25. Dividend payout	$\frac{\text{Dividends}}{\text{Net income}}$	Percent	13

Notes:

1. *Averaging*. When one term of a formula is an income statement item and the other term is a balance sheet item, it is often preferable to use the average of the beginning and ending balance sheet amounts rather than the ending balance sheet amounts.
2. *Tangible assets*. Ratios involving noncurrent assets or total assets often exclude intangible assets such as goodwill and trademarks. When this is done, the word *tangible* is usually used in identifying the ratio.
3. *Debt*. Debt ratios may exclude accounts payable, accrued liabilities, deferred income taxes and other noninterest-bearing liabilities. The reader often has no way of knowing whether this has been done, however. Conceptually, *debt* means interest-bearing liabilities.
4. *Coverage ratios*. Times interest earned and other coverage ratios can be calculated using pretax cash generated by operations instead of pretax operating profit.

To calculate **average growth rate,** growth is first calculated on a year-to-year basis. From 1992 to 1993, this was 6.97 percent ($4,652 ÷ $4,349 − 100 percent); from 1993 to 1994, 11.37 percent; and so on. These five year-to-year rates are then averaged; the result is an average growth rate in sales of 7.74 percent.

The **compound growth rate** calculation uses the compound interest/present value concepts described in the appendix to Chapter 8. In this instance the question is: At what rate would $4,349 have to grow to reach the amount of $6,295 after five years? (More formally: What rate of return gives a present value of $4,349 to a future value of $6,295 in five years?) Using Table A at the end of this book, this rate can be approximated as almost 8 percent (since $4,349 ÷ $6,295 = 0.691, which falls near the

0.681 factor for 8 percent on the five-year line); using a preprogrammed calculator, the rate can be calculated as 7.68 percent.

In some cases, the compound growth rate method can give misleading results because either the base year number (here, for 1992) or the final year number (for 1997) is abnormally high or low. In such a case, the average growth rate method is preferable.

The **implied growth rate equation** is used to project a company's *potential* to grow its sales and profits. The implied growth rate equation is:

$$\text{Implied growth rate} = \text{Return on shareholders' equity} * \text{Profit retention rate}$$

$$\text{Implied growth rate} = \frac{\text{Net income}}{\text{Shareholders' equity}} * (1 - \text{Dividend payout})$$

$$21.8 \text{ percent} = .397 * (1 - .45)$$

The implied growth rate equation indicates that Franklin has the potential to grow its sales profits 21.8 percent per year without an injection of new equity capital if it achieves a 39.7 percent return on equity and maintains a dividend payout of 45 percent. It is important to note that the implied growth rate equation does not predict that Franklin will grow at a 21.8 percent rate. The company's actual growth rate will depend on many factors, such as product market conditions.[7]

Making Comparisons

Difficulties

An approximately accurate report of actual performance can be obtained from a company's financial statements. Finding an adequate standard with which these actual amounts can be compared, however, is often difficult. Some of the problems are described below. Financial statement analysis is used as an example, but the same problems arise in analyzing other types of quantitative data.

Deciding on the proper basis for comparison

In general, a youth who can high jump six feet is a better high jumper than a youth who can only jump five feet. In business, however, there are situations in which one cannot tell whether a higher number represents better performance than a lower number.

A high current ratio is not necessarily better than a low current ratio. For example, the current ratio for Franklin on December 31, 1997, was 1.03 to 1. Suppose that on January 2, 1998, Franklin borrowed $300 million of long-term debt and used these funds to pay down accounts payable. A balance sheet prepared subsequent to this transaction would show $1,245 million of current assets and $915 million of current liabilities, and the current ratio would accordingly be 1.36 to 1, 1 1/3 times the ratio two days earlier. Yet, one could scarcely say that a company that had increased its long-term debt in order to pay current liabilities was in an improved financial condition.

In some comparisons the direction of change that represents "better" is reasonably apparent. Generally, a high profit margin is better than a low one, and a high ROI is better than a low one. Even these statements have qualifications, however. A high return may indicate that the company is only skimming the cream off the market; a more intensive marketing effort now could lead to a more sustained growth in the future.

[7] A company's implied growth rate is often used in dividend and net income–based equity valuation models to normalize dividend and net income growth for future periods beyond five years.

Many standards can usefully be thought of as a *quality range* rather than as a single number. Actual performance that goes outside the range in *either* direction is an indication of an unsatisfactory situation. For a certain company the current ratio may be considered satisfactory if it is within the range 1.5:1 to 2.5:1. Below 1.5:1 there is the danger of being unable to meet maturing obligations. Above 2.5:1 there is an indication that funds are being left idle rather than being efficiently employed.

Differences in the situations

No reasonable person would expect a 12-year-old youth to run as fast as a 19-year-old athlete; the youth's performance should be compared to others of the same age, sex, and training. Differences in the factors that affect a company's performance this year as compared with last year are complex. Nevertheless, some attempt must be made to allow for these differences. The task is more difficult when we attempt to compare one company with another, even if both are of the same size and in the same industry. It becomes exceedingly difficult if the two companies are in different industries or if they are of substantially different size.

Changes in the dollar measuring stick

Accounting amounts are expressed in historical dollars. A change in price levels may therefore seriously lessen the validity of comparisons of ratios computed for different time periods. Also, a ratio whose numerator and denominator are expressed in dollars of significantly different purchasing power (e.g., the capital intensity ratio when the fixed assets were acquired many years ago) may have no useful meaning. The fact that plant and equipment amounts are stated as unexpired historical dollar costs causes particular difficulty in making comparisons of ratios. Two companies, for example, might have physically identical facilities in all respects except age, and they might operate exactly the same way and earn exactly the same net income. If, however, the facilities of one company were purchased at a time when prices were low and the facilities are almost fully depreciated, and if the facilities of the other company were purchased at a time of higher prices and those facilities are relatively new, then the ROI of the company that carried its assets at a low book value would be much higher than the ROI of the other company.

Differences in definition

The term *six feet* used to measure the high jumper's leap is precisely defined and easily measured. But the individual elements making up such terms as *current assets* and *current liabilities* are by no means precisely defined, and there is considerable diversity in practice as to how they should be measured. Similarly, profit may mean (1) net income as determined by using generally accepted accounting principles (which in turn can be a range of values, depending on the particular methods used for depreciation, inventory valuation, and so forth); (2) income after taxes, based on the firm's income tax return; (3) profit as determined by procedures required by a regulatory agency; or (4) profit as shown on a report intended for the use of management only.

Hidden short-run changes

A balance sheet may not reflect the typical situation. It reports as of one moment in time and tells nothing about short-term fluctuations in assets and equities that have occurred within the period between two balance sheet dates. Many department stores, for example, publish annual balance sheets as of January 31. By that date the December holiday season inventories have been sold out, and payments of many of the holiday season receivables have been received; but Easter merchandise has not started to arrive, and payables for this merchandise have not yet been generated. Current assets

(other than cash) and current liabilities as reported on the January 31 balance sheet are therefore likely to be lower than at other times of the year. As a result ratios such as inventory turnover and the average collection period may not be representative of the situation in other seasons.

Moreover, companies have been known to deliberately clean up their balance sheets just before the end of the year. They may reduce inventories, which increases the inventory turnover ratio, and then build up inventories again early in the next year. Such "window dressing" of the balance sheet is difficult for an outside analyst to discern.

The past as an indication of the future

Financial statements are historical documents, and financial ratios show relationships that have existed in the past. Managers and analysts alike are primarily interested in what is happening now and what is likely to happen rather than what did happen. Often, outside analysts must rely on past data as an indication of the current situation. But they should not be misled into believing that the historical ratios necessarily reflect current conditions—much less that they reflect future conditions. With this caveat in mind, past financial ratios can be a useful tool to construct future pro forma, financial statements that the outside analyst can use as a basis for making operating and financial condition predictions.

Possible Bases for Comparison

An actual financial statement amount or ratio can be compared against four types of standards: (1) experience, (2) a budget, (3) an historical amount, and (4) an external benchmark.

Experience

Managers and analysts gradually build up their own ideas as to what constitutes good or poor performance. One important advantage that experienced people have is that they possess a feeling for what the "right" relationships are in a given situation. These subjective standards of a competent analyst or manager are more important than standards based on mechanical comparisons.

Budgets

Almost all companies prepare budgets that show what performance is expected to be under the circumstances prevailing. If actual performance corresponds with budgeted performance, there is a reasonable inference that performance was good.

Two important qualifications affect this inference, however. First, the budgeted amounts may not have been developed very carefully. The comparison can, of course, be no more valid than the validity of the standards. Second, the budgeted amounts were necessarily arrived at on the basis of various assumptions as to the conditions that would be prevailing during the period. If these assumptions turn out to be incorrect, the amounts are also incorrect as a measure of results "under the circumstances prevailing." If, because of a recession or other economic phenomenon outside the control of management, net income is lower than the amount budgeted, it cannot fairly be said that the difference indicates poor management performance. Nevertheless, the budget is a type of standard that has fewer inherent difficulties than either historical or external standards. Of course, outside analysts frequently do not have access to a company's budget; but some overall budget parameters (such as earnings per share and return on investment) are publicly stated by top management as corporate financial goals.

Historical standards

A comparison of a company's current performance with its past performance raises relatively few comparison problems and is consistent with a management philosophy of

continuous improvement. Such a comparison does not run into the problem of differences in accounting methods. If a method has changed, the change must be reported in the financial statements. Moreover, the analyst can also recollect or find out from supplementary data some of the circumstances that have changed between the two periods and thus allow for these changes in making the comparison. At best, however, a comparison between a current amount and a historical amount in the same company can show only that the current period is better or worse than the past. This may not provide a sound basis for judgment because the historical amount may not have represented an acceptable standard. A company that increases its ROE from 1 percent to 2 percent has doubled its ROE, but it nevertheless is not doing very well.

External benchmarks

When one company is compared with another, environmental and accounting differences may raise serious problems of comparability. If, however, the analyst is able to allow for these differences, then the outside data provide a performance check that has the advantage of being arrived at independently. Moreover, the two companies may have been affected by the same set of economic conditions, so this important cause of noncomparability may be neutralized.

Some companies use the results of a highly regarded competitor as a benchmark. Others identify the best performer among their various quasi-independent business units and use this unit's results as a benchmark against which to compare the other units' performance. Such comparisons may involve overall results or specific parameters such as inventory turnover or production efficiency.

Several organizations, including Dun & Bradstreet, various industry associations, and the Department of Commerce, publish average ratios for groups of companies in the same industry. Several on-line computer database services provide access to financial and statistical information for several thousand industrial companies and utilities in the United States and Canada; ratios can be calculated from these data. A reference librarian can assist in locating these various sources.

Use of industrywide ratios involves all the difficulties of using ratios derived from one other company plus the special problems that arise when the data for several companies are thrown together into a single average. Nevertheless, they may give some useful impressions about the average situation in an industry.

Use of Comparisons

The principal value of analyzing financial statement information is that it *suggests questions* that need to be answered. Such an analysis rarely provides the answers. A large unfavorable difference between actual performance and whatever standard is used indicates that something may be wrong, and this leads to an investigation. Even when the analysis indicates strongly that something *is* wrong (as when one company's income has declined while incomes of comparable companies have increased), the analysis rarely shows the underlying causes of the difficulty. Nevertheless, the ability to pick from thousands of potential questions those few that are really worth asking is an important one.

Keep in mind the basic relationships shown in Illustration 13–2, or some variation applicable to the situation being analyzed. The only number that encompasses all these relationships is an ROI ratio. A change in any less inclusive ratio may be misleading as an indication of better or worse performance, because it may have been offset by compensating changes in other ratios. An increase in dollars of net income indicates improved performance only if there was no offsetting increase in the investment required. An increase in the net profit margin indicates improved performance only if there was no offsetting decrease in sales volume or increase in investment. An increase in the gross margin percentage indicates improved performance

only if there was no offsetting decrease in sales volume, increase in investment, or increase in selling and administrative expenses.

In short, the use of any ratio other than ROI, taken by itself, implies that all other things are equal. This *ceteris paribus* condition ordinarily does not prevail, and the validity of comparisons is lessened to the extent that it does not. Yet, the ROI ratio is so broad that it does not give a clue as to which of the underlying factors may be responsible for changes in it. It is to find these factors, which if unfavorable indicate possible trouble areas, that the subsidiary ratios of profitability are used. Furthermore, an ROI ratio tells nothing about the financial condition of the company; liquidity and solvency ratios are necessary for this purpose.

Summary

The numbers on financial statements are usually most useful for analytical purposes when they are expressed in relative terms in the form of ratios. ROI measures overall performance, but other ratios help the analyst find more specific areas affecting ROI where investigation may be fruitful. Categories of ratios include those related to profitability, investment utilization, and financial condition. Although a great many ratios can be calculated, only a few are ordinarily necessary in connection with a given problem.

The essential task is to find a standard or norm with which actual performance can be compared. In general, there are four types of standards: (1) subjective standards, derived from the analyst's experience; (2) budgets, set in advance of the period under review; (3) historical data, showing performance of the same company in the past; and (4) the performance of other companies, as shown by their financial statements or by industry averages. None of these is perfect, but a rough allowance for the factors that cause noncomparability often can be made. The comparison may then suggest important questions that need to be investigated; it rarely indicates answers to the questions.

Problems

Problem 13–1

You are given the following data on two companies, M and N (figures are millions):

	M	N
Sales	$1,080	$1,215
Net income	54	122
Investment	180	405

Required:

a. Which company has the higher profit margin?
b. Which company has the higher investment turnover?
c. Based solely on the data given, in which firm would you prefer to invest?

Problem 13–2.

As the manager of Losen division of McCarthy Corporation, you are interested in determining the division's return on investment. As division manager you have no control over financing assets, but you control acquisition and disposition of assets. The division controller has given you the following data to aid you in calculating return on investment:

Fiscal year, January 1 to December 31 (000 omitted):	
Total assets, January 1	$400,000
Total assets, December 31	525,000
Long-term debt, January 1	75,000
Long-term debt, December 31	96,000
Owners' equity, January 1	278,000
Owners' equity, December 31	303,000
Net income for the year	54,000
Interest expense on long-term debt	4,200

Tax rate = 30%.

Required:

What method would be most appropriate for calculating the division's return on investment (ROI)? Why? Using this method, what is ROI for the current year?

Problem 13–3.

The president of Kelly Company is interested in determining how effective the company's new controller has been in controlling cash on hand. You have the following information available from the fiscal year preceding the new controller's arrival, and the current year:

	Current Year	Preceding Year
Cash on hand	$ 5,479,296	$ 6,123,704
Cash expenses	83,138,408	99,748,943

Required:

Does it appear that the new controller has been effective in managing cash?

Problem 13–4.

The treasurer of Gould's Stores, Inc., was interested in what effect, if any, new credit terms have had on collections of customer accounts. The usual 30-day payment period was shortened to 20 days in an attempt to reduce the investment in accounts receivable. The following information for the current year and the preceding year (prior to the payment period change) is available:

	Current Year	Preceding Year
Accounts receivable (net of bad debt allowance)	$1,392,790	$1,207,393
Credit sales	13,035,085	11,597,327

Required:

What effect has the new credit policy apparently had?

Problem 13–5.

Tara Whitney was interested in controlling her company's inventory because she knew that excess inventories were expensive in that they tied up funds. On the other hand,

insufficient inventory levels could result in lost sales. Ms. Whitney obtained the following inventory information from her trade association, which reported average figures for companies similar to hers:

Days' inventory	38 days
Inventory turnover	11 times

Ms. Whitney had the following information from last year, which she considered to be a typical year for her company:

Cost of sales	$300,000
Beginning inventory	58,160
Ending inventory	62,880

Required:

How does Ms. Whitney's company's inventory compare with other similar companies?

Problem 13–6.

Ralite Company had net income for the year of $20 million. It had 2 million shares of common stock outstanding, with a year-end market price of $82 a share. Dividends during the year were $5.74 a share.

Required:

Calculate the following ratios: (1) price/earnings ratio; (2) dividend yield; and (3) dividend payout.

Problem 13–7.

Unisonic Company had sales revenues for the year of $1,750. Average working capital; property, plant, and equipment; and shareholders' equity were $250, $525, and $1,500 respectively. (All figures are millions.)

Required:

Calculate: (*a*) working capital turnover, (*b*) capital intensity, and (*c*) equity turnover.

Cases

CASE 13–1 Genmo Corporation*

On the night of February 27, 1994, certain records of the Genmo Corporation were accidentally destroyed by fire. Two days after that the principal owner had an appointment with an investor to discuss the possible sale of the company. The owner needed as much information as could be gathered for this purpose, recognizing that over a longer period of time a more complete reconstruction would be possible.

On the morning of February 28, the following were available: (1) A balance sheet as of December 31, 1992, and an income statement for 1992 (Exhibit 1) and (2) certain fragmentary data and ratios that had been calculated from the current financial statements (Exhibit 2). The statements themselves had been destroyed in the fire. (In ratios involving balance sheet amounts, Genmo used year-end amounts rather than an average.) And (3) the following data (in thousands):

1993 revenues	$10,281
Current liabilities, December 31, 1993	2,285

* © Professor Robert N. Anthony, Harvard Business School.

EXHIBIT 1 Genmo Corporation Financial Statements (thousands of dollars)

BALANCE SHEET
As of December 31, 1992

Assets		
Current assets:		
Cash		$ 18
Marketable securities		494
Accounts receivable		728
Inventories		972
Prepaid expenses		214
Total current assets		2,426
Investments		898
Real estate, plant, and equipment	$4,727	
Less: Accumulated depreciation	2,433	2,294
Special tools		171
Goodwill		594
Total assets		$6,383
Liabilities and Shareholders' Equity		
Current liabilities:		
Accounts payable		$ 732
Loans payable		266
Accrued liabilities		1,232
Total current liabilities		2,230
Long-term debt		250
Other noncurrent liabilities		951
Total liabilities		3,431
Shareholders' equity:		
Preferred stock		25
Common stock		54
Additional paid-in capital		667
Retained earnings		2,206
Total shareholders' equity		2,952
Total liabilities and shareholders' equity		$6,383

Income Statement, 1992

Total revenues		$9,779
Cost of sales (excluding depreciation and amortization)	$8,165	
Depreciation	278	
Amortization of goodwill and special tools	343	
	8,786	
Selling, general, and administrative expenses	430	
Provision for income taxes	163	
Total costs and expenses		9,379
Net income		$ 400

EXHIBIT 2 Selected Ratios

	1993	1992
Acid-test ratio	0.671	0.556
Current ratio	1.172	1.088
Inventory turnover (times)	10.005	8.400
Days' receivables	39.66	27.17
Gross margin percentage	15.12	16.50
Profit margin percentage	2.831	4.090
Invested capital turnover (times)	2.091	2.355
Debt/equity ratio (percentage)	62.15	40.68
Return on shareholders' equity	?	13.55

Questions

1. Prepare a balance sheet as of December 31, 1993, and the 1993 income statement.
2. What was the return on shareholders' equity for 1993?

CASE 13–2 Amerbran Company (B)*

Using the 19x1 financial statements in Amerbran Company (A), Case 11–2, together with the 19x0 income statement shown in Exhibit 1 below, calculate the ratios listed below for 19x0 and 19x1. Use year-end amounts for ratios that involve balance sheet data. The company's interest expense in 19x0 and 19x1 was (in thousands) $105,165 and $102,791 respectively.

1. Return on assets.
2. Return on equity.
3. Gross margin percentage.
4. Return on sales.
5. Asset turnover.
6. Days' cash (19x1 only).
7. Days' receivables.
8. Days' inventories.
9. Inventory turnover.
10. Current ratio.
11. Acid-test ratio.
12. Debt/capitalization ratio.
13. Times interest earned.

EXHIBIT 1

AMERBRAN COMPANY
Income Statement
For the Year Ended December 31, 19x0
(in thousands)

Sales revenue, net	$6,577,480
Cost of sales	2,573,350
Excise taxes on goods sold	2,354,350
Gross margin	1,649,780
Selling, general, and administrative expenses	974,121
Income before income taxes	675,659
Provision for income taxes	296,877
Net income	$ 378,782

Questions

1. Comment on Amerbran's treatment of excise taxes as part of the calculation of gross margin.
2. As an outside analyst, what questions would you want to ask Amerbran's management based on the ratios you have calculated?

CASE 13–3 Identify the Industries—1996*

Common-sized balance sheets of 12 firms are presented in the following pages, along with some useful ratios (see Exhibit 1, page 415). These companies were chosen because they consist of primarily one major business segment and the relationships between balance sheet items, profit, and operations are fairly typical of these industries. The companies involved are:

- Regional bank
- Temporary office personnel agency
- For-profit hospital chain
- Warehouse club
- Major passenger airline
- Major regional utility company
- Manufacturer of oral, personal, and household care products
- Hotel chain
- Upscale department store chain
- Discount department store chain
- International oil company
- Defense contractor

The financial statement dates are noted at the top of each column. Use the ratios, common-sized statements, and your knowledge of business operations and conditions at the time these data were generated to identify the companies.

CASE 13–4 Supplement to Identify the Industries*

Presented in Exhibit 1 (see page 416) are balance sheets, in percentage form, and selected ratios drawn from the balance sheets and operating statements of seven different firms in seven different industries. Recognizing the fact of certain differences between firms in the same industry, each firm whose figures are summarized is broadly typical of those in its industry.

See if you can identify the industry represented. Then, be prepared as best you can to explain the distinctive asset structures and ratios of each industry.

1. Basic chemical company
2. Maker of name-brand, quality men's apparel
3. Meat packer
4. Retail jewelry chain (which leased its store properties)
5. Coal-carrying railroad
6. Automobile manufacturer
7. Advertising agency

EXHIBIT 1

	Jun-96 A	Dec-95 B	Dec-95 C	Jan-96 D	Dec-95 E	Jan-96 F	Dec-95 G	Dec-95 H	Dec-95 I	Dec-95 J	Dec-95 K	Sep-96 L
Cash and Marketable Securities	13.5	2.1	2.0	0.9	32.6	0.2	13.4	3.3	0.2	1.2	17.7	2.1
Receivables	7.9	9.4	7.6	32.7	63.1	2.3	7.2	14.6	6.0	13.4	55.4	2.8
Inventories	—	37.8	6.2	22.9	—	42.6	0.5	10.1	1.6	2.0	—	30.6
Other Current Assets	5.4	4.3	3.1	2.5	—	1.1	2.4	2.8	1.6	4.5	4.6	1.8
Total Current Assets	26.8	53.6	19.0	59.0	95.8	46.2	23.4	30.9	9.5	21.1	77.7	37.2
Plant & Equipment	55.6	16.1	71.7	40.4	1.8	50.3	55.4	28.2	81.1	49.0	11.7	58.8
Investments	6.0	1.9	6.2	—	—	—	19.4	—	0.7	10.5	—	—
Goodwill	2.2	25.7	—	—	0.3	—	—	35.9	—	17.6	7.7	1.0
Other Noncurrent Assets	9.4	2.7	3.1	0.6	2.1	3.5	1.7	5.0	8.8	1.8	2.9	2.9
Total Noncurrent Assets	73.2	46.4	81.0	41.0	4.2	53.8	76.6	69.1	90.5	78.9	22.3	62.8
Total Assets	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Accounts Payable	12.6	10.6	9.3	10.1	84.7	17.2	10.0	9.7	3.7	4.2	7.4	25.3
Notes Payable	—	12.2	1.9	8.5	6.0	6.5	—	2.7	3.5	—	—	1.2
Current Portion of L/T Debt	0.8	0.1	0.5	2.7	—	0.9	7.1	0.5	2.8	1.2	—	0.2
Unearned Revenues	11.6	3.5	—	—	—	—	—	—	—	—	—	—
Other Current Liabilities	4.8	11.1	8.8	9.1	0.9	5.9	0.4	10.1	5.2	8.4	26.3	9.4
Total Current Liabilities	29.8	37.5	20.5	30.4	91.5	30.5	17.5	22.9	15.1	13.8	33.7	36.1
L/T Debt	17.8	15.1	8.5	13.4	0.5	28.2	35.0	39.2	31.8	35.9	—	25.0
Other Noncurrent Liabilities	30.5	3.8	26.7	4.1	—	1.9	6.6	15.9	20.0	14.5	—	2.7
Total Liabilities	78.1	56.4	55.7	47.9	92.1	60.7	59.0	78.0	67.0	64.2	33.7	63.8
Preferred Stock	1.1	—	(0.1)	—	—	—	—	5.3	5.9	—	—	—
Common Stock	1,8	2.4	3.1	6.1	0.3	0.6	4.2	2.4	1.3	0.0	5.6	0.0
Additional Paid-in-Capital	21.5	2.6	—	—	3.0	1.5	—	13.5	18.8	22.6	1.0	6.5
Retained Earnings	(1.0)	38.5	58.6	47.7	4.5	38.3	41.7	31.3	7.1	12.9	60.6	31.1
Adjustments to Retained Earnings	1.0	0.1	1.5	—	0.1	(1.1)	(0.2)	(11.7)	—	0.3	—	(1.5)
Treasury Stock	(2.5)	—	(18.9)	(1.8)	—	—	(4.7)	(18.9)	—	—	(0.8)	—
Total Stockholders' Equity	21.9	43.6	44.3	52.1	7.9	39.3	41.0	22.0	33.0	35.8	66.3	36.2
Total Liabilities & Stockholders' Equity	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Selected Ratios												
Current Ratio	0.90	1.43	0.92	1.94	1.05	1.51	1.34	1.35	0.63	1.53	2.31	1.03
Inventory Turns (X)	N.M.	2.5	8.9	4.5	N.M.	5.0	N.M.	5.8	2.6	N.M.	N.M.	11.9
Receivables Collection Period	28	29	27	79	N.M.	3	51	49	49	55	54	3
Net Sales/Total Assets	1.019	1.191	1.357	1.505	0.066	2.524	0.539	1.094	0.447	0.890	3.741	3.983
Net Profits/Net Sales	0.053	0.068	0.052	0.040	0.171	0.029	0.105	0.021	0.069	0.060	0.026	0.013
Net Profits/Total Assets	0.054	0.080	0.071	0.060	0.011	0.073	0.057	0.023	0.031	0.053	0.096	0.051
Net Profits/Net Worth	0.217	0.185	0.160	0.116	0.144	0.186	0.138	0.102	0.113	0.147	0.145	0.140

Notes: *"Adjustments to Retained Earnings" consists primarily of foreign translation adjustments. *"N.M." means that the ratio is not meaningful, even if calculable, for this company.

EXHIBIT 1

	A	B	C	D	E	F	G
Cash and marketable securities	4.0	7.6	5.1	15.7	4.1	3.2	17.0
Receivables	3.9	8.6	16.4	26.8	21.5	27.6	72.1
Inventories	—	24.9	11.0	23.2	61.0	49.2	—
Other current assets	.9	3.5	—	1.2	.2	1.6	.8
Plant and equipment (net)	78.7	44.6	49.5	33.4	10.9	17.1	7.4
Other assets	12.5[a]	10.8[b]	18.0[c]	.7	2.3	1.3	2.7
Total assets	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Notes payable	—	—	12.8	—	5.1	2.0	—
Accounts payable	2.9	23.9	5.3	29.3	12.6	10.5	50.3
Accrued taxes	2.6	3.6	1.9	1.4	6.6	3.1	—
Other current liabilities	.6	4.9	5.7	—	1.2	5.8	2.6
Long-term debt	35.2	3.4	30.4	1.7	5.8	20.6	3.3
Other liabilities	3.8	6.4	—	1.6	1.0	—	1.0
Preferred stock	—	—	—	—	2.2	.1	—
Capital stock	16.7	6.8	27.8	9.4	31.0	17.4	6.8
Retained earnings	38.2	50.0	16.1	56.6	34.5	40.5	36.0
Total liabilities & stockholder equity	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Selected Ratios							
Current assets/current liabilities	1.45	1.38	1.25	2.06	3.41	3.81	1.44
Cash, marketable securities, and receivables current liabilities	0.96	0.50	1.20	1.32	1.62	1.44	1.24
Inventory turnover (X)	—	6.4X	6X	23X	2.1X	3.1X	—
Receivables collection period (days)	20	19	64	18	64	66	42
Total debt/total assets	0.412	0.356	0.565	0.339	0.313	0.420	0.663
Long-term debt/capitalization	0.403	0.055	0.425	0.025	0.078	0.262	0.090
Net sales/total assets	0.32	1.61	0.69	5.40	1.30	1.51	5.33
Net profits/total assets	0.052	0.059	0.057	0.080	0.085	0.065	0.081
Net profits/total net worth	0.102	0.105	0.137	0.121	0.124	0.112	0.240
Net profits/net sales	0.167	0.037	0.083	0.015	0.065	0.043	0.015

Note: Investments in affiliated companies accounted for using the equity method including some non-homogeneous subsidiaries that under US GAAP should be accounted for on a full consolidation basis.

[a]Includes 10.1% of investments in affiliated companies.

[b]Includes 9.2% of investments in affiliated companies.

[c]Includes 14.4% of investments in affiliated companies.

CASE 13–5 Springfield National Bank*

John Dawson, Jr., president of Dawson Stores, Inc., had a discussion with Stefanie Anderson, a loan officer at Springfield National Bank. Both Mr. Dawson and Dawson Stores, Inc., were deposit customers of the bank and had been for several years. Dawson's comments were directly to the point:

> It appears that we are going to have some working capital needs during the next year at Dawson Stores, Inc. I would like to obtain a $1,000,000 line of credit, on an unsecured basis, to cover these short-term needs. Could you set up the line of credit for a year to be reviewed when next year's statements are available?
>
> I know from my friends that you need information about the company in order to grant this request, so I have brought a copy of the company's statements for the last four years for you. Could you let me know about the line of credit in a few days? We are having a board meeting in two weeks, and I would like to get the appropriate paperwork for you at that time.

In reviewing the reports of previous contacts by bank personnel with Dawson Stores, Inc., Ms. Anderson found the information summarized below:

> Dawson Stores, Inc., had been incorporated in 1881. The stock had been widely dispersed upon the death of John Dawson, Sr., who had divided his share among his 5 children and 14 grandchildren.
>
> Dawson Stores, Inc., had maintained its deposit accounts with Springfield for many years, even during the years John Dawson, Sr., had managed the company. The accounts had varied over the past few years. Average balances of the accounts were $350,000 for the past year. The company had occasionally purchased certificates of deposits for short periods.
>
> Dawson Stores, Inc., had not used bank credit in the last 10 years. A recent Dun & Bradstreet report requested by a business development officer reported all trade accounts satisfactory and contained only satisfactory information. The D&B report showed the officers were John as president and his brother Bill as vice president and treasurer. The directors were the officers, their two sisters, and two cousins, the latter four residing in other states. Credit terms included both revolving (30-day) accounts and installment sales.
>
> Dawson Stores, Inc., has operated seven stores for the past six years. All store locations have been modernized frequently. One store location was moved during the past year to a new location two blocks from the previous location.
>
> The call report from the business development officer reported the premises orderly and well located for this chain of small retail soft-goods and hard-goods stores (based upon visits to three of seven locations), all located in the Springfield trade area. The president was happy with his present bank services, but in the opinion of the business development officer there was little possibility for further business.

The audited financial statements left with Ms. Anderson by John Dawson are summarized in Exhibits 1, 2, and 3. Notes accompanying these financial statements gave the following additional information.

Accounts receivable

Retail customer accounts receivable are written off in full when any portion of the unpaid balance is past due 12 months. The allowance for losses arising from uncollectible customer accounts receivable is based on historical bad debt experience and current aging of the accounts.

Thirty-day accounts are revolving charge accounts that are billed every 30 days. Deferred payment accounts are accounts requiring monthly principal payments of at least 10 percent of the outstanding balance

	1990	1991	1992	1993
Accounts receivable (in thousands):				
Thirty-day accounts	$ 68	$ 75	$ 40	$ 32
Deferred payment accounts	2,606	2,709	3,102	3,595
Other accounts	245	310	348	251
Less: Allowance for losses	(57)	(87)	(112)	(111)
	$2,862	$3,007	$3,378	$3,767

EXHIBIT 1

DAWSON STORES, INC.
Comparative Balance Sheets
As of January 31
(amounts in thousands)

	1990	1991	1992	1993
Assets				
Current assets:				
Cash	$ 107	$ 141	$ 709	$ 916
Accounts receivable (net)	2,862	3,007	3,378	3,767
Inventories	2,600	2,383	2,821	3,090
Supplies and prepaid expenses	70	100	91	75
Total current assets	5,639	5,631	6,999	7,848
Investments and other assets	287	318	162	201
Property, plant, and equipment (net)	4,917	5,186	5,385	5,707
Total assets	$10,843	$11,135	$12,546	$13,756
Liabilities and Shareholders' Equity				
Current liabilities:				
Accounts payable	$ 1,153	$ 1,166	$ 1,767	$ 2,272
Taxes other than income taxes	379	389	414	418
Accrued liabilities	410	454	676	792
Income taxes, currently payable	221	229	491	480
Deferred income taxes, installment sales	374	401	484	589
Current portion of long-term debt	119	143	181	141
Total current liabilities	2,656	2,782	4,013	4,692
Long-term debt	3,494	3,430	3,136	2,942
Deferred credits	266	292	244	302
Shareholders' equity:				
Capital stock	130	130	130	130
Retained earnings	4,297	4,501	5,023	5,690
Total liabilities and shareholders' equity	$10,843	$11,135	$12,546	$13,756

plus interest at 15 percent. Other accounts are for sales contracts from three to five years from the sales of office properties. The following is an aging schedule of accounts receivable as of January 31, 1993:

(in thousands)	30 Days or Less	30 to 60 Days	Over 60 Days
Thirty-day	$29	$3	$1
Deferred payment	3,200	288	106
Other	228	23	–0–

Inventories

Substantially all inventories are recorded at cost on the last-in, first-out (LIFO) method. Inventories on January 31 are stated less the following amounts that would have been determined under the retail method without regard to last-in, first-out principles (Amounts in thousands):

1990	1991	1992	1993
$283	$519	$560	$660

EXHIBIT 2

DAWSON STORES, INC.
Comparative Statements of Income and Retained Earnings
For the Years Ending January 31
(amounts in thousands)

	1990	1991	1992	1993
Revenues	$18,297	$19,558	$21,976	$24,128
Cost of sales	12,816	13,884	15,163	16,527
	5,481	5,674	6,813	7,601
Operating expenses	4,789	5,023	5,422	5,830
Earnings before income taxes	692	651	1,391	1,771
Income taxes:				
Current	246	275	690	813
Deferred	91	48	34	104
	337	323	724	917
Net income	355	328	667	854
Retained earnings, beginning of the year	4,058	4,297	4,501	5,023
Less: Dividends	116	124	145	187
Retained earnings, end of year	$ 4,297	4,501	5,023	$ 5,690
Earnings per share (100,000 shares issued and outstanding)	$ 3.55	$ 3.28	$ 6.67	$ 8.54

Plant
Property, plant, and equipment is carried at cost less accumulated depreciation. Depreciation is computed using the straight-line method for financial reporting purposes and accelerated methods for tax purposes.

	1990	1991	1992	1993
Land	$1,128	$1,285	$ 948	$1,023
Building and improvements	4,643	5,050	5,760	5,969
Fixtures and equipment	1,311	1,426	1,427	1,602
Construction in progress	329	304	266	351
Accumulated depreciation	(2,494)	(2,879)	(3,016)	(3,238)
	$4,917	$5,186	$5,385	$5,707

Annual minimum rentals on long-term noncancellable leases are as follows:

1993	$ 245
1994	238
1995	226
1996	222
1997	219
Beyond 1997	1,848

Contingent rentals are based upon a percentage of sales. Most leases require additional payments for real estate taxes, insurance, and other expenses that are included in operating costs in the accompanying statement of income and retained earnings.

Income taxes
Deferred income taxes are provided for income and expenses that are recognized in different accounting periods for financial reporting than for income tax purposes. The temporary differences and the related deferred taxes are as follows:

	1990	1991	1992	1993
Excess of tax over book depreciation	$28	$22	$25	$ 5
Deferred income on installment sales	66	23	77	104
Other	(3)	3	(68)	(5)
Total	$91	$48	$34	$104

Long-term debt

The long-term debt of Dawson Stores, Inc., is composed of mortgage loans from three savings institutions on the store properties that the company occupies. There is no debt agreement that places restrictions on the company's operations or financing.

EXHIBIT 3

DAWSON STORES, INC.
Statements of Cash Flows
For the Years Ending January 31
(amounts in thousands)

	1990	1991	1992	1993
Cash flows from operating activities:				
Net income	$ 355	$ 328	$ 667	$ 854
Adjustments for differences between net income and cash flows from operating activities:				
Depreciation and amortization expense	329	358	388	424
Equity in loss of joint venture	—	—	37	38
(Increases) Decreases in current assets:				
Accounts receivable (net)	(379)	(145)	(371)	(389)
Inventories	(28)	217	(438)	(269)
Supplies and prepaid expenses	(7)	(30)	9	16
Increases (Decreases) in current liabilities:				
Accounts payable	89	13	601	505
Accrued liabilities and others	157	54	247	120
Income taxes currently payable	(10)	8	262	(11)
Deferred income taxes	30	27	83	105
Cash provided by operations	536	830	1,485	1,393
Cash flow for investing activities:				
Additions to property, plant, and equipment	(725)	(656)	(416)	(933)
Receipts from disposals of property and equipment	126	138	29	287
Mortgages assumed by purchasers of office properties and prepayment on long-term debt	(103)	(168)	(209)	(102)
Investments	(17)	(27)	—	(46)
Other (net)	64	81	80	29
Cash used for investing activities	(655)	(632)	(516)	(765)
Cash flow for financing activities:				
Proceeds from long-term debt	229	104	97	218
Reductions of long-term debt	(119)	(144)	(353)	(452)
Cash dividends	(116)	(124)	(145)	(187)
Cash used for financing activities	(6)	(164)	(401)	(421)
Increase (Decrease) in cash	(125)	34	568	207
Cash at beginning of the year	232	107	141	709
Cash at end of the year	$ 107	$ 141	$ 709	$ 916

Questions

1. Appraise the recent performance and financial position of Dawson Stores, Inc., using selected financial ratios as appropriate.
2. As Stefanie Anderson, would you conclude that the company is a good credit risk?

CASE 13–6 Quality Furniture Company*

In March 1992, Richard Allan, an assistant credit analyst for the Quality Furniture Company, was concerned about changes in two of Quality's accounts in Minnesota—Lloyd's, Inc., of Minneapolis and The Emporium department store in St. Paul. He therefore brought the credit folders of these two customers to the attention of Watt Ralphson, the credit manager of Quality Furniture. The Quality Furniture Company had its headquarters in Scranton, Pennsylvania, and manufactured a limited line of high-quality home furniture for distribution to department stores, independent home furnishing retailers, and regional chains.

Lloyd's retailed quality home furnishings from three locations—one in the downtown section of Minneapolis and the others in nearby suburban areas. Sales were somewhat seasonal, with a slight downturn in the midsummer months and a slight upturn during the December holiday season. Lloyd's sales were approximately 75% for cash or credit cards and 25% on six-month installment terms. Installment terms called for 25% down and the balance in equal monthly payments over a six-month period.

Lloyd's had been established as a partnership and was later incorporated. In June 1991, two of the four original partners sold their shares in the company to the two remaining owners.

Lloyd's had been a customer of Quality Furniture for over 30 years and had previously handled its affairs in a most satisfactory manner. The Emporium was a comparatively new customer of Quality's, having established an account in 1983. A medium-sized department store in downtown St. Paul, The Emporium was well-known for its extensive lines of home furnishings. Its account with Quality had been satisfactory through 1991.

Both accounts were sold on terms of 2%, 10, net 30, and although not discounting, had been paying invoices promptly until December 1991. Ralphson had previously established a $50,000 limit on Lloyd's and an $85,000 limit on The Emporium.

Quality Furniture advertised its lines nationally and attempted to maintain intensive coverage of its trading areas by distributing through stores strategically located within a particular marketing area. Beginning in 1990, activity in the furniture market had become sufficiently spotty that quality of product and service were not the only bases for competition among manufacturers for outlets. Credit terms and financing of dealers became equally important, thus Quality Furniture Company, in Ralphson's words, was "backed into the position of supporting numerous customers in order to maintain adequate distribution for its products."

Because of this requirement for the extension of fairly liberal credit, Ralphson had adhered strictly to a policy of obtaining current reports on the financial status of customers. These reports, obtained as annual balance sheets and profit and loss statements for customers that were considered satisfactory risks, were supplied directly by the customers. Under certain circumstances, wherein Quality was working very closely with a particular customer who was trading actively on a small investment, Ralphson received quarterly and at times monthly financial statements in order "to keep on top" of the credit situation.

In early March 1992, Richard Allen received the annual reports of Lloyd's and The Emporium. After reviewing these statements and checking the accounts receivable ledger for both customers, Allen felt that the accounts should be reviewed by Ralphson. Accordingly, he furnished Ralphson with the information found in Exhibits 1 through 5.

When reviewing the accounts, Ralphson kept in mind that 1991 had not been a particularly good year for retail furniture stores. It was generally known that stores such as The Emporium, carrying low-priced furniture lines, were the first to suffer the declines which had come in the late summer and early fall. This situation was followed by signs of a relaxing demand for furniture of higher quality and higher price toward the

EXHIBIT 1 Aging of Quality Furniture's Accounts Receivable Balances Owed by Lloyd's and The Emporium as of March 31, 1992

	Prior	December	January	February	March	Totals
Lloyd's		$34,819	$5,480	$21,146	$ 6,168	$ 67,613
The Emporium	$2,285[a]	29,304	6,153	26,112	54,749	118,603

[a]Represents invoice on disputed shipment: customer claimed damaged merchandise.

EXHIBIT 2 Lloyd's, Inc. Balance Sheets as of January 31, 1990–1992 (dollars in thousands)

	1/31/90	1/31/91	1/31/92
Assets			
Cash	$ 85	$ 65	$ 50
Accounts receivable, net	1,385	1,565	1,610
Inventory	1,825	1,820	1,825
Total current assets	$3,295	$3,450	$3,485
Land	355	355	355
Buildings, fixtures, and equipment	1,355	1,370	1,575
Less: Accumulated depreciation	190	290	395
Net buildings, fixtures, and equipment	$1,165	$1,080	$1,180
Investments	65	65	65
Due from stockholders	—	215	290
Deferred charges	40	20	20
Total assets	$4,920	$5,185	$5,395
Liabilities and Net Worth			
Accounts payable	$ 865	$ 870	$ 925
Notes payable—employees	70	80	80
Estimated federal income tax	65	—	—
Current maturities on long-term debt	155	360	220
Miscellaneous accruals	220	205	65
Total current liabilities	$1,375	$1,515	$1,290
Notes payable—bank[a]	545	900	875
Mortgage notes payable	2,260	2,250	2,630
Preferred stock—5% noncumulative	190	190	190
Common stock	360	360	360
Additional paid-in capital	—	—	115
Retained earnings (deficit)	190	(30)	(65)
Total liabilities and net worth	$4,920	$5,185	$5,395

[a]Secured by pledged accounts receivable.

end of 1991. The drop in volume and the subsequent price-cutting hit the profit margins of some retailers to such an extent that the losses in the latter part of the year in some cases equaled, or more than offset, profits gained in the earlier part of the year.

In the early months of 1992, the "softness" of the furniture business continued. Although there was no severe drop in the buying of furniture at the retail level, retail stores reduced orders of new lines and reorders of established lines in January, February, and

EXHIBIT 3 Lloyd's Inc. Income Statements for Years Ending January 31, 1990–1992 (dollars in thousands)

	1/31/90	1/31/91	1/31/92
Gross sales	$11,720	$9,600	$9,160
Less: Returns and allowances	1,050	1,115	730
Net sales	$10,670	$8,485	$8,430
Cost of goods sold	6,460	5,125	5,100
Gross profit	$ 4,210	$3,360	$3,330
Operating expenses	3,570	3,090	3,045
Operating profit	$640	$270	$ 285
Other income	400	65	85
Net profit after other income	$ 1,040	$ 335	$ 370
Other deductions	290	345	405
Net profit (loss) before tax	$ 750	$ (10)	$ (35)
Income and other tax expense	345	—	—
Net profit (loss)	$ 405	$ (10)	$ (35)
Dividends paid	$ 210	$ 210	$ —

EXHIBIT 4 The Emporium Balance Sheets as of January 31, 1990–1992 (dollars in thousands)

	1/31/90	1/31/91	1/31/92
Assets			
Cash	$ 565	$ 740	$ 475
Notes and accounts receivable[a]	5,450	5,500	5,305
Inventory	5,480	5,370	4,925
Tax carryback claim	—	—	445
Total current assets	$11,495	$11,610	$11,150
Fixed assets, net	1,370	1,465	1,325
Leasehold improvements, net	3,480	3,590	3,460
Cash value life insurance	285	280	275
Investments	55	55	55
Notes receivable—officers and employees	105	110	140
Prepaid and deferred items	140	145	155
Total assets	$16,930	$17,255	$16,560
Liabilities and Net Worth			
Notes payable—Industrial Finance Coporation[a]	$ 5,380	$ 5,310	$ 4,300
Accounts payable	2,305	2,440	2,660
Miscellaneous accruals	630	590	680
Total current liabilities	$ 8,315	$ 8,340	$ 7,640
Common stock and additional paid-in capital	3,420	3,420	3,420
Retained earnings	5,195	5,495	5,500
Total liabilities and net worth	$16,930	$17,255	$16,560

[a]Receivables pledged to secure 30-day renewable notes to Industrial Finance Corporation.

EXHIBIT 5 The Emporium Income Statements for Years Ending January 31, 1990–1992 (dollars in thousands)

	1/31/90	1/31/91	1/31/92
Gross sales	$32,125	$31,265	$28,970
Less: Returns and allowances	2,925	2,870	2,215
Net sales	$29,200	$28,395	$26,755
Cost of goods sold	18,105	17,850	18,385
Gross profit	$11,095	$10,544	$8,370
Operating expenses	9,080	8,995	9,780
Operating profit (loss)	$2,015	$1,550	$(1,410)
Adjustments:			
Elimination—reserves for inventory losses	—	—	870
Reduction—bad debt reserve	—	—	105
Tax carryback	—	—	445
Federal income and other tax expense	925	650	—
Net profit before dividends	$ 1,090	$ 900	$ 10
Dividends paid	725	600	5
Net profit to retained earnings	$ 365	$ 300	$ 5

March, because of a general feeling that there had been considerable "overbuying" by customers which would result in a subsequent downturn in retail sales.

Throughout the country, orders for shipment in March were down about 30% from February; February had itself shown a drop of about 10% from January. Thus, credit managers among furniture manufacturing concerns were placed in the unhappy position of trying to please sales managers who wanted to maintain volume, while they were aware that the shipment of furniture to customers who had already overextended their financial positions was potentially dangerous in such a period.

Questions

1. What do you think is happening at Lloyd's and The Emporium?
2. What financial ratios and questions raised in your analysis of the two companies' financial statements support your opinions?

Chapter Twenty-Two

Control: The Management Control Environment

In this and the next three chapters we describe the nature of the management control process and the use of accounting information in that process. This chapter describes the environment in which management control takes place: the organization, the rules and procedures governing its work, the organization's culture, and the organization's external environment.

Management control focuses on organization units called *responsibility centers*. There are four types of responsibility centers that can be used: revenue centers, expense centers, profit centers, and investment centers. Profit centers and investment centers may require the use of transfer pricing, which this chapter also addresses.

Management Control

An organization has goals; it wants to accomplish certain things. It also has strategies for attaining these goals, which are developed through an activity called **strategy formulation.** Strategy formulation is not a systematic activity because strategies change whenever a new opportunity to achieve the goals—or a new threat to attaining the goals—is perceived, and opportunities and threats do not appear according to a regular schedule.

Essentially, the management control process takes the goals and strategies as given and seeks to assure that the strategies are implemented by the organization. Formally, **management control** is defined as the process by which managers influence members of the organization to implement the organization's strategies efficiently and effectively. The word *control* suggests activities that ensure the work of the organization proceeds as planned, which is certainly part of the management control function. However, management control also involves planning, which is deciding what should be done. The organization will not know how to implement strategies unless plans are developed that indicate the best way of doing so.

These plans have essentially two parts: (1) a statement of objectives, which are the results that the managers should achieve in order to implement strategies, and (2) the resources required in order to attain these objectives. (The words *goals* and *objectives* are often used interchangeably. We use *goals* for broad, usually nonquantitative, long-run plans relating to the organization as a whole, and *objectives* for more specific, often quantitative, shorter-run plans for individual responsibility centers.)

Moreover, managers do not always seek *planned* results. If there is a better way than the one indicated in the plan, managers ordinarily should employ that better way. Therefore, the statement that management control seeks to assure *desired* results is more realistic than a reference to planned results.

With respect to a machine or other mechanical process, we can say that the process is either "in control" or out of control; that is, either the machine is doing what it is supposed to be doing, or it is not. In an organization, such a dichotomy is not appropriate. An organization is rarely "out of control"; rather, its *degree* of control lies somewhere along a continuum ranging from excellent to poor.

Management control is a process (described in the succeeding three chapters) that takes place in an environment. This chapter discusses some of the important characteristics associated with this environment.

The Environment

Four facets of the management control environment discussed in this section are as follows: the nature of organizations; rules, guidelines, and procedures that govern the actions of the organization's members; the organization's culture; and the external environment.

The Nature of Organizations

A building with its equipment is not an organization. Rather, it is the people who work in the building that constitute the organization. A crowd walking down a street is not an organization, nor are the spectators at a football game when they are behaving as individual spectators. But the cheering section at a game is an organization; its members work together under the direction of the cheerleaders. An organization is a group of human beings who work together for one or more purposes. These purposes are called *goals*.

Management

An organization has one or more leaders. Except in rare circumstances, a group of people can work together to accomplish the organization's goals only if they are led. These leaders are called **managers** or, collectively, **the management.** An organization's managers perform many important tasks, among these are the following:

- Deciding what the organization's goals should be.
- Deciding on the objectives that should be achieved in order to move toward these goals.
- Communicating these goals and objectives to members of the organization.
- Deciding on the tasks that are to be performed in order to achieve these objectives and on the resources that are to be used in carrying out these tasks.
- Ensuring that the activities of the various organizational parts are coordinated.
- Matching individuals to tasks for which they are suited.
- Motivating these individuals to carry out their tasks.
- Observing how well these individuals are performing their tasks.
- Taking corrective action when the need arises.

Just as the leader of a cheering section performs these functions, so too does the chief executive officer of General Electric Company.

Organization hierarchy

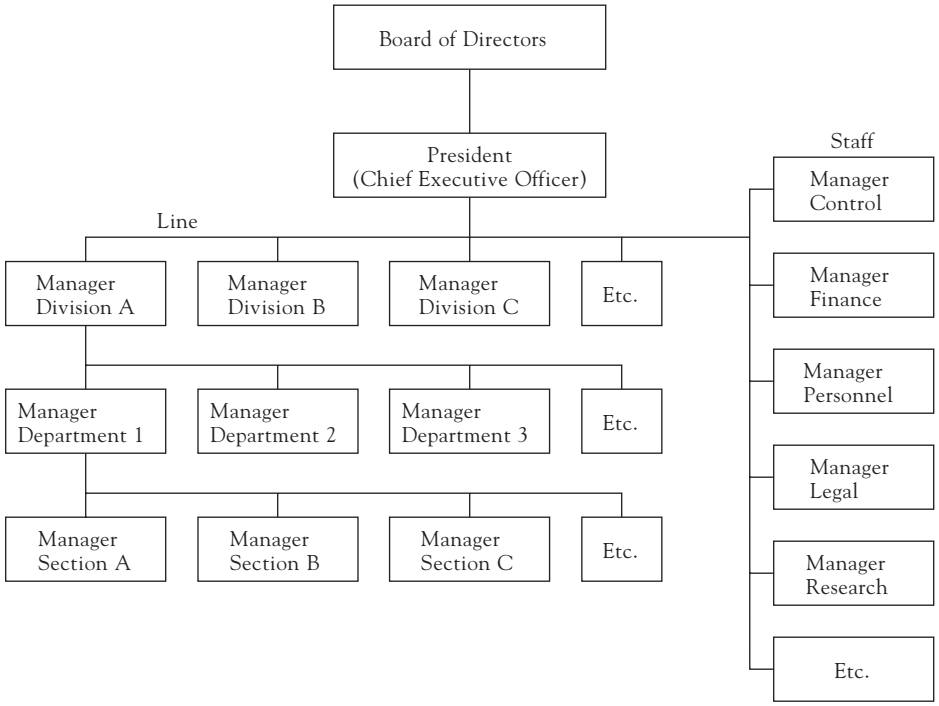
A manager can supervise only a limited number of subordinates. (Old Testament writers put this number at 10.) It follows that an organization of substantial size must have several layers of managers in the organization structure. Authority runs from the top unit down through the successive layers. Such an arrangement is called an **organization hierarchy.**

The formal relationships among the various managers can be diagrammed in an **organization chart.** Illustration 22–1 shows a partial organization chart. A number of organization units report to the chief executive officer (CEO). Some of these are **line units**; that is, their activities are directly associated with achieving the objectives of the organization. They produce and market goods or services. Others are **staff units,** which exist to provide various support services to other units and to the chief executive officer. The principal line units are called *divisions* in the illustration. Each division contains a number of *departments*, and within each department are a number of *sections*. Different companies and nonbusiness organizations use different names for these layers of organization units. Also, in some companies, the chairman of the board is the chief executive officer and the president is the chief operating officer (COO).

Responsibility centers

All the units in Illustration 22–1 are **organization units.** Thus, Section A of Department 1 of Division A is an organization unit. Division A itself, including all of its

ILLUSTRATION 22–1
Partial Organization Chart



departments and sections, is also an organization unit. Each of these units is headed by a manager who is responsible for the work done by the unit; each unit therefore is called a **responsibility center.** Managers are responsible in the sense that they are held accountable for the activities of their organization units. These activities include not only the work done within the responsibility center but also its relationships with the external environment (described below). A description of how responsibility centers work and how responsibility choices should be made is provided later in the chapter.

Rules, Guidelines, and Procedures

An organization has a set of rules, guidelines, and procedures that influence the way its members behave. Some of these controls are written; others are less formal. They vary, depending in part on the size, complexity, and other characteristics of the organization and in part on the wishes of the organization's senior management. These rules, guidelines, and procedures exist until the organization changes them. Typically, such change comes slowly.

Some of these controls are physical such as security guards and computer passwords. Others are written in manuals, memoranda, or other documents. Still others are based on the oral instructions of managers. Some may even involve nonverbal communication, such as the appropriate mode of office attire: Since the boss wears casual clothes, you do too. An important set of rules is the written and unwritten rules relating to the rewards the organization offers for good performance or the penalties for substandard performance and prohibited activities.

Culture

Each organization has its own culture, with norms of behavior that are derived in part from tradition, in part from external influences (such as the norms of the community and of labor unions), and in part from the attitudes of senior management and the board of directors. Cultural factors are unwritten, and they are therefore difficult to

identify. Nevertheless, they are important. For example, they explain why one entity has much better actual control than another, although both have adequate formal management control systems.

An important aspect of culture is the attitude of senior management, particularly on the part of the chief executive officer and the chairman[1] of the board, toward control. This has an important influence on the organization's control environment. Some top managers prefer tight controls; others prefer loose controls. Either can work well in appropriate circumstances.

External Environment

The external environment of an organization includes everything that is outside of the organization itself, including customers, suppliers, competitors, the community, regulatory agencies, and others. The organization is continually involved in a two-way interaction with its external environment.

The nature of the environment in which an organization operates affects the nature of its management control system. Differences in environmental influences on the organization can be summarized in one word: uncertainty. In an organization having relatively certain revenues and whose technology is not subject to rapid change (e.g., pulp-making), management control is considerably different from management control in an organization that operates in a fiercely competitive marketplace and whose products must be changed frequently in order to take advantage of new technological breakthroughs (e.g., computers). An organization that operates in a relatively uncertain environment relies more on the informal judgment of its managers than on its formal management control system. Also, managers at all levels in such an organization need prompt, accurate information about what is going on in the outside world.

Responsibility Centers and Responsibility Accounts

Illustration 22–2 provides a basis for describing the nature of responsibility centers. The top section depicts an electricity generating plant, which in some important respects is analogous to a responsibility center. Like a responsibility center, the plant (1) uses inputs to (2) do work, which (3) results in outputs. In the case of the generating plant, the inputs are coal, water, and air, which the plant combines to do the work of turning a turbine connected to a generator rotor. The outputs are kilowatts of electricity.

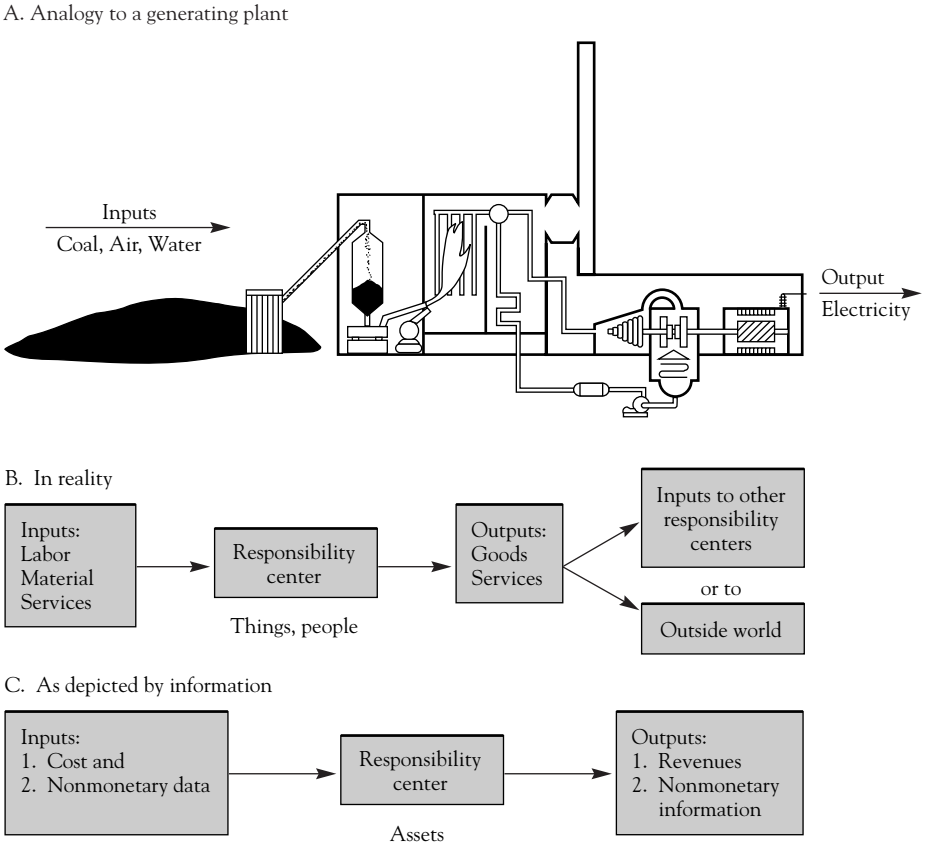
Inputs and Outputs

As shown in part B of Illustration 22–2, a responsibility center also has inputs: physical quantities of material, hours of various types of labor, and a variety of services. Usually, both current and noncurrent assets are also required. The responsibility center performs work with these resources. As a result of this work, it produces outputs: goods (if tangible) or services (if intangible). These products go either to other responsibility centers within the organization or to customers in the outside world.

Part C of the illustration shows information about these inputs, assets, and outputs. Although the resources used to produce outputs are mostly nonmonetary things

[1]The authors fully realize that the position of chairman of the board may be held by a woman. We use the term *chairman* because it is almost universally used in business practice irrespective of the position holder's gender (unlike in some universities and other nonprofit organizations, where the titles *chairperson, chair,* and *chairwoman* are also used).

ILLUSTRATION 22–2
Nature of a Responsibility Center



such as pounds of material and hours of labor, for purposes of management control these things must be measured with a monetary common denominator so that the physically unlike elements of resources can be combined. The monetary measure of the resources used in a responsibility center is *cost*. In addition to cost information, nonaccounting information on such matters as the physical quantity of material used, its quality, and the skill level of the work force is also useful.

If the outputs of a responsibility center are sold to an outside customer, accounting measures these outputs in terms of revenue. If, however, goods or services are transferred to other responsibility centers within the organization, the measure of output may be either a monetary measure, such as the cost of the goods or services transferred, or a nonmonetary measure, such as the number of units of output.

Responsibility Accounting

Responsibility center managers need information about what has taken place in their respective areas of responsibility. In addition to historical information about inputs (cost) and outputs, managers also need information about planned *future* inputs and outputs. The management accounting construct that deals with both planned and actual accounting information about the inputs and outputs of a responsibility center is called **responsibility accounting.** Responsibility accounting involves a continuous flow of information that corresponds to the continuous flow of inputs into, and outputs from, an organization's responsibility centers.

Contrast with full cost accounting

An essential characteristic of responsibility accounting is that it focuses on responsibility centers. Full cost accounting focuses on goods and services (formally called *products*) rather than on responsibility centers. This difference in focus is what distinguishes responsibility accounting from full cost accounting. In making this distinction we do not mean to imply that product cost accounting and responsibility accounting are two separate accounting systems. In fact, they are two related parts of the management accounting system.

It is common for a given responsibility center in an organization to perform work related to several products. For example, the Ford Taurus and Mercury Sable automobiles (products) are assembled in the same plants (responsibility centers). In each responsibility center, different inputs are consumed in order to produce the center's output; these inputs are called **cost elements** (or, sometimes, **line items**). That is, there are three different dimensions of cost information, each of which answers a different question: (1) Where was the cost incurred (responsibility center dimension)? (2) For what output was the cost incurred (product dimension)? (3) What type of resource was used (cost element dimension)?

Illustration 22–3 shows how these three dimensions of cost information typically appear in an organization's cost reporting system. For simplicity, it is assumed that this is a manufacturing company with only four departments: 1 and 2 are the production departments, fabrication and assembly; department 3 provides all production support functions; and department 4 performs all selling and administrative activities. Part A of the illustration shows the full costs of the organization's two products for a one-month period, and the details of the cost elements that make up these full costs. Note that it is impossible to identify from the part A information what costs the managers of Departments 1, 2, and 3 were individually responsible for. In particular, the costs of Department 3 have been allocated first to the two production departments and then, through their overhead allocations (cost drivers), to the two products; hence, Department 3 costs are a portion of the amount shown as each product's production overhead costs.

By contrast, responsibility accounting identifies the amount of costs that each of the four departmental managers is responsible for, as shown in part B of the illustration. Note that part B, however, does not show the costs of the two products. Both types of information are needed. Note also that the total product costs ($48,120) are equal to the total responsibility costs. The two parts are different arrangements of the same underlying data.

Full product costs and responsibility costs, then, are two different ways of "slicing the same pie." This is depicted in part C of Illustration 22–3, which summarizes the cost data in a matrix format to show both product costs and responsibility costs, without including the cost element details. If cost information in the cells of the matrix is added across a row, the total is responsibility accounting data, which is useful for management control purposes. If this information is instead added down a column, the total is product cost information, which is useful for pricing decisions and product profitability evaluation.

In addition to the department managers, some organizations have product managers who are responsible for the product costs in the columns of the matrix (as well as for their products' revenues). Such organizations are called *matrix organizations*, and in them both the columns and rows of part C represent responsibility centers.

Effectiveness and Efficiency

The performance of a responsibility center manager can be measured in terms of the effectiveness and efficiency of the work of the responsibility center. **Effectiveness** means how well the responsibility center does its job—that is, the extent to which it

ILLUSTRATION 22–3 Contrast Between Full Costs and Responsibility Costs

A. FULL PRODUCT COSTS

	Total	Product X	Product Y
Cost element:			
Direct material	$20,000	$14,000	$ 6,000
Direct labor	13,000	8,000	5,000
Indirect production	9,620	5,920	3,700
Selling and administration	5,500	3,645	1,855
Total costs	$48,120	$31,565	$16,555

B. RESPONSIBILITY COSTS

		Departments (Responsibility Centers)			
	Total	1	2	3	4
Cost element:					
Direct material	$20,000	$16,000	$ 4,000		
Direct labor	13,000	4,000	9,000		
Supervision	4,240	800	1,200	$ 840	$1,400
Other labor costs	6,970	1,500	170	2,200	3,100
Supplies	1,290	660	330	100	200
Other costs	2,620	880	440	500	800
Total costs	$48,120	$23,840	$15,140	$3,640	$5,500

C. IN MATRIX FORMAT

		Product X	Product Y	Responsibility Costs
Department	1	16,496	7,344	$23,840
	2	9,184	5,956	15,140
	3	2,240	1,400	3,640
	4	3,645	1,855	5,500
Product Costs		**$31,565**	**$16,555**	**$48,120**

produces the intended or expected results. **Efficiency** is used in its engineering sense—that is, the amount of output per unit of input. An efficient operation either produces a given quantity of outputs with a minimum consumption of inputs or produces the largest possible outputs from a given quantity of inputs.

Effectiveness is always related to the organization's objectives. Efficiency, per se, is not. An efficient responsibility center is one that does whatever it does with the lowest consumption of resources. However, if what it does (i.e., its output) is an inadequate contribution to the accomplishment of the organization's objectives, then it is ineffective.

Example If a department responsible for processing incoming sales orders does so at a low cost per order processed, it is efficient. If, however, the department is slow in answering customer queries about the status of orders, thus antagonizing customers to the point where they take their business elsewhere, the department is ineffective.

Stated informally, then, *efficiency* means "doing things right," whereas *effectiveness* means "doing the right things."

In many responsibility centers a measure of efficiency can be developed that relates actual costs to a number that expresses what costs *should* be for a given amount of output (that is, to a standard or budget). Such a measure can be a useful indication, but never a perfect measure, of efficiency for at least two reasons: (1) recorded costs are not a precisely accurate measure of resources consumed, and (2) standards are, at best, only approximate measures of what resource consumption ideally should have been in the circumstances prevailing.

A responsibility center should be both effective *and* efficient; it is not a case of one or the other. In some situations both effectiveness and efficiency can be encompassed within a single measure. For example, in profit-oriented organizations, profit measures the combined result of effectiveness and efficiency. When an overall measure does not exist, classifying the various performance measures used as relating either to effectiveness (e.g., warranty claims per 1,000 units sold) or efficiency (e.g., labor-hours per unit produced) is useful.

Types of Responsibility Centers

As previously noted, an important business goal is to earn a satisfactory return on investment (ROI). Return on investment is the ratio:

$$ROI = \frac{\text{Revenues} - \text{Expenses}}{\text{Investment}}$$

The three elements of this ratio lead to definitions of the types of responsibility centers important in management control systems. These are (1) revenue centers, (2) expense centers, (3) profit centers, and (4) investment centers.

Revenue Centers

If a responsibility center manager is held accountable for the outputs of the center as measured in monetary terms (revenues) but is not responsible for the costs of the goods or services that the center sells, then the responsibility center is a **revenue center.** Many companies treat regional sales offices as revenue centers. In retailing companies, it is customary to treat each selling department as a revenue center.

A sales organization treated as a revenue center usually has the additional responsibility for controlling its selling expenses (travel, advertising, point-of-purchase displays, and so on). Therefore, revenue centers are often expense centers as well. However, a revenue center manager is not responsible for the center's major cost item—its cost of goods and services sold. Thus, subtracting just the selling expenses for which the manager is responsible from the center's revenues does not result in a very meaningful number, and certainly does not measure the center's profit.

Expense Centers

If the control system measures the expenses (i.e., the costs) incurred by a responsibility center but does not measure its outputs in terms of revenues, then the responsibility center is called an **expense center.** Every responsibility center has outputs; that is, it does something. In many cases, however, measuring these outputs in terms of revenues is neither feasible nor necessary. For example, it would be extremely difficult to measure the monetary value of the accounting or legal department's outputs. Although measuring the revenue value of the outputs of an individual production department generally is relatively easy to do, there is no reason for doing so if the responsibility of the department

manager is to produce a stated *quantity* of outputs at the lowest feasible cost. For these reasons, most individual production departments and most staff units are expense centers.

Expense centers are not quite the same as cost centers. Recall from Chapter 18 that a cost center (or cost pool) is a device used in a full cost accounting system to collect costs that are subsequently to be charged to cost objects. In a given company most but not all cost centers are also expense centers. However, a cost center such as Occupancy is not a responsibility center at all and, hence, is not an expense center.

Standard cost centers

A special type of expense center in which standard costs have been set for many of its cost elements is called a **standard cost center.** Actual performance is measured by the *variances* between its actual costs and these standards (as was described in Chapter 20). Because standard cost systems are used in operations having a high degree of task repetition, such operations are also the settings for standard cost centers. Examples include all kinds of assembly-line operations, fast-food restaurants, blood-testing laboratories, and automobile service facilities. By contrast, most production support and corporate staff departments are not standard cost centers.

Profit Centers

Revenue is a monetary measure of outputs; expense (or cost) is a monetary measure of inputs, or resources consumed. Profit is the difference between revenue and expense. If performance in a responsibility center is measured in terms of the difference between (1) the revenues it earns and (2) the expenses it incurs, the responsibility center is a **profit center.**

In financial accounting, revenue is recognized only when it is realized by a sale to an outside customer. By contrast, in responsibility accounting, revenue measures the outputs of a responsibility center in a given accounting period *whether or not the company realizes the revenue in that period.* Thus, a factory is a profit center if it "sells" its output to the sales department and records the revenue and cost of such sales. Likewise, a service department, such as the corporate training department, may "sell" its services to the responsibility centers that receive these services. These "sales" generate revenues for the service department. Since the difference between sales revenues and the cost of these sales is profit, the service department is a profit center if both of these elements are measured.[2]

A given responsibility center is a profit center only if management *decides* to measure that center's outputs in terms of revenues. Revenues for a company as a whole are automatically generated when the company makes sales to the outside world. By contrast, revenues for an internal organization unit are recognized only if management decides that it is a good idea to do so. No accounting principle *requires* that revenues be measured for individual responsibility centers within a company. In recent years many companies in their total quality management programs have been emphasizing that every department has customers: some have external customers, others have internal customers. To reinforce this philosophy, many departments that formerly were expense centers have been converted to profit centers. With some ingenuity, practically any expense center could be turned into a profit center because some way of putting a selling price on the output of most responsibility centers can be found. The question is whether there are sufficient benefits in doing so.

[2] In some such service centers, the prices for the center's services are set with the intent of recovering exactly the costs of the services—that is, breaking even. Even though the goal is to earn zero profit, the center is still a profit center because it is responsible for both its revenues and expenses. In fact, a profit center can even have a negative profit goal, indicating that its budgeted costs exceed its budgeted revenues

Advantages of profit centers

A profit center resembles a business in miniature. Like a separate company, it has an income statement that shows revenues, expenses, and profit. Most of the decisions made by the profit center manager affect the numbers on this income statement. The income statement for a profit center, therefore, is a basic management control document. Because their performance is measured by profit, the managers of profit centers are motivated to make decisions about inputs and outputs that will increase the profit reported for their profit centers. Since they act somewhat as they would if they were running their own businesses, the profit center is a good training ground for general management responsibility. The use of the profit center concept is one of the important tools that has made possible the decentralization of profit responsibility in large companies.

Criteria for profit centers

In deciding whether to treat a responsibility center as a profit center, the following points are relevant:

1. Using the profit center idea involves extra recordkeeping. The profit center itself has the extra work of measuring output in revenue terms; the responsibility centers that receive its outputs have the work of recording the cost of goods or services received.
2. If the manager of a responsibility center has little authority to decide on the quantity and quality of its outputs or on the relation of output to costs, then a profit center is usually of little use as a control device. This does not imply that the manager of a profit center must have *complete* control over outputs and inputs; few, if any, managers have such complete authority.
3. When senior management requires responsibility centers to use a service furnished by another responsibility center, the service usually is furnished at no charge, and the service unit therefore is not a profit center. For example, if senior management requires internal audits, the audited units usually are not asked to pay for the cost of the internal auditing service, and the internal auditing unit therefore is not a profit center.
4. If outputs are fairly homogeneous (e.g., cement), a nonmonetary measure of output (e.g., tons of cement produced) may be adequate, and no substantial advantage may be gained in converting these outputs to a monetary measure of revenue.
5. To the extent that the profit center technique puts managers in business for themselves, it promotes a spirit of competition. In many situations, competition provides a powerful incentive for good management. In other situations, however, where organization units should cooperate closely with one another, the profit center device may generate excessive friction between profit centers, to the detriment of the company's overall welfare. Also, it may generate too much interest in short-run profits to the detriment of long-run results.

Transfer Prices

A **transfer price** measures the value of products (i.e., goods or services) furnished by a profit center to other responsibility centers within a company. It is to be contrasted with a *market price*, which measures exchanges between a company and its outside customers. Internal exchanges that are measured by transfer prices result in (1) *revenue*

for the responsibility center furnishing (i.e., selling) the product and (2) *cost* for the responsibility center receiving (i.e., buying) the product. Whenever a company has profit centers, transfer prices usually are required. There are two general types of transfer prices: the market-based price and the cost-based price.

Market-based transfer prices

If a market price for the product exists, a **market-based transfer price** is usually preferable to a cost-based price. The buying responsibility center should ordinarily not be expected to pay more internally than it would have to pay if it purchased from an outside vendor, nor should the selling center ordinarily be entitled to more revenue than it could obtain by selling to an outside customer. If the market price is abnormal, as when an outside vendor sets a low "distress" price in order to use temporarily idle capacity, then such temporary aberrations are ordinarily disregarded in arriving at transfer prices. The market price may be adjusted downward to reflect the fact that credit costs (e.g., bad debt losses) and possibly certain selling costs are not incurred in an internal exchange. This downward adjustment, usually only a few percentage points, assures that the buying center is not indifferent between buying within the company or on the outside.

Market-based prices, where available, are widely used.[3] They have the benefit of being reasonably objective rather than a function of the relative negotiating skills of the selling and buying profit center managers. Also, many companies expect their profit centers to deal with one another almost literally "at arm's length" as independent businesses, and market-based prices add to the realism of this business relationship. In practice, however, the "true" market price is sometimes not clear, because different suppliers may set different prices on essentially identical items. A clearly stated policy (e.g., "the lowest available price, after consideration of supplier reliability and other factors such as warranty, delivery, and credit terms") or an arbitration mechanism (described below) is needed to deal with these market-price ambiguities.

Cost-based transfer prices

In a great many situations, no reliable market price exists for use as a basis for the transfer price. In these situations a **cost-based transfer price** is used. If feasible, the cost should be a *standard* cost. If it is an actual cost, the selling responsibility center has little incentive to control efficiency, because any cost increases will be automatically passed on to the buying center in the transfer price.

[3] Based on a survey of 215 large corporations, S. C. Borkowski, "Environmental and Organizational Factors Affecting Transfer Pricing: A Survey," *Journal of Management Accounting Research* 2 (Fall 1990), p. 87, reported the prevalence of various transfer-pricing policies as follows:

Basis of Transfer Price	Percent
Market price	33
Negotiation	23
Full cost plus profit	17
Full cost	24
Variable costs	4
	100

Senior management may specify the method of computing cost and the amount of profit to be included in the transfer price in order to lessen the chance of arguments. To avoid disputes, any policy statement as to how costs and profit are to be computed must be thorough and carefully worded. In particular, short-term per-unit costs may be different from longer-term costs. There can also be questions as to whether all of the cost elements normally included in the seller's definition of full cost should be included in the definition of cost used to determine internal prices. Also, disputes—or at least resentment on the part of the buyer—may occur if market conditions have squeezed the seller's outside profit margins to a lower level than that specified in the policy statement.[4]

Negotiation and arbitration

Because of the potential areas for disagreement in both market-based and cost-based transfer pricing, such prices are sometimes negotiated between buyer and seller rather than being set by reference to outside prices or by a formula applied to the seller's costs. Also, the seller is sometimes willing to depart from the normal company transfer price policy. For example, the selling responsibility center may be willing to sell below the normal market price rather than lose the business, which could happen if the buying responsibility center took advantage of a temporarily low outside price. In such circumstances, the two parties negotiate a deal.

If either responsibility center manager lacks complete freedom to act or the parties have unequal bargaining powers, these negotiations will not always lead to an equitable result. The prospective buying center may not have **sourcing freedom**—the power of threatening to take its business elsewhere—or the prospective seller may not have the power of refusing to do the work. When such conditions exist, there usually needs to be an arbitration mechanism to settle transfer pricing disputes. Such negotiations and arbitration can be very time consuming.

> **Example** A U.S.–based automobile company decided to market a car in the United States that would be manufactured in one of the company's European plants. It took almost one full year for the European manufacturing profit center and the U.S. marketing profit center to reach agreement on the transfer price.

Risk of suboptimization

Usually, profit centers are not, in fact, legally independent business entities. (When they are legally separate, they have the same parent.) When they engage in transactions among themselves, there is sometimes the risk that a decision that will increase a given profit center's reported income will not increase the *total* company's income. This **risk of suboptimization** may exist when the selling profit center's normal transfer price is higher than its short-run costs, which is almost always the case.

> **Example** Division B buys Component X from Division A. Division B uses this component in Product Y. The current transfer price for X, which includes full costs plus a profit margin, is $50. Division B's *variable* cost of Product Y, including the $50 for Component X, is $150 per unit (i.e., $100 of variable cost is added by B's production and selling operations). Both currently have considerable excess capacity. This has led Division B to consider temporarily contribution pricing (described in Chapter 26) Product Y. Division B has the opportunity, without spoiling the market, to sell 1,000 units of Y to a new customer on

[4] If the buying and selling responsibility centers are located in different countries (e.g., GM selling items made in one of its U.S. parts plants to one of its European assembly plants), then the laws of *either country* may impact how the transfer price is set. The intent of the laws is to limit the extent to which profits can be shifted from a high-tax country to a low-tax country by manipulating the transfer price. Further discussion of these laws is beyond the scope of this introductory text.

a one-time basis for $145 per unit. Since this is less than B's $150 per unit variable cost, B rejects this opportunity.

However, it happens that A's variable cost for Component X is only $20 per unit, making the company's variable cost for Product Y only $120 per unit ($20 variable cost in A plus $100 in B). Thus, the company could earn a contribution of $25 per unit (= $145 price − $120 variable costs) on the deal that B has turned down. Adherence to the established transfer prices has therefore led to suboptimization for the company as a whole and for each division.

This example of suboptimization probably is found more often in textbooks than in practice. Since it is in the self-interest of both managers that the sale be made to the outside customer at a below-normal price, the sensible course of action is for them to get together and negotiate a mutually agreeable transfer price. This price would be higher than the selling division's variable cost but lower than its normal transfer price. In effect, the contribution margin from the transaction would be divided fairly between the two divisions.

Multiple criteria

Companies seek many things in their transfer pricing policies: objectivity, realism, fairness to all parties involved, a minimum of time spent in negotiating and arbitrating, and minimum risk of suboptimization. They also want the prices eventually to result in measured profits that reflect the "true" economics of each of the profit centers involved. For example, if Division A sells to Division B on an ongoing basis, corporate management does not want Division B to look more profitable than it really is solely because unrealistically low transfer prices result in profit arbitrarily being shifted from A to B. Such a hidden subsidy could lead to a decision to increase investment in Division B when in fact the expansion is not warranted. The various criteria listed above, particularly realism versus risk of suboptimization, often conflict. Not surprisingly, therefore, one frequently hears profit center managers express dissatisfaction with the particular transfer pricing approach used in their company.

Investment Centers

An **investment center** is a responsibility center in which the manager is held responsible for the use of assets as well as for profit.[5] It is, therefore, the ultimate extension of the responsibility idea. In an investment center the manager is expected to earn a satisfactory return on the assets employed in the responsibility center.

Many companies use a ratio of profit to investment to measure an investment center's return on investment. Return on assets (profit divided by total assets) and return on "net assets" or invested capital (profit divided by assets net of certain or all current liabilities) are commonly used, in part because these ROI measures correspond to ratios calculated for the company as a whole by outside securities analysts. Other companies measure an investment center's **residual income** (also more recently called **economic value added** or **EVA**), which is defined as profit (before interest expense) minus a capital charge. The capital charge is calculated by applying a rate to the investment in the center's assets or net assets.[6]

[5]Note that in an investment center, both profit *and* assets are measured. Many companies refer to both their profit centers and their investment centers as *profit centers*.

[6]In a survey of the *Fortune* 1,000 largest U.S. industrial firms, James S. Reece and William R. Cool found that of those companies having investment centers, 65 percent used only an ROI measure, 2 percent used only residual income, 28 percent used both ROI and residual income, and the remaining 5 percent either used some other method or did not disclose their method. (See "Measuring Investment Center Performance," *Harvard Business Review,* May–June 1978.) A more recent study reported that the use of residual income had increased to 36 percent. (Source: Vijay Govindarajan, "Profit Center Measurement: An Empirical Study," Working Paper, Amos Tuck School of Business Administration, Dartmouth College, 1994.)

Example Division Z of ABC Corporation is an investment center. In 19x1 the division's profit was $150,000 (net of interest expense of $30,000), and the division employed $1,000,000 of assets. For purposes of calculating residual income, ABC levies a 10 percent capital charge on assets employed. Division Z's ROI and residual income for the year would be calculated as follows:

$$ROI = \frac{\text{Profit}}{\text{Investment}} = \frac{\$150{,}000}{\$1{,}000{,}000} = 15 \text{ percent}$$

$$\begin{aligned}\text{Residual income} &= \text{Preinterest profit} - (\text{Capital charge} * \text{Investment}) \\ &= \$180{,}000 - (0.10 * \$1{,}000{,}000) = \$80{,}000\end{aligned}$$

Residual income is conceptually superior to ROI as a performance measure. Suppose the Division Z manager in the example above could increase profits by $12,000 a year by making an investment of $100,000. Because the 12 percent ($12,000 ÷ $100,000) return on this investment is less than the 15 percent average return the division is already earning, the manager may shy away from making this investment. However, if the incremental capital cost rate is truly 10 percent, the investment would increase corporate "wealth" by the amount of additional annual residual income the investment would produce: $12,000 − (0.10 * $100,000) = $2,000.

Despite its conceptual advantage, many companies do not use residual income as an investment center measure for two reasons. First, ROI percentages are ratios that can be used to compare investment centers of differing sizes, whereas residual income is an absolute dollar amount that is a function of the investment center's size. Second, a company's residual income is an internal figure that is not reported to shareholders and other outsiders.

Whether ROI or residual income is used, the measurement of assets employed—the investment base—poses many difficult problems. For example, consider cash. The cash balance of the company is a safety valve, or buffer, protecting the company against short-run fluctuations in funds requirements. Compared with an independent company, an investment center needs relatively little cash because it can obtain funds from headquarters on short notice. Part of the headquarters cash balance therefore exists for the financial protection of the investment centers and can logically be allocated to them as part of their capital employed. This cash can be allocated to investment centers in any of several ways.

Similar problems arise with respect to each type of asset that the investment center uses. Valuation of plant and equipment is especially controversial: Options include gross book value, net book value, and replacement cost. A discussion of these problems is outside the scope of this introductory treatment. For our present purpose, we need only state that many problems exist and that there is much disagreement as to the best solution. Despite these difficulties, a growing number of companies find it useful to create investment centers.[7]

The investment center approach is normally used only for a relatively "free-standing" product division—that is, a division that both produces and markets a line of goods or a set of services and significantly influences its own level of assets. This approach has the effect of "putting managers in business for themselves" to an even greater extent than does the profit center. Reports on performance show not only the amount of profit that the investment center has earned, which is the case with reports for a profit

[7]Govindarajan's 1994 survey (see footnote 6) found that 93 percent of the *Fortune* 1,000 companies had two or more profit centers. Companies considerably smaller than these 1,000 have also adopted the investment center measurement approach.

center, but also relates the profit to the amount of assets used in generating it (either through an ROI measure or residual income). This is obviously a more encompassing report on performance than a report that does not take into account the assets employed. On the other hand, the possible disadvantages mentioned above for profit centers exist in a magnified form in investment centers.

Two misconceptions

Some people think that the principal reason for using the investment center approach is to enhance control over *all* assets. This is not the case. Most companies exercise control over fixed assets via the capital investment procedures described in Chapter 27. This control precludes a responsibility center manager from unilaterally making large investments in fixed assets. Rather, the investment center approach primarily directs managers' attention to the *current* assets under their day-to-day control, particularly inventories and receivables.

Second, many companies monitor the ROI or residual income of their profit centers to see if the company is continuing to earn a satisfactory return on the capital tied up in those units. This measurement process *does not* make those units investment centers. Such a unit is an investment center only if its *manager is held accountable* for the ROI or residual income of the unit.

Nonmonetary Measures

The fact that each responsibility center is treated as either a revenue, expense, profit, or investment center does not mean that only monetary measures are used in monitoring its performance. Virtually all responsibility centers have important nonfinancial objectives: the quality of their goods or services, cycle times, customer satisfaction, employee morale, and so on. Particularly in expense centers such as staff units, these nonmonetary factors may be more important than monetary measures. Many companies employ, in addition to their monetary control systems, formal systems for establishing and measuring nonmonetary factors. Two systems in common use are **management by objectives** (MBO) systems and **Balanced Scorecard** systems; they are described in Chapter 24.

Summary

An organization consists of responsibility centers. Management control involves the planning and control of these centers' activities so they make the desired contributions toward achieving the organization's objectives. The management control environment includes the nature of the organization; its rules, guidelines, and procedures; its culture; and its external environment.

Responsibility centers use inputs and assets to produce outputs. Responsibility accounting focuses on planned and actual amounts for responsibility center inputs and outputs. It is to be contrasted with full cost accounting, which focuses on products rather than on responsibility centers.

There are four types of responsibility centers: revenue centers, in which outputs are measured in monetary terms; expense centers, in which inputs are measured in monetary terms; profit centers, in which both inputs and outputs are measured in monetary terms; and investment centers, in which both profits and assets employed are measured and related to each other. In profit centers and investment centers, a transfer price is used to measure products furnished to other responsibility centers. Nonmonetary measures are also important in all types of responsibility centers.

Problems

Problem 22–1.

Department 7 of the Arbia Company manufactures a variety of components for products, one of which is Part No. 211. Data on this part are as follows:

	Monthly Planned Cost	Actual Cost July	
	Per Unit	Per Unit	Total
Direct material and direct labor	$30.17	29.82	$29,820
Fixed costs, Department 12	6.49	6.88	6,880
Costs allocated to Department 12	13.83	14.29	14,290
Total	$50.49	$50.99	$50,990

Part No. 211 can be purchased from an outside vendor for $31.00.

Required

What costs are relevant for each of the following purposes?

a. For preparing financial statements for July?
b. For deciding whether to make or buy Part No. 211?
c. For assessing the performance of the manager of Department 7?

Problem 22–2.

Golub Company manufactures three products, A, B, and C. It has three marketing managers, one for each product. During the first year of operations, the company allocated its $30,000 of actual advertising expense to products on the basis of the relative net sales of each product. In the second year, the advertising budget was increased to $60,000. Half was spent on general institutional advertising in the belief the company image would be enhanced. Of the other half, $10,000 was spent on Product A, $15,000 on Product B, and $5,000 on Product C. For purposes of income measurement, all advertising expenses continued to be allocated on the basis of sales. Certain data in the second year were as follows:

	Total	Product A	Product B	Product C
Net sales	$460,000	$207,000	128,800	$124,200
Advertising expense	60,000	27,000	16,800	16,200
Income	55,000	25,500	12,000	17,500

When the marketing manager of Product A received these figures, he complained that his department was charged with an unfair portion of advertising, and that he should be held responsible only for the actual amount spent to advertise Product A.

Required:

a. Comment on the sales manager's complaint.
b. In Golob's responsibility accounting system, how much advertising expense should be charged to the department responsible for marketing Product A?

Problem 22–3.

The Top Division of C. Can Company manufactures metal tops that are used by other divisions of C. Can Company and that are also sold to external customers. The Hardware Division of C. Can Company has requested the Top Division to supply a certain top, Style H, and the Top Division has computed a proposed transfer price per thousand tops, as follows:

Variable cost	$195
Fixed cost	21
Total cost	216
Profit (to provide normal return on assets employed)	40
Transfer price	$256

The Hardware Division is unwilling to accept this transfer price because Style H tops are regularly sold to outside customers for $239 per thousand. The Top Division points out, however, that competition for this top is unusually keen, and that this is why it cannot price the top to external customers so as to earn a normal return. Both divisions are profit centers.

Required:

What should the transfer price be? (Explain your answer.)

Problem 22–4.

Urban Services, Inc., a management consulting group, is in its fourth year of operation. It consists of three independent groups: (1) legal services, (2) accounting services, and (3) portfolio management. All its revenue comes from physicians and dentists. It has no plans to expand its services outside these markets. Clients are billed at hourly rates for services rendered to them.

One group often performs services for another group. For example, after the accounting services group has decided that a client physician needs to shelter some of his or her income, it requests the portfolio management group to match the needs of the client with the best shelter possible for this client.

Corporate policy allows each group manager to operate his or her group as if it were a separate company. The following is representative of pricing and cost information for each group:

	Per Consulting Hours		
Group	Billing Rate	Variable Cost	Total Fixed Cost
Legal services	$115	$35.00	$396,000
Accounting services	140	46.00	462,000
Portfolio management	104	57.00	330,000

Required:

a. The staff of the portfolio management group is working at capacity with its own outside clients. If the legal services group wants to buy consulting ser-

vices from the portfolio management group, at what price per hour should the portfolio management group bill the legal services group?

b. Are there any conditions under which the portfolio management group should bill the legal services group at less than this price?

c. The accounting services group has been using about 1,400 hours per quarter of legal services group time at a rate of $115. If the legal services group manager decides to raise the rate 10 percent, should the accounting services group be forced by corporate management to pay the new rate in order to keep the business in the firm?

Cases

CASE 22–1 Shuman Automobiles, Inc.*

Clark Shuman, owner and general manager of an automobile dealership, was nearing retirement and wanted to begin relinquishing his personal control over the business's operations. (See Exhibit 1 for current financial statements.) The reputation he had established in the community led him to believe that the recent growth in his business would continue. His long-standing policy of emphasizing new-car sales as the principal business of the dealership had paid off, in Shuman's opinion. This, combined with close attention to customer relations so that a substantial amount of repeat business was generated, had increased the company's sales to a new high level. Therefore, he wanted to make organizational changes to cope with the new situation, especially given his desire to withdraw from any day-to-day managerial responsibilities.

Accordingly, Shuman divided up the business into three departments: new-car sales, used-car sales, and the service department. He then appointed three of his most trusted employees managers of the new departments: Janet Moyer, new-car sales; Paul Fiedler, used-car sales: and Nate Bianci, service department. All of these people had been with the dealership for several years.

Each manager was told to run her or his department as if it were an independent business. In order to give the new managers an incentive, their remuneration was to be calculated as a straight percentage of their department's gross profit.

Soon after taking over as manager of new-car sales, Janet Moyer had to settle upon the amount to offer a particular customer who wanted to trade his old car as a part of the purchase price of a new one with a list price of $14,400. Before closing the sale, Moyer had to decide the amount she would offer the customer for the trade-in value of the old car. She knew that if no trade-in were involved, she would deduct about 8 percent from the list price of this model new car to be competitive with several other dealers in the area. However, she also wanted to make sure that she did not lose out on the sale by offering too low a trade-in allowance.

During her conversation with the customer, it had become apparent that the customer had an inflated view of the worth of his old car, a far from uncommon event. In this case, it probably meant that Moyer had to be prepared to make some sacrifices to close the sale. The new car had been in stock for some time, and the model was not selling very well, so she was rather anxious to make the sale if this could be done profitably.

In order to establish the trade-in value of the car, the used-car manager, Fiedler, accompanied Moyer and the customer out to the parking lot to examine the car. In the course of his appraisal, Fiedler estimated the car would require reconditioning work costing about $840, after which the car would retail for about $7,100. On a wholesale basis, he could either buy or sell such a car, after reconditioning, for about $6,100. The retail automobile dealer's handbook of used-car prices, the "Blue Book," gave a cash buying price range of $5,500 to $5,800 for the trade-in model in good condition. This range represented the distribution of cash prices paid by automobile dealers for the model of car in the area in the past month. Fiedler estimated

*Copyright © by the President and Fellows of Harvard College. Harvard Business School case 177-033.

EXHIBIT 1

SHUMAN AUTOMOBILES, INC.
Income Statement
For the Year Ended December 31

Sales of new cars			$6,879,371
Cost of new-car sales*		$6,221,522	
Sales remuneration		137,470	6,358,992
			520,379
Allowances on trade†			154,140
New-car gross profit			366,239
Sales of used cars		3,052,253	
Cost of used-car sales*	$2,623,100		
Sales remuneration	92,815		
		2,715,915	
		336,338	
Allowances on trade†		56,010	
Used-car gross profit			280,328
			646,567
Service sales to customers		980,722	
Cost of work*		726,461	
		254,261	
Service work on reconditioning:			
Charge	238,183		
Cost*	245,915	(7,732)	
Service work gross profit			246,529
Dealership gross profit			893,096
General and administrative expenses			345,078
Income before taxes			$ 548,018

*These amounts include all costs assignable directly to the department, but exclude allocated general dealership overhead.
†Allowances on trade represent the excess of amounts allowed on cars taken in trade over their appraised value.

that he could get about $5,000 for the car "as is" (that is, without any work being done to it) at next week's regional used car auction.

The new-car department manager had the right to buy any trade-in at any price she thought appropriate, but then it was her responsibility to dispose of the car. She had the alternative of either trying to persuade the used-car manager to take over the car and accepting the used-car manager's appraisal price, or she herself could sell the car through wholesale channels or at auction. Whatever course Moyer adopted, it was her primary responsibility to make a profit for the dealership on the new cars she sold, without affecting her performance through excessive allowances on trade-ins. This primary goal, Moyer said, had to be "balanced against the need to satisfy the customers and move the new cars out of inventory—and there is only a narrow line between allowing enough on a used car and allowing too much."

After weighing all these factors, with particular emphasis on the personality of the customer, Moyer decided to allow $6,500 for the used car, provided the customer agreed to pay the list price for the new car. After a certain amount of haggling, during which the customer came down from a higher figure and Moyer came up from a lower one, the $6,500 allowance was agreed upon. The necessary papers were signed, and the customer drove off.

Moyer returned to the office and explained the situation to Joanne Brunner, who had recently joined the dealership as accountant. After listening with interest to Moyer's explanation of the sale, Brunner set

about recording the sale in the accounting records of the business. As soon as she saw that the new car had been purchased from the manufacturer for $12,240, she was uncertain as to the value she should place on the trade-in vehicle. Since the new car's list price was $14,400 and it had cost $12,240, Brunner reasoned that the gross margin on the new-car sale was $2,160. Yet Moyer had allowed $6,500 for the old car, which needed $840 of repairs and could be sold retail for $7,100 or wholesale for $6,100. Did this mean that the new-car sale involved a loss? Brunner was not at all sure she knew the answer to this question. Also, she was uncertain about the value she should place on the used car for inventory valuation purposes. Brunner decided that she would put down a valuation of $6,500, and then await instructions from her superiors.

When Fiedler, the used-car manager, found out what Brunner had done, he stated forcefully that he would not accept $6,500 as the valuation of the used car. He commented as follows:

> My used-car department has to get rid of that used car, unless Janet (Moyer) agrees to take it over herself. I would certainly never have allowed the customer $6,500 for that old tub. I wouldn't have given anymore than $5,260, which is the wholesale price less the cost of repairs. My department has to make a profit too, you know. My own income depends on the gross profit I show on the sale of used cars, and I won't stand for having my income hurt because Janet is too generous toward her customers!

Brunner replied that she had not meant to cause trouble but had simply recorded the car at what seemed to be its cost of acquisition, because she had been taught that this was the best accounting practice. Whatever response Fiedler was about to make to this comment was cut off by the arrival of Clark Shuman, the general manager, and Nate Bianci, the service department manager. Shuman picked up the phone and called Janet Moyer, asking her to come over right away.

"All right, Nate," said Shuman, "now that we are all here, would you tell them what you just told me?"

Bianci said, "Clark, the trouble is with this trade-in. Janet and Paul were right in thinking that the repairs they thought necessary would cost about $840. Unfortunately, they failed to notice that the rear axle is cracked; it will have to be replaced before we can retail the car. This will probably use up parts and labor costing about $640.

"Beside this," Bianci continued, "there is another thing that is bothering me a good deal more. Under the accounting system we've been using, I can't charge as much on an internal job as I would for the same job performed for an outside customer. As you can see from my department statement (Exhibit 2), I lost almost $8,000 on internal work last year. On a reconditioning job like this, which costs out at $1,480, I don't even break even. If I did work costing $1,480 for an outside customer, I would be able to charge about $2,000 for the job. The Blue Book gives a range of $1,960 to $2,040 for the work this car needs, and I have always aimed for about the middle of the Blue Book range.[1] That would give my department a gross profit of $520, and my own income is now based on that gross profit. Since a large proportion of the work of my department is the reconditioning of trade-ins for resale, I figure that I should be able to make the same charge for repairing a trade-in as I would get for an outside repair job."

Fiedler and Moyer both started to talk at once at this point. Fiedler managed to edge out Moyer: "This axle business is unfortunate, all right; but it's very hard to spot a cracked axle. Nate is likely to be just as lucky the other way next time. He has to take the rough with the smooth. It's up to him to get the cars ready for me to sell."

Moyer, after agreeing that the failure to spot the axle was unfortunate, added: "This error is hardly my fault, however. Anyway, it's ridiculous that the service department should make a profit on jobs it does for the rest of the dealership. The company can't make money when its left hand sells to its right."

At this point, Clark Shuman was getting a little confused about the situation. He thought there was a little truth in everything that had been said, but he was not sure how much. It was evident to him that some action was called for, both to sort out the present problem and to prevent its recurrence. He instructed Ms. Brunner, the accountant, to "work out how much we are really going to make on this whole deal," and then retired to his office to consider how best to get his managers to make a profit for the dealership.

[1] In addition to the monthly Blue Book for used-car prices, there was a monthly Blue Book that gave the range of charges for various classes of repair work, based on the actual charges made and reported by vehicle repair shops in the area.

EXHIBIT 2

SHUMAN AUTOMOBILES, INC
Analysis of Service Department Expenses
For the Year Ended December 31

	Customer Jobs	Reconditioning Jobs	Total
Number of jobs	3,780	468	4,248
Direct labor	$302,116	$ 98,820	$400,936
Supplies	103,966	32,755	136,721
Department overhead	84,592	27,670	112,262
	490,684	159,245	649,919
Parts	235,787	86,670	322,457
	726,461	245,915	972,376
Charges made for jobs to customers or other departments	980,722	238,183	1,218,905
Gross profit (loss)	245,261	(7,732)	246,529
General overhead proportion			140,868
Departmental profit for the year			$ 105,661

A week after the events described above, Clark Shuman was still far from sure what action to take to motivate his managers to make a profit for the business. During the week, Bianci had reported to him that the repairs to the used car had cost $1,594, of which $741 represented the cost of those repairs that had been spotted at the time of purchase, and the remaining $853 the cost of supplying and fitting a replacement for the cracked axle. To support his own case for a higher allowance on reconditioning jobs, Bianci had looked through the duplicate customer invoices over the last few months and had found examples of similar (but not identical) work to that which had been done on the trade-in car. The amounts of these invoices averaged $2,042, and the average of the costs assigned to these jobs was $1,512. (General overhead was not assigned to individual jobs.) In addition, Bianci had obtained from Ms. Brunner the cost analysis shown in Exhibit 2. Bianci told Shuman that this was a fairly typical distribution of the service department's expenses.

Questions

1. Suppose the new-car deal is consummated, with the repaired used car being retailed for $7,100, the repairs costing Shuman $1,594. Assume that all sales personnel are on salary (no commissions) and that general overhead costs are fixed. What is the dealership incremental gross profit on the total transaction (i.e., new and repaired-used cars sold)?
2. Assume each department (new, used, service) is treated as a profit center, as described in the case. Also assume in *a*–*c* that it is known with certainty *beforehand* that the repairs will cost $1,594.
   a. In your opinion, at what value should this trade-in (*un*repaired) be transferred from the new-car department to the used-car department? Why?
   b. In your opinion, how much should the service department be able to charge the used-car department for the repairs on this trade-in car? Why?
   c. Given your responses to *a* and *b*, what will be each department's incremental gross profit on this deal?
3. Is there a strategy in this instance that would give the dealership more profit than the one assumed above (i.e., repairing and retailing this trade-in used car)? Explain. In answering *this* question, assume the service department operates at capacity.
4. Do you feel the three-profit-center approach is appropriate for Shuman? If so, explain why, including an explanation of how this is better than other specific alternatives. If not, propose a better alternative and explain why it is better than three profit centers and any other alternatives you have considered.

CASE 22–2 Birch Paper Company*

"If I were to price these boxes any lower than $480 a gross," said James Brunner, manager of Birch Paper Company's Thompson Division, "I'd be countermanding my order of last month for our sales force to stop shaving their bids and to bid full cost quotations. I've been trying for weeks to improve the quality of our business. If I turn around now and accept this job at $430 or anything less than $480, I'll be tearing down this program I've been working so hard to build up. The division can't show a profit by putting in bids that don't even cover a fair share of overhead costs, let alone give us a profit."

Birch Paper Company was a medium-sized, vertically integrated paper company, producing white and kraft papers and paperboard. A portion of its paperboard output was converted into corrugated boxes by the Thompson Division, which also printed and colored the outside surface of the boxes. Including Thompson, the company had four producing divisions and a timberland division, which supplied part of the company's pulp requirements.

For several years each division had been judged on the basis of its profit and return on investment. Top management had been working to gain effective results from a policy of decentralizing responsibility for all decisions except those relating to overall company policy. Top management felt that the concept of decentralization had been successfully applied and that the company's profits and competitive position had definitely improved.

Early in the year, the Northern Division designed a special retail display box for one of its finished papers in conjunction with the Thompson Division, which was equipped to make the box. Thompson's package design and development staff spent several months perfecting the design, production methods, and materials that were to be used; because of the unusual color and shape, these were far from standard. According to an informal agreement between the two divisions, Thompson was reimbursed by Northern only for the out-of-pocket cost of its design and development work.

When the specifications were all prepared, the Northern Division asked for bids on the box from the Thompson Division and from two outside companies, West Paper Company and Erie Papers, Inc. Birch's division managers normally were free to buy from whichever supplier they wished, and even on sales within the company, divisions were expected to meet the going market price if they wanted the business.

At this time the profit margins of converters such as the Thompson Division were being squeezed. Thompson, like many other similar converters, bought its board, liner, or paper and printed, cut, and shaped it into boxes. Though it bought most of its materials from other Birch divisions, most of Thompson's sales were to outside customers. If Thompson got the order from Northern, it probably would buy its linerboard and corrugating medium from the Southern Division of Birch. The walls of a corrugated box consist of outside and inside sheets of linerboard sandwiching the corrugating medium.

About 70 percent of Thompson's out-of-pocket cost of $400 a gross for the order represented the cost of linerboard and corrugating medium. Though Southern had been running below capacity and had excess inventory, it quoted the market price, which had not weakened as a result of the oversupply. Its out-of-pocket costs on liner and corrugating medium were about 60 percent of selling price.

The Northern Division received bids on the boxes of $480 a gross from the Thompson Division, $430 a gross from West Paper, and $432 a gross from Erie Papers. Erie offered to buy from Birch the outside linerboard with the special printing already on it, but would supply its own inside liner and corrugating medium. The outside liner would be supplied by the Southern Division at a price equivalent to $90 per gross of boxes, and would be printed for $30 a gross by the Thompson Division. Of the $30, about $25 would be out-of-pocket costs.

Since this situation appeared to be a little unusual, William Kenton, manager of the Northern Division, discussed the wide discrepancy of bids with Birch's marketing vice president. He told the marketing vice president, "We sell in a very competitive market, where higher costs cannot be passed on. How can we be expected to show a decent profit and return on investment if we have to buy our supplies at more than 10 percent over the going market?"

Knowing that Brunner had on occasion in the past few months been unable to operate the Thompson Division at capacity, the marketing vice president thought it odd that Brunner would add the full 20 percent overhead and profit charge to his out-of-pocket costs. When asked about this over the telephone, Brunner's answer was the statement that appears at the beginning of this case. Brunner went on to say that having done the design and developmental work on the box at only out-of-pocket cost, he felt entitled to a normal markup on the production of the box itself.

The vice president thought about the cost structures of the various divisions. He remembered a comment the controller had made to the effect that costs that were variable for one division could be largely fixed for the company as a whole. He knew that in the absence of specific orders from top management, Kenton would accept the lowest bid, namely, that of West Paper for $430. However, it would be possible for top management to order the acceptance of another bid if the situation warranted such action. And though the volume represented by the transactions in question was less than 5 percent of the volume of any of the divisions involved, other transactions could conceivably raise similar problems later.

Questions

1. What are the additional costs to Birch Paper Company if Northern buys the boxes from West or Erie, rather than from Thompson?
2. Does the present system motivate Mr. Brunner in such a way that actions he takes in the best interests of the Thompson Division are also in the best interests of the Birch Paper Company? Explain.
3. What should the marketing vice president do?

CASE 22–3 Enager Industries, Inc.*

> I don't get it. I've got a new product proposal that can't help but make money, and top management turns thumbs down. No matter how we price this new item, we expect it to make $130,000 pretax. That would contribute 14 cents per share to our earnings after taxes, which is nearly as much as the 15-cent earnings-per-share increase in 1997 that the president made such a big thing about in the shareholders' annual report. It just doesn't make sense for the president to be touting e.p.s. while his subordinates are rejecting profitable projects like this one.

The frustrated speaker was Sarah McNeil, product development manager of the Consumer Products Division of Enager Industries, Inc. Enager was a relatively young company, which had grown rapidly to its 1997 sales level of over $74 million. (See Exhibits 1–3 for financial data for 1996 and 1997.)

Enager had three divisions, Consumer Products, Industrial Products, and Professional Services, each of which accounted for about one-third of Enager's total sales. Consumer Products, the oldest of the three divisions, designed, manufactured, and marketed a line of houseware items, primarily for use in the kitchen. The Industrial Products Division built one-of-a-kind machine tools to customer specifications; for example, it was a large "job shop," with the typical job taking several months to complete. The Professional Services Division, the newest of the three, had been added to Enager by acquiring a large firm that provided land planning, landscape architecture, structural architecture, and consulting engineering services. This division had grown rapidly, in part because of its capability to perform environmental impact studies.

Because of the differing nature of their activities, each division was treated as an essentially independent company. There were only a few corporate-level managers and staff people, whose job was to coordinate the activities of the three divisions. One aspect of this coordination was that all new project proposals requiring investment in excess of $500,000 had to be reviewed by the corporate vice president of finance, Henry Hubbard. It was Hubbard who had recently rejected McNeil's new product proposal, the essentials of which are shown in Exhibit 4.

Performance Evaluation

Prior to 1996, each division had been treated as a profit center, with annual division profit budgets negotiated between the president and the respective division general managers. In 1995, Enager's president, Carl Randall, had become concerned about high in-

*Copyright © by James S. Reece.

EXHIBIT 1

ENAGER INDUSTRIES, INC.
Income Statements
For 1996 and 1997
(thousands of dollars, except earnings per share figures)

	Year Ended December 31	
	1996	**1997**
Sales	$70,731	$74,225
Cost of sales	54,109	56,257
Gross margin	16,622	17,968
Other expenses:		
Development	4,032	4,008
Selling and general	6,507	6,846
Interest	994	1,376
Total	11,533	12,230
Income before taxes	5,089	5,738
Income tax expense	2,036	2,295
Net income	$ 3,053	$ 3,443
Earnings per share (500,000 and 550,000 shares outstanding in 1996 and 1997, respectively)	$6.11	$6.26

terest rates and their impact on the company's profitability. At the urging of Henry Hubbard, Randall had decided to begin treating each division as an investment center so as to be able to relate each division's profit to the assets the division used to generate its profits.

Starting in 1996, each division was measured based on its return on assets, which was defined as the division's net income divided by its total assets. Net income for a division was calculated by taking the division's "direct income before taxes" and then subtracting the division's share of corporate administrative expenses (allocated on the basis of divisional revenues) and its share of income tax expense (the tax rate applied to the division's "direct income before taxes" after subtraction of the allocated corporate administrative expenses). Although Hubbard realized there were other ways to define a division's income, he and the president preferred this method since "it made the sum of the [divisional] parts equal to the [corporate] whole."

Similarly, Enager's total assets were subdivided among the three divisions. Since each division operated in physically separate facilities, it was easy to attribute most assets, including receivables, to specific divisions. The corporate-office assets, including the centrally controlled cash account, were allocated to the divisions on the basis of divisional revenues. All fixed assets were recorded at their balance sheet values, that is, original cost less accumulated straight-line depreciation. Thus, the sum of the divisional assets was equal to the amount shown on the corporate balance sheet ($75,419,000 as of December 31, 1997).

In 1995 Enager had as its return on year-end assets (net income divided by total assets) a rate of 4.5 percent. According to Hubbard, this corresponded to a "gross return" of 9.3 percent; he defined gross return as equal to earnings *before* interest *and* taxes (EBIT) divided by assets. Hubbard felt that a company like Enager should have a gross EBIT return on assets of at least 12 percent, especially given the interest rates the corporation had paid on its recent borrowings. He therefore instructed each division manager that the division was to try to earn a gross return of 12 percent in 1996 and 1997. In order to help pull the

EXHIBIT 2

ENAGER INDUSTRIES, INC.
Balance Sheets
For 1996 and 1997
(thousands of dollars)

	As of December 31	
	1996	**1997**
Assets		
Current assets:		
Cash and temporary investments	$ 1,404	$ 1,469
Accounts receivable	13,688	15,607
Inventories	22,162	25,467
Total current assets	37,254	42,543
Plant and equipment:		
Original cost	37,326	45,736
Accumulated depreciation	12,691	15,979
Net	24,635	29,757
Investments and other assets	2,143	3,119
Total assets	$64,032	$75,419
Liabilities and Owners' Equity		
Current liabilities:		
Accounts payable	$ 9,720	$12,286
Taxes payable	1,210	1,045
Current portion of long-term debt	—	1,634
Total current liabilities	10,930	14,965
Deferred income taxes	559	985
Long-term debt	12,622	15,448
Total liabilities	24,111	31,398
Common stock	17,368	19,512
Retained earnings	22,553	24,509
Total owners' equity	39,921	44,021
Total liabilities and owners' equity	$64,032	$75,419

return up to this level, Hubbard decided that new investment proposals would have to show a return of at least 15 percent in order to be approved.

1996–1997 Results

Hubbard and Randall were moderately pleased with 1996's results. The year was a particularly difficult one for some of Enager's competitors, yet Enager had managed to increase its return on assets from 4.5 percent to 4.8 percent, and its gross return from 9.3 percent to 9.5 percent. The Professional Services Division easily exceeded the 12 percent gross return target; Consumer Products' gross return on assets was 8 percent; but Industrial Products' return was only 5.5 percent.

At the end of 1996, the president put pressure on the general manager of the Industrial Products Division to improve its return on investment, suggesting that this division was not "carrying its share of the

EXHIBIT 3 Ratio Analysis for 1996 and 1997

	1996	1997
Net income ÷ Sales	4.3%	4.6%
Gross margin ÷ Sales	23.5%	24.2%
Development expenses ÷ Sales	5.7%	5.4%
Selling and general ÷ Sales	9.2%	9.2%
Interest ÷ Sales	1.4%	1.9%
Asset turnover*	1.10x	0.98x
Current ratio	3.41	2.84
Quick ratio	1.38	1.14
Days' cash*	7.9	7.9
Days' receivables*	70.6	76.7
Days' inventories*	149.5	165.2
EBIT ÷ Assets*	9.5%	9.4%
Return on invested capital*,†,‡	6.9%	7.0%
Return on owners' equity*	7.6%	7.8%
Net income ÷ Assets*,§	4.8%	4.6%
Debt/capitalization*	24.0%	28.0%

*Ratio based on year-end balance sheet amount, not annual average amount.
†Invested capital includes current portion of long-term debt, excludes deferred taxes.
‡Adjusted for interest expense add-back.
§Not adjusted for add-back of interest; if adjusted, 1996 and 1997 ROA are both 5.7 percent.

load." The division manager had taken exception to this comment, saying the division could get a higher return "if we had a lot of old machines the way Consumer Products does." The president had responded that he did not understand the relevance of the division manager's remark, adding, "I don't see why the return on an old asset should be higher than that on a new asset, just because the old one cost less."

The 1997 results both disappointed and puzzled Carl Randall. Return on assets fell from 4.8 percent to 4.6 percent, and gross return dropped from 9.5 percent to 9.4 percent. At the same time, return on sales (net income divided by sales) rose from 4.3 percent to 4.6 percent, and return on owners' equity also increased, from 7.6 percent to 7.8 percent. These results prompted Randall to say the following to Hubbard:

> You know, Henry, I've been a marketer most of my career, but until recently I thought I understood the notion of return on investment. Now I see in 1997 our profit margin was up and our earnings per share were up; yet two of your return on investment figures were down while return on owners' equity went up. I just don't understand these discrepancies.
>
> Moreover, there seems to be a lot more tension among our managers the last two years. The general manager of Professional Services seems to be doing a good job, and she seems pleased with the praise I've given her. But the general manager of Industrial Products seems cool toward me every time we meet. And last week, when I was eating lunch with the division manager at Consumer Products, the product development manager came over to our table and expressed her frustration about your rejecting a new product proposal of hers the other day.
>
> I'm wondering if I should follow up on the idea that Karen Kraus in HRM brought back from the organization development workshop she attended over at the university. She thinks we ought to have a one-day off-site "retreat" of all the corporate and divisional managers to talk over this entire return on investment matter.

EXHIBIT 4 Financial Data from New Product Proposal

1. Projected asset investment:*	
Cash	$ 50,000
Accounts receivable	150,000
Inventories	300,000
Plant and equipment†	500,000
Total	$1,000,000
2. Cost data:	
Variable cost per unit	$ 3.00
Differential fixed costs (per year)‡	$ 170,000

3. Price/market estimates (per year):

Unit Price	Unit Sales	Break-Even Volume
$6.00	100,000 units	56,667 units
7.00	75,000	42,500
8.00	60,000	34,000

*Assumes 100,000 units' sales.
†Annual capacity of 120,000 units.
‡Includes straight-line depreciation on new plant and equipment.

Questions

1. Why was McNeil's new product proposal rejected? Should it have been? Explain.
2. Evaluate the manner in which Randall and Hubbard have implemented their investment center concept. What pitfalls did they apparently not anticipate?
3. What, if anything, should Randall do now with regard to his investment center measurement approach?

CASE 22–4 Piedmont University*

When Hugh Scott was inaugurated as the 12th president of Piedmont University in 1991, the university was experiencing a financial crisis. For several years enrollments had been declining and costs had been increasing. The resulting deficit had been made up by using the principal of "quasi-endowment" funds. For true endowment funds, only the income could be used for operating purposes; the principal legally could not be used. Quasi-endowment funds had been accumulated out of earlier years' surpluses with the intention that only the income on these funds would be used for operating purposes; however, there was no legal prohibition on the use of the principal. The quasi-endowment funds were nearly exhausted.

Scott immediately instituted measures to turn the financial situation around. He raised tuition, froze faculty and staff hirings, and curtailed operating costs. Although he had come from another university and was therefore viewed with some skepticism by the Piedmont faculty, Scott was a persuasive person, and the faculty and trustees generally agreed with his actions. In the year ended June 30, 1993, there was a small operating surplus.

In 1993, Scott was approached by Neil Malcolm, a Piedmont alumnus and partner of a local management consulting firm. Malcolm volunteered to examine the situation and make recommendations for permanent measures to maintain the university's financial health. Scott accepted this offer.

Malcolm spent about half of his time at Piedmont for the next several months and had many conversations with Scott, other administrative officers,

and trustees. Early in 1994 he submitted his report. It recommended increased recruiting and fundraising activities, but its most important and controversial recommendation was that the university be reorganized into a set a profit centers.

At that time the principal means of financial control was an annual expenditure budget submitted by the deans of each of the schools and the administrative heads of support departments. After a dean or department head discussed a budget with the president and financial vice president, it was usually approved with only minor modifications. There was a general understanding that each school would live within the faculty size and salary numbers in its approved budget, but not much stress was placed on adhering to the other items.

Malcolm proposed that in the future the deans and other administrators submit budgets covering both the revenues and the expenditures for their activities. The proposal also involved some shift in responsibilities, and new procedures for crediting revenues to the profit centers that earned them and charging expenditures to the profit centers responsible for them. He made rough estimates of the resulting revenues and expenditures of each profit center using 1993 numbers; these are given in Exhibit 1.

Several discussions about the proposal were held in the University Council, which consisted of the president, academic deans, provost, and financial vice president. Although there was support for the general idea, there was disagreement on some of the specifics, as described below.

Central administrative costs

Currently, no university-wide administrative costs were charged to academic departments. The proposal was that these costs would be allocated to profit centers in proportion to the relative costs of each. The graduate school deans regarded this as unfair. Many costs incurred by the administration were in fact closely related to the undergraduate school. Furthermore, they did not like the idea of being held responsible for an allocated cost that they could not control.

Gifts and endowment

The revenue from annual gifts would be reduced by the cost of fund-raising activities. The net amount of annual gifts plus endowment income (except gifts and income from endowment designated for a specified school) would be allocated by the president according to his decision as to the needs of each school, subject to the approval of the Board of Trustees. The deans thought this was giving the president too much authority. They did not have a specific alternative, but thought that some way of reducing the president's discretionary powers should be developed.

Athletics

Piedmont's athletic teams did not generate enough revenue to cover the costs of operating the athletic department. The proposal was to make this department self-sufficient by charging fees to students who participated in intramural sports or who used the swimming pool, tennis courts, gymnasium, and other facilities as individuals. Although there was no strong opposition, some felt that this would involve student dissatisfaction, as well as much new paperwork.

Maintenance

Each school had a maintenance department that was responsible for housekeeping in its section of the campus and for minor maintenance jobs. Sizable jobs were performed at the school's request by a central maintenance department. The proposal was that in the future the central maintenance department would charge schools and other profit centers for the work they did at the actual cost of this work, including both direct and overhead costs. The dean of the business school said that this would be acceptable provided that profit centers were authorized to have maintenance work done by an outside contractor if its price was lower than that charged by the maintenance department. Malcolm explained that he had discussed this possibility with the head of maintenance, who opposed it on the grounds that outside contractors could not be held accountable for the high quality standards that Piedmont required.

Computers

Currently, the principal mainframe computers and related equipment were located in and supervised by the engineering school. Students and faculty members could use them as they wished, subject to an informal check on overuse by people in the computer rooms. About one-fourth of the capacity of these computers was used for administrative work. A few departmental mainframe computers and hundreds of microcomputers and word processors were located throughout the university, but there was no central record of how many there were.

The proposal was that each user of the engineering school computers would be charged a fee based on

EXHIBIT 1 Rough Estimates of 1993 Impact of the Proposals (millions of dollars)

	Revenues	Expenditures
Profit center:		
Undergraduate liberal arts school	$ 42.0	$ 40.9
Graduate liberal arts school	7.8	16.1
Business school	21.4	17.2
Engineering school	23.8	24.2
Law school	9.4	9.1
Theological school	1.7	4.8
Unallocated revenue*	7.0	—
Total, academic	$113.1	$112.3
Other:		
Central administration	$ 14.1	$ 14.1
Athletics	3.6	3.6
Computers	4.8	4.8
Central maintenance	8.0	8.0
Library	4.8	4.8

*Unrestricted gifts and endowment revenue, to be allocated by the president.

usage. The fee would recover the full cost of the equipment, including overhead. Each school would be responsible for regulating the amount of cost that could be incurred by its faculty and students so that the total cost did not exceed the approved item in the school's budget. (The mainframe computers had software that easily attributed the cost to each user.) Several deans objected to this plan. They pointed out that neither students nor faculty understood the potential value of computers and that they wanted to encourage computer usage as a significant part of the educational and research experience. A charge would have the opposite effect, they maintained.

Library

The university library was the main repository of books and other material, and there were small libraries in each of the schools. The proposal was that each student and faculty member who used the university library would be charged a fee, either on an annual basis, or on some basis related to the time spent in the library or the number of books withdrawn. (The library had a secure entrance at which a guard was stationed, so a record of who used it could be obtained without too much difficulty.) There was some dissatisfaction with the amount of paperwork that such a plan would require, but it was not regarded as being as important as some of the other items.

Cross registration

Currently, students enrolled at one school could take courses at another school without charge. The proposal was that the school at which a course was taken would be reimbursed by the school in which the student was enrolled. The amount charged would be the total semester tuition of the school at which the course was taken, divided by the number of courses that a student normally would take in a semester, with adjustments for variations in credit hours.

Questions

1. How should each of the issues described above be resolved?
2. Do you see other problems with the introduction of profit centers? If so, how would you deal with them?
3. What are the alternatives to a profit center approach?
4. Assuming that most of the issues could be resolved to your satisfaction, would you recommend that the profit center idea be adopted, or is there an alternative that you would prefer?

Chapter Twenty-Seven

Longer-Run Decisions: Capital Budgeting

Chapter 26 discussed types of alternative choice problems with a relatively short time horizon. Such short-run decisions do not commit, or lock in, the organization to a certain course of action over a considerable period in the future. Similarly, they usually do not significantly affect the amount of funds that must be invested in the organization. In this chapter we extend the discussion of alternative choice decisions to those that involve relatively long-term differential investments of capital. Such problems are called **capital investment problems;** they are also commonly called **capital budgeting problems** because a capital budget is a list of the capital investment projects that an organization has decided to carry out.

In these problems differential costs and revenues are treated the same as in Chapter 26; the only difference is that the longer time horizon of capital budgeting problems magnifies the problems of estimating these cost and revenue items. However, the long-term investment aspect of capital budgeting problems leads to a more complicated analytical approach. It is important that these complications be mastered because capital budgeting decisions *do* lock in the organization to a course of action for several, perhaps many, future years.

Nature of the Problem

When an organization purchases a long-lived asset, it makes an investment similar to that made by a bank when it lends money. The essential characteristic of both types of transactions is that cash is committed today in the expectation of recovering that cash plus some additional cash in the future: The investor commits cash today with the expectation of receiving both a return *of* the investment and a satisfactory return *on* the investment.

In the case of the bank loan, the return of investment is the repayment of the principal and the return on investment is the inflow of interest payments received over the life of the loan. In the case of the long-lived asset, both the return of investment and the return on investment are in the form of *cash earnings* generated by use of the asset. If, over the life of the investment, the inflows of cash earnings exceed the initial investment outlays, then we know that the original investment was recovered (return of investment) and that some profit was earned (positive return on investment). Thus, an **investment** is the purchase of an expected future stream of cash inflows.

When an organization considers whether or not to purchase a new long-lived asset, the essential question is whether the future cash inflows are likely to be large enough to warrant making the investment. The problems discussed in this chapter all have this general form: A certain amount is proposed for investment now in the expectation that the investment will generate a stream of cash inflows in future years; are the anticipated future cash inflows large enough to justify investing funds in the proposal? Some illustrative problems are described here:

Replacement. Shall we replace existing equipment with more efficient equipment? The future expected cash inflows on this investment are the cost savings resulting from lower operating costs, or the profits from additional volume produced by the new equipment, or both.

Expansion. Shall we build or otherwise acquire a new facility? The future expected cash inflows on this investment are the cash profits from the goods and services produced in the new facility.

Cost reduction. Shall we buy equipment to perform an operation now done manually? That is, shall we spend money in order to save money? The expected future cash inflows on this investment are savings resulting from lower operating costs.

Choice of equipment. Which of several proposed items of equipment shall we purchase for a given purpose? The choice often turns on which item is expected to give the largest return on the investment made in it.

New product. Should a new product be added to the line? The choice turns on whether the expected cash inflows from the sale of the new product are large enough to warrant the investment in equipment, working capital, and the costs required to make and introduce the product.

General Approach

All these problems involve two quite dissimilar types of amounts. First, there is the investment, which is usually made in a lump sum at the beginning of the project. Although not literally made today, it is made at a specific point in time that for analytical purposes is called *today*, or Time Zero. Second, there is a stream of cash inflows expected to result from this investment over a period of future years.

These two types of amounts cannot be compared directly with one another because they occur at different times. To make a valid comparison, we must bring the amounts involved to equivalent values at the same point in time. The most convenient point is at Time Zero. We need not adjust the amount of the investment since it is already stated at its Time Zero (present) value. We need only to convert the stream of future cash inflows to their present value equivalents so that we can then compare them directly with the amount of the investment.[1]

Net Present Value

To do this, we multiply the cash inflow for each year by the present value of $1 for that year at the appropriate rate of return (Appendix Table A, page 931). This process is called **discounting** the cash inflows. The rate at which the cash inflows are discounted is called the **required rate of return,** the **discount rate,** or the **hurdle rate.** The difference between the present value of the cash inflows and the amount of investment is called the **net present value (NPV).** If the NPV is a nonnegative amount, the proposal is acceptable.

Example A proposed investment of $1,000 is expected to produce cash inflows of $625 per year for each of the next two years. The required rate of return is 14 percent. The present value of the cash inflows can be compared with the present value of the investment as follows:

	Year	Amount	Discount Factor (Table A)	Total Present Value
Cash inflow	1	$ 625	0.877	$ 548
Cash inflow	2	625	0.769	481
Present values of cash inflows				1,029
Less: Investment	0	1,000		1,000
Net present value			1.000	$ 29

The proposed investment is acceptable.

[1] If the reader is not familiar with the concept of present value, the Appendix to Chapter 8 (up to the section titled Calculating Bond Yields) should be read before continuing with this chapter. (As an aid to understanding, the calculations shown here are done manually. In practice, they are greatly simplified by the use of computers.)

The decision rule given above is a general rule, and some qualifications to it will be discussed later.

Return on Investment

So far, we have shown how the net present value can be calculated if the investment, cash inflows, and the required rate of return are given. It is useful to look at the situation from another viewpoint: How can the rate of return be calculated when the investment and the cash inflows are given?

Consider a bank loan. Assume that a bank lends $25,000 and receives interest payments of $2,500 at the end of each year for five years, with the $25,000 loan principal being repaid at the end of the fifth year. It is correct to say that the bank earned a return of 10 percent on its investment of $25,000. The return percentage is found by dividing the annual cash inflow by the amount of investment that was outstanding (i.e., unrecovered) during the year. In this case the amount of loan outstanding each year was $25,000 and the cash inflow was $2,500 in each year, so the rate of return was $2,500 ÷ $25,000 = 10 percent.

If, however, a bank lends $25,000 and is repaid $6,595 at the end of each year for five years, the problem of finding the return is more complicated. In this case only part of each year's $6,595 cash inflow represents the return *on* investment, and the remainder is a repayment of the principal (return *of* investment). This is the same loan that was used in the Kinnear Company example in the Appendix to Chapter 8. As was demonstrated there, this loan also has a return of 10 percent, in the same sense as did the loan described in the preceding paragraph: The $6,595 annual payments will recover the $25,000 loan investment and in addition will provide a return of 10 percent of the amount of *unrecovered* investment (principal still outstanding) each year. The fact that the return is 10 percent is demonstrated in Illustration 8–1. Of the $6,595 repaid in the first year, $2,500, or 10 percent of the $25,000 then outstanding, is the return; the $4,095 remainder of the payment reduces the principal down to $20,905. In the second year $2,091 is a return of 10 percent on the $20,905 of principal then outstanding, and the $4,504 remainder reduces the principal to $16,401. And so on.

As seen in the above example, when an investment involves annual interest payments with the full amount of the investment being recovered in a lump sum at the end of the investment's life, the computation of the return is simple. But when the annual payments combine both principal and interest, the computation is more complicated. Some investment problems are of the simple type. For example, if a business buys land for $25,000, rents it for $2,500 a year for five years, and then sells it for $25,000 at the end of five years, the return is 10 percent. Many capital investment decisions, on the other hand, relate to depreciable assets, which characteristically have little or no resale value at the end of their useful life. The cash inflows must therefore be large enough for the investor both to recover the investment itself during its life and also to earn a satisfactory return on the amount not yet recovered, just as in the situation shown in Illustration 8–1.

Stream of cash inflows

The cash inflows on most capital investments are a series of amounts received over several future years. Calculating the present value of a series, or stream, of cash inflows was explained in the Appendix to Chapter 8. Recall that for a *level* stream (i.e., equal annual inflows), the factors in Appendix Table B on page 932 can be used.

Table A and Table B are often used in combination, as shown in the next Example. This example also demonstrates that the return on investment for the business renting its land, mentioned above, is indeed 10 percent.

Example A proposed investment of $25,000 is expected to generate annual cash inflows of $2,500 a year for the next five years, with the $25,000 to be recovered in a lump sum at the end of the fifth year. Is this proposal acceptable if the required rate of return is 10 percent?

As shown by the following calculation, the cash inflows discounted at 10 percent have a present value of $25,000, which is equal to the original investment. Thus, the investment's return is 10 percent, and it is therefore acceptable.

Year	Inflow	10 Percent Discount Factor	Present Value
1–5	$2,500/yr.	3.791 (Table B)	$ 9,478
End of 5	$ 25,000	0.621 (Table A)	15,525
Total present value			$25,003*

*Would be $25,000 if discount factors included more decimal places.

Other compounding assumptions

Tables A and B are constructed on the assumption that cash inflows are received once a year, on the last day of the year. For many problems this is not a realistic assumption because cash in the form of increased revenues or lower costs is likely to flow in throughout the year. Nevertheless, annual tables are customarily used in capital investment problems on the grounds that (1) they are easier to understand than tables constructed on other assumptions, such as monthly or continuous compounding, and (2) they are good enough, considering the inevitable margin of error in the basic estimates.

Annual tables *understate* the present value of cash inflows if these inflows are, in fact, received throughout the year rather than entirely on the last day of the year. Tables are available showing the present values of earnings flows that occur quarterly, monthly, or even continuously.

Example The table below illustrates the degree to which annual tables understate the present value of inflows received during the year. The numbers in the table show the ratio of the present value of periodic, within-the-year receipts to the present value of an equal annual total received at the end of one year. For example, the table shows that if the discount rate is 10 percent and cash inflows are received continuously, then the use of a PV table that assumes year-end inflows will understate the present value of the inflows by 4.7 percent.

	Discount Rates			
Frequency of Inflow	6 Percent	10 Percent	15 Percent	25 Percent
Semiannually	1.014	1.023	1.032	1.049
Monthly	1.026	1.043	1.062	1.096
Continuously	1.029	1.047	1.068	1.106

Estimating the Variables

We now discuss how to estimate each of the five elements involved in capital investment calculations. These are:

1. Required rate of return.

2. Economic life (number of years for which cash inflows are anticipated).
3. Amount of cash inflow in each year.
4. Amount of investment.
5. Terminal value.

Required Rate of Return

Two alternative ways of arriving at the required rate of return—trial and error, and cost of capital—will be described here.

Trial and error

Recall that the higher the required rate of return, the lower the present value of the cash inflows. It follows that the higher the required rate of return, the fewer the investment proposals that will have cash inflows whose present value exceeds the amount of the investment. Thus, if a given rate results in the rejection of many proposed investments that management intuitively feels are acceptable, or if not enough proposals are being sent to senior management for final approval, the indication is that this rate is too high. Conversely, if a given rate results in senior management's receiving a flood of project proposals, the indication is that the rate is too low. As a starting point in this trial-and-error process, a company may select a rate that other companies in the same industry use.

Cost of capital

In economic theory the required rate of return should be equal to the company's cost of capital. This is the cost of debt capital plus the cost of equity capital, weighted by the relative amount of each in the company's capital structure.

Example Assume a company in which the cost of debt capital (e.g., bonds) is 5 percent, the cost of equity capital (e.g., common stock) is 15 percent, 30 percent of the total capital is debt, and 70 percent of capital is equity. The cost of capital is calculated as follows:

Type	Capital Cost	Weight	Weighted Cost
Debt (bonds)	5%	0.3	1.5%
Equity (stock)	15	0.7	10.5
Total		1.0	12.0%

In the example the 5 percent used as the cost of debt capital may appear to be low. It is low because it has been adjusted for the income tax effect of debt financing. Since interest on debt is a tax-deductible expense, each additional dollar of interest expense ultimately costs the company only $0.60 (assuming a tax rate of 40 percent) because income taxes are reduced by $0.40 for each additional interest dollar. For reasons to be explained, capital investment calculations should be made on an after-tax basis, so the rate of return should be an after-tax rate.

The problem with the cost-of-capital approach is that, although the cost of debt is usually known within narrow limits, the cost of equity is difficult to estimate. Conceptually, the cost of equity capital is the rate of return that equity investors expect to earn on their investment in the company's stock. These expectations are reflected in the stock's market price. Unfortunately, getting from the concept of the cost of equity to a specific number can be a difficult trip. Some companies use the capital asset pric-

ing model (CAPM) to make the estimate. This method, the use of which requires that the company's shares be publicly traded, is described in finance texts. Suffice it to say here that the cost of equity capital is an estimate, and, unless the company's stock is actively traded, the estimate is quite imprecise.[2]

Selection of a rate

Most companies use a judgmental approach in establishing the required rate of return. Either they experiment with various rates by the trial-and-error method described above, or they judgmentally settle upon a rate because they feel elaborate calculations are likely to be fruitless.

The required rate of return selected by the methods described above applies to investment proposals of average risk. (*Average* here refers to the risk of all of the firm's existing investments considered as a whole.) In general, the return demanded for an investment varies directly with the investment's risk. Thus, the required return for an individual investment project of greater-than-average risk should be higher than the average rate of return on all projects. Conversely, a project with below-average risk should have a lower required rate.

Effect of nondiscretionary projects

Some investments are made to meet environmental, health, and safety requirements or to enhance employee wellness and satisfaction rather than based on an analysis of their profitability. These are often classified as necessity projects. Examples include pollution-control equipment, installation of devices to protect employees from injury, and in-company day care and recreational facilities. These investments use capital but provide no readily identifiable cash inflows. Thus, if the other, profit-enhancing discretionary investments had a net present value of zero when discounted at the cost of capital, the company would not recover all of its capital costs. The discretionary projects not only must stand on their own feet but also must carry the capital-cost burden of the nondiscretionary (i.e., necessity) projects. For this reason many companies use a required rate of return that is higher than the cost of capital.

> **Example** Zelph Company typically has $10 million invested in capital projects, 20 percent of which represents necessity projects. If Zelph's cost of capital is 12 percent, its capital projects must earn $1.2 million per year in addition to recovering the amount invested. The $8 million of discretionary projects must therefore earn 15 percent, not 12 percent (because $8 million * 0.15 = $1.2 million). Even the 15 percent is an understatement, because the $2 million capital invested in the necessity projects must also be recovered.

Economic Life

The **economic life of an investment** is the number of years over which cash inflows are expected as a consequence of making the investment. Even though cash inflows may be expected for an indefinitely long period, the economic life is usually set at a specified maximum number of years, such as 10, 15, or 20. This maximum is often shorter than the life actually anticipated both because of the uncertainty of cash inflow estimates for distant years and because the present value of cash inflows for distant years is so low that the amount of these cash inflows has no significant effect on

[2]For regulated public utilities the cost of equity capital is treated as a cost that a utility is allowed to recover, along with operating costs and interest, through the rates the utility charges its customers. In rate hearings conducted by public utility commissions, the cost of equity is always an issue, with each side's expert witnesses supporting different numbers as being correct.

the calculation. For example, at a discount rate of 12 percent, a $1 cash inflow in year 21 has a present value of only 9.3 cents.

The end of the period selected for the economic life is called the **investment horizon,** which suggests that beyond this time cash inflows are not visible. Economic life can rarely be estimated exactly. Nevertheless, it is important that the best possible estimate be made, for the economic life has a significant effect on the calculations.

When a proposed project involves the purchase of equipment, the economic life of the investment corresponds to the estimated service life of the equipment to the user. When thinking about the life of equipment, there is a tendency to consider primarily its physical life—the number of years until the equipment wears out. Although the physical life is an upper limit, in most cases the economic life of the equipment is considerably shorter than its physical life. The primary reason is that technological progress makes equipment obsolete and the investment in the equipment will cease to earn a return when it is replaced by even better equipment. (Computers provide an extreme example.)

The economic life also ends when the entity ceases to make profitable use of the equipment. This can happen because the operation performed by the equipment is made unnecessary by a change in style or process, because the market for the product made with the equipment has vanished, or because the entity decides (for whatever reason) to discontinue the product.

The key question is: Over what period of time is the investment likely to generate cash inflows for this entity? When the investment no longer produces cash inflows, its economic life has ended. In view of the uncertainties associated with the operation of an organization, most managers are conservative in estimating what the economic life of a proposed investment will be.

Cash Inflows

The earnings from an investment are the additional amounts of *cash* expected to flow in as a consequence of making the investment as compared with what the cash inflows would be if the investment were not made. The *differential* concept emphasized in the preceding chapter is therefore equally applicable here, and the discussion in that chapter should carefully be kept in mind in estimating cash inflows for the type of problem now being considered. In particular, recall that the focus is on cash inflows. Accounting numbers based on the accrual concept are not necessarily relevant.

Consider, for example, a proposal to replace existing equipment with better equipment. What are the cash inflows associated with this proposal? First, the existing equipment must still be usable. If it no longer works, there is no alternative and hence no analytical problem; it must be replaced. The comparison, therefore, is between (1) continuing to use the existing equipment (the base case) and (2) investing in the proposed equipment. The existing equipment has certain labor, material, power, repair, and other costs associated with its future operation. If the new equipment is proposed as a means of reducing costs, there will be different, lower costs associated with its use. The difference between these two amounts of cost is the cash inflow anticipated if the new equipment is acquired. (Note that in this example, the differential cash inflow is really a reduction in cash outflows.)

If the proposed equipment is not a replacement but instead increases productive capacity, the differential income from the higher sales volume is a cash inflow anticipated from the use of the proposed equipment. This differential income is the difference between the added sales revenue and the additional costs required to produce that sales revenue. These differential costs include any material, labor, selling costs, or other costs that would not be incurred if the increased volume were not produced and sold.

Often a project's cash flows can be analyzed with an implicit base case of the status quo, but this is not always a valid approach. For example, if a company chooses not to invest in more modern equipment, it may lose market position to competitors who are investing in such equipment. In this instance the base case will involve a worsening of present results rather than a level continuation of them. Thus, the cash flow analysis of the investment must be done carefully to ensure that the differential flows in fact reflect the difference between a "better future" (if the investment is made) and a "deteriorating past" (if it is not made).

Inflation

If inflation is expected to continue in future years, the purchasing power of a $1 cash inflow decreases as the length of time until the inflow will be received increases. The question arises as to whether future inflows should therefore be restated in terms of current (*Time Zero*) purchasing power before discounting them. In general, the answer is no. This is because the discount rate already includes an inflation component: The discount rate is higher if inflation is expected than the rate would be if there were no expectations of future inflation. The rate is higher either because (1) management intentionally increases the rate to account for future inflation or (2) because the company's cost of capital reflects the financial markets' inflation expectations (e.g., bond interest rates are higher in inflationary periods than in periods of stable prices).[3]

Depreciation

Depreciation on the proposed equipment is *not* an item of differential cost. In capital investment problems we are analyzing *cash* flows. The cash flow associated with acquisition of equipment is an *outflow* at Time Zero. This cash outflow is the amount of the investment against which the present value of the expected future cash inflows is compared. Because of the matching concept, accrual accounting capitalizes this initial cost as an asset and then uses a depreciation method to charge this cost systematically to the periods in which the asset is used. Recall that the accounting entry to record depreciation (dr. Depreciation Expense, cr. Accumulated Depreciation) has no impact on cash. Not only do these depreciation entries not affect cash; to treat them as outflows would result in double-counting the cost of the equipment in the present value analysis.

Depreciation on the existing equipment is likewise not relevant because the book value of existing equipment represents a sunk cost. For the reason explained in the preceding chapter, sunk costs should be disregarded.

Income tax impact For alternative choice problems in which no investment is involved, aftertax income is 60 percent of pretax income, assuming a tax rate of 40 percent.[4] Thus, if a proposed cost-reduction method is estimated to save $10,000 a year pretax, it will save $6,000 a year after tax. Although $6,000 is obviously not as welcome as $10,000 would be, the proposed cost-reduction method would increase income; in the absence of arguments to the contrary, the decision should be made to adopt it. This is the case with *all* the alternative choice problems discussed in the

[3] If the cash flows being discounted are expressed in constant-dollar terms, it is important that the discount rate not include an element for inflation (or an *inflation premium* as it is called in some finance texts). Otherwise the cash flows would be doubly discounted for inflation, and the net present value would be understated.

[4] As of 1997, the effective federal tax rate on corporations with $18.3 million or more taxable income was 35 percent. (The other extreme of the graduated rate structure was a 15 percent rate for companies earning up to $50,000 pretax.) In examples in this book, we use a 40 percent tax rate because (*a*) it makes illustrative calculations simpler to understand than would using 35 percent and (*b*) many corporations pay state and/or local taxes on income that raise their overall rate to around 40 percent.

ILLUSTRATION 27–1 Calculation of Net Present Value with Tax Shield

Assumed situation: A proposed machine costs $10,000 and will provide estimated pretax cash inflows of $3,500 per year for five years. The required rate of return is 12 percent, the tax rate is 40 percent, and straight-line depreciation is used.

	Taxable Income Calculation	Present Value Calculation
Annual pretax cash inflow	$3,500	$ 3,500
Less: Additional depreciation	−2,000	
Differential taxable income	1,500	
Differential income tax ($1,500 * 40%)		−600
Aftertax annual cash inflow		2,900
Present value of $2,900 over 5 years (factor = 3.605)		10,779
Less: Investment		10,000
Net present value		$ 779

The proposal is acceptable.

preceding chapter: If the proposal is acceptable on a pretax basis, it is also acceptable on an aftertax basis.

When depreciable assets are involved in a proposal, however, the situation is quite different. In proposals of this type, there is no simple relationship between pretax cash inflows and aftertax cash inflows. This is the case because, although depreciation is not a factor in estimates of operating cash flows, it *does* affect the calculation of taxable income; thus, it affects cash outflows because it affects the amount of tax payments. Because depreciation offsets part of what would otherwise be additional taxable income, it is called a *tax shield*. Depreciation "shields" the pretax cash inflows from the full impact of income taxes.

To calculate the *aftertax* cash inflows, we must take account of this **depreciation tax shield.** At the same time, for the reasons given above we must be careful not to permit the amount of depreciation itself to enter into the calculation of cash flows. Illustration 27–1 shows a net present value calculation including the tax shield.

At times, under specified conditions, income tax regulations permit a company to take an **investment tax credit (ITC)** when it purchases new machinery or equipment or makes certain other types of investments. Currently, companies can reduce their taxable income by making expenditures for certain socially desirable purposes, such as construction of low-income housing, access for disabled persons, and empowerment zones. These credits should also be taken into account in calculating aftertax income.

Accelerated depreciation. For simplicity the example in Illustration 27–1 assumed straight-line depreciation. In fact, most companies use accelerated depreciation[5] in calculating taxable income because it increases the present value of the depreciation tax shield. Because accelerated depreciation results in nonlevel amounts of taxable income from year to year, Table B (which assumes a level flow each year) cannot be used in calculating present values. Instead, one must compute the aftertax income each year and find the present value of each annual amount by using Table A.

Differential depreciation. If the proposed asset is to replace an asset that has not been fully depreciated for tax purposes, then the tax shield is based on only the

[5]U.S. tax laws use the term *accelerated cost recovery*, rather than accelerated depreciation.

differential depreciation—the difference between depreciation on the present asset and that on the new one. If the new asset is purchased, the old one will presumably be disposed of, so its depreciation will no longer provide a tax shield to the operating cash flows. In this case the present value of the tax shield of the remaining depreciation on the old asset must be calculated (usually year by year), and this amount must be subtracted from the present value of the depreciation tax shield on the proposed asset.

Tax effect of interest

Interest actually paid (as distinguished from imputed interest) is an allowable expense for income tax purposes. Therefore, if interest costs will be increased as a result of the investment, it can be argued that interest provides a tax shield similar to depreciation and that its impact should be estimated by the same method as for depreciation. Customarily, however, interest is *not* included anywhere in the calculations of either cash inflows or taxes. This is because the calculation of the required rate of return includes an allowance for the tax effect of interest: The estimate of the cost of debt is the aftertax cost of debt.

In problems where the method of financing is an integral part of the proposal, the tax shield provided by interest may appropriately be considered. In these problems the rate of return in the calculation is a return on the part of the investment that was financed by the shareholders' equity, not a return on the total funds committed to the investment.

> **Example** A company is considering an investment in a parcel of real estate and intends to finance 70 percent of the investment by a mortgage loan on the property. It may wish to focus attention on the return on its own funds, the remaining 30 percent. In this case it is appropriate to include in the calculation both the interest on the mortgage loan and the effect of this interest on taxable income. The rationale is that these debt funds—the mortgage—would not have been available to the company were it not investing in the real estate.[6]

Investment

The investment is the amount of funds an entity risks if it accepts an investment proposal. The relevant investment costs are the *differential* costs—the cash outlays that will be made if the project is undertaken but that will not be made if it is not undertaken. The cost of the asset itself, any shipping and installation costs, and costs of training employees in the use of the new asset are examples of differential investment costs. These outlays are part of the investment, even though some of them may not be capitalized (treated as assets) in the accounting records.

Existing assets

If the purchase of a new asset results in the sale of an asset, the net proceeds from the sale reduce the amount of the differential investment. In other words, the differential investment represents the total amount of *additional* funds that must be committed to the investment project. The net proceeds from the existing asset are its selling price less any costs incurred in selling it and in dismantling and removing it, and adjusted for any income tax effects (described below).

Investments in working capital

Although our examples of investments have thus far been fixed assets, an investment actually is the commitment, or long-term locking up, of funds in any type of asset.

[6] Technically, this recognition of the tax effect of interest also assumes that the project-related debt (the mortgage loan, in the example) will not increase the perceived overall riskiness of the company and hence will not cause an increase in its overall cost of capital.

Thus, investments include long-term commitments of funds to finance additional inventories, receivables, and other current assets. In particular, if new equipment is acquired to produce a new product, additional funds will probably be required for inventories, accounts receivable, and increased cash needs. Part of this increase in current assets may be financed by increased accounts payable; the remainder of the financing must come from permanent capital. This additional working capital is as much a part of the Time Zero differential investment as is the capital required to finance the equipment itself.[7]

Deferred investments

Many projects involve a single commitment of funds at one moment of time, which we have called Time Zero. For some projects, on the other hand, the commitments are spread over a considerable period of time. The construction of a new facility may require disbursements over several years, or a proposal may involve the construction of one unit of a facility now and a second unit several years later. To make the present value calculations, these investments must be brought to a common point in time. This is done by the application of discount rates to the amounts of cash outflow involved. In general, the appropriate rate depends on the uncertainty that the investment will be made; the lower the uncertainty, the lower the rate. Thus, if the commitment is a definite one, the discount rate may be equivalent to the interest rate on high-grade bonds (which also represent a definite commitment). If, however, the future investments will be made only if earnings materialize, then the rate can be the required rate of return.

Capital gains and losses

When existing equipment is replaced by new equipment, the transaction may give rise to either a gain or loss, depending on whether the amount realized from the sale of the existing equipment is greater or less than its net book value. (If the new equipment is "of a like kind" to the equipment to be replaced, no gain or loss is recognized for tax purposes.) These gains or losses are taxed at the company's ordinary income tax rate. When existing assets are disposed of, the relevant amount by which the new investment is reduced is the *net* proceeds of the sale—the sale proceeds adjusted for the tax impact associated with the disposal. The adjustment will be downward if there is a gain, since the gain will create an additional tax outflow. Conversely, a loss will result in an upward adjustment of the sale proceeds.

Terminal Value

A project may have a value at the end of its time horizon. This **terminal value** is a cash inflow at that time.[8] In the analysis of the project, the *discounted* amount of the terminal value is added to the present value of the other cash inflows. Several types of terminal value are described in the following paragraphs.

Residual value

A proposed asset may have a **residual value** (i.e., salvage or resale value) at the end of its economic life. In many cases the estimated residual value is so small and occurs so far in the future that it has no significant effect on the decision. Moreover, any salvage

[7] In the preceding chapter the differential investment in current assets was assumed to be for a *short* term; thus, it was assumed that short-term debt rather than permanent capital would be used to finance differential current assets. The cost of this short-term debt is one element of the differential holding costs that were described in that chapter.

[8] In some instances there is an additional *outlay* at the end of the project horizon. A notable example is the cost of decommissioning a nuclear power plant, which is hundreds of millions of dollars.

or resale value realized may be approximately offset by removal and dismantling costs. In situations where the estimated residual value is significant, the net residual value (after removal costs and any tax effect from a capital gain or loss) is viewed as a cash inflow at the time of disposal and is discounted along with the other cash inflows.

Acquisitions and new products

If one company acquires another, it usually expects its investment in the acquired company to produce a stream of cash inflows for an indefinitely long period. This may also be true with an investment in development of a new product. However, the estimates of cash inflows in later years are so speculative that many companies arbitrarily set the economic life of such a project at 10 years (5 in some companies).

After economic life is set, there is the problem of estimating terminal value. One approach to this problem is to assume that the acquired company or the new product is sold to another party on the assumed terminal date. Since the new buyer would be buying a stream of future cash inflows, the price could be arrived at by estimating the value of these cash flows, perhaps by applying a multiple to the cash flows of the terminal year. This selling price is then discounted, using the appropriate factor from Table A.

Working capital

Often, the terminal value of investments in current assets is reasonably assumed to be approximately the same as the amount of the initial investment in them. That is, it is assumed that at the end of the project, these items can be liquidated at their original cost. (This cost can be adjusted upward if inflation is expected to increase the investment in working capital over the life of the project.) The amount of terminal current assets, net of any related accounts payable settlements, is treated as a cash inflow in the last year of the project, and its present value is found by discounting that amount at the required rate of return.

Nonmonetary Considerations

The quantitative analysis involved in a capital investment proposal does not provide the complete solution to the problem because it encompasses only those elements that can be reduced to numbers. As was true for the short-term alternative choice problems in the preceding chapter, a full consideration of the problem involves evaluating the nonmonetary factors.

Many investments are undertaken without a calculation of net present value. The necessity projects described earlier are a major example. For some of these, no economic analysis is necessary; if an unsafe condition is found, it must be corrected regardless of the cost. For many capital expenditure proposals in the research/development and general/administrative areas, no reliable estimate of increased revenues or decreased costs can be made, so the approach described here is not feasible.[9]

Even if the proposal is amenable to a quantitative analysis, the result is, at most, a guide to the decision maker. Other factors must be considered in arriving at the final decision, and in some cases their importance overwhelms the quantitative analysis. Among these factors are the following:

- The person proposing the project wants it to be approved, and therefore may give optimistic estimates of the numbers. Unless the person has a prior track record of such bias, it is difficult to detect.

[9]Based on a survey of 100 large industrial companies, Thomas Klammer et al. reported that only 45 percent of respondents used discounting techniques for general and administrative costs, and only 8 percent used these techniques for "social expenditures." See "Capital Budgeting Practices—A Survey of Corporate Use," *Journal of Management Accounting Research,* Fall 1991, pp. 120–21.

- The *status quo* alternative may be incorrectly stated. For example, it may implicitly be assumed that if a proposal for a new process is rejected, the sales of the products made with the existing process will continue as is. However, failure to make the investment may cause the company's market position to deteriorate: Competitors are making such investments, and the resulting better quality or customer responsiveness will cause the company's sales to decline if it does not make similar investments.
- Training costs and start-up costs associated with some new technology may be included in their entirety in the first proposal that will benefit from them, when in fact these costs will benefit similar follow-on projects in the future. This causes a negative bias in the analysis of the initial project and may suggest postponing investments that are in fact needed to remain competitive.
- On the other hand, a project proposal may have its scope—and hence its costs—understated in order to stay below the investment threshold where board of directors approval is required. This "foot-in-the-door" tactic often involves one or more follow-on proposals needed to complete the original proposal's partial solution.
- The proposal may overlook increases in "hidden" costs (usually step-function costs) that will result from the increased workload the project will create in various support departments. (The "just one" paradox described in the preceding chapter applies to capital investment proposals as well.)

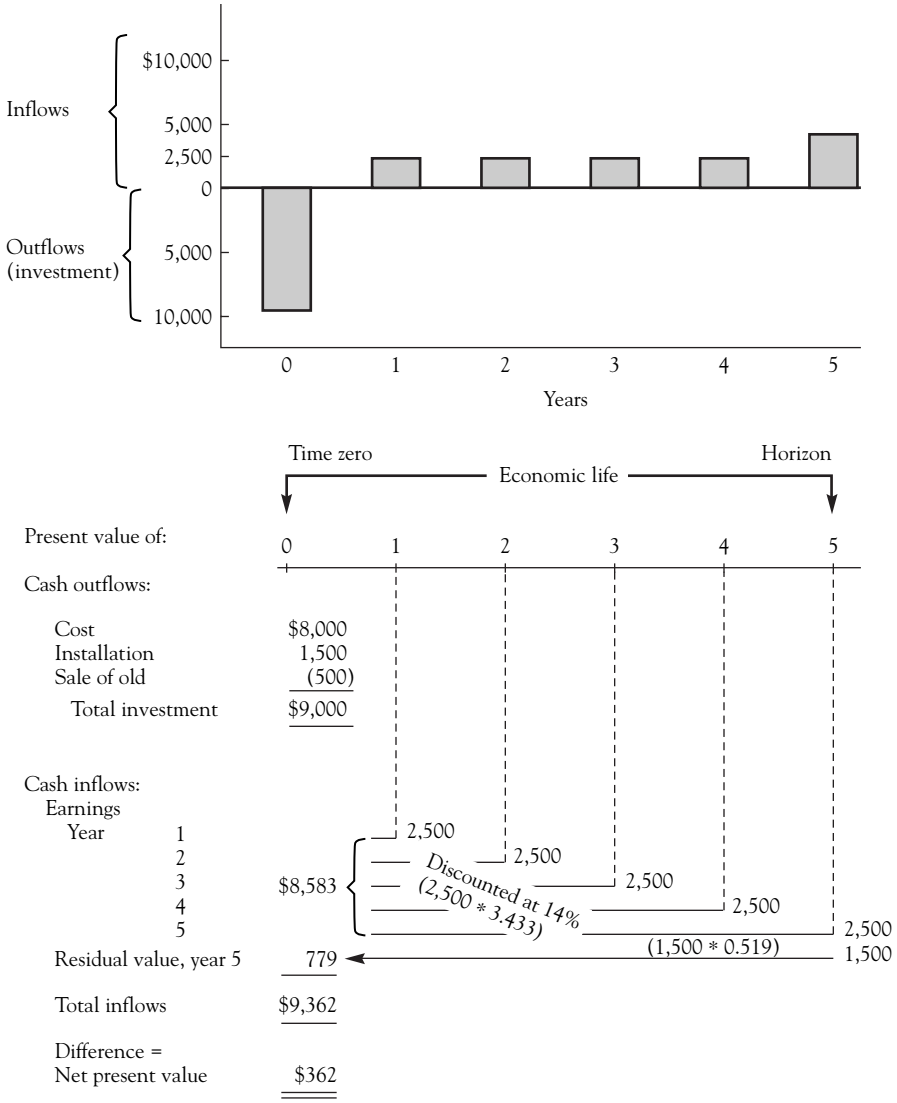
In sum, the techniques described in this chapter are by no means the whole story of capital budgeting decisions. They are, however, the only part of the story that can be described as a definite procedure; the remainder generally is learned only through experience.

Summary of the Analytical Process

Following is a summary of the previous presentation of the steps involved in using the net present value method in analyzing a proposed investment:

1. Select a required rate of return. This rate applies to projects deemed to be of average risk and may be adjusted for a specific proposal whose risk is felt to be above or below average.
2. Estimate the economic life of the proposed project.
3. Estimate the differential cash inflows for each year during the economic life, being careful that the base case is properly defined and quantified.
4. Find the net investment, which includes the additional outlays made at Time Zero, less the proceeds (adjusted for tax effects) from disposal of existing equipment and the investment tax credit, if any.
5. Estimate the terminal values at the end of the economic life, including the residual value of equipment and current assets that will be liquidated.
6. Find the present value of all the inflows identified in steps 3 and 5 by discounting them at the required rate of return, using Table A (for single annual amounts) or Table B (for a series of equal annual flows).
7. Find the net present value by subtracting the net investment from the present value of the inflows. If the net present value is zero or positive, decide that the proposal is acceptable insofar as the monetary factors are concerned.
8. Taking into account the nonmonetary factors, reach a final decision. (This part of the process is at least as important as all the other parts put together, but there is no way of generalizing about it.)

ILLUSTRATION 27–2
Cash Flow Diagram



As an aid to visualizing the relationships in a proposed investment, it is often useful to use a diagram of the flows similar to that shown in Illustration 27–2.

Other Methods of Analysis

So far, we have limited the discussion of techniques for analyzing capital investment proposals to the net present value (NPV) method. We shall now describe three alternative ways of analyzing a proposed capital investment: (1) the internal rate of return method, (2) the payback method, and (3) the unadjusted return on investment method.

Internal Rate of Return Method

When the NPV method is used, the required rate of return must be selected in advance of making the calculations because this rate is used to discount the cash inflows in each year. As already pointed out, the choice of an appropriate rate of return is a difficult

matter. The **internal rate of return (IRR) method** avoids this difficulty. It computes the rate of return that equates the present value of the cash inflows with the present value of the investment—the rate that makes the NPV equal zero. This rate is called the internal rate of return, or the **discounted cash flow (DCF) rate of return.** (The IRR method is sometimes called the **DCF method.**)

Level inflows

If the cash inflows are level (the same amount each year), the computation is simple. It will be illustrated by a proposed $1,200 investment with estimated cash inflow of $400 a year for four years. The procedure is as follows:

1. Divide the investment, $1,200, by the annual inflow, $400. The result, 3.0, is called the **investment/inflow ratio.**
2. Look across the four-year row of Table B. The column in which the figure closest to 3.0 appears shows the approximate rate of return. Since the closest figure is 3.037 in the 12 percent column, the return is approximately 12 percent.
3. If management is satisfied with a return of approximately 12 percent, then it should accept this project (aside from qualitative considerations). If it requires a higher return, it should reject the project.

The number 3.0 in the above example is simply the ratio of the investment to the annual cash inflows. Each number in Table B shows the ratio of the present value of a stream of cash inflows to an investment of $1 made today, for various combinations of rates of return and numbers of years. The number 3.0 opposite any combination of year and rate of return means that the present value of a stream of inflows of $1 a year for that number of years discounted at that rate is $3. The present value of a stream of inflows of $400 a year is in the same ratio; therefore, it is $400 times 3, or $1,200. If the number is more than 3.0, as is the case with 3.037 in the example above, then the return is correspondingly more than 12 percent.

In using Table B in this method, it is usually necessary to interpolate—to estimate the location of a number that lies between two numbers in the table. There is no need to be precise about these interpolations because the final result can be no better than the basic data, which are ordinarily only rough estimates. A quick interpolation made visually is usually as good as the accuracy of the data warrants. However, widely used computer programs calculate the IRR exactly.

Uneven inflows

If cash inflows are not the same in each year, the IRR must be found by trial and error. The cash inflows for each year are listed, and various discount rates are applied to these amounts until a rate is found that makes their total present value equal to the present value of the investment. This rate is the internal rate of return. This trial-and-error process can be quite tedious if the computations are made manually; in practice, computer programs and calculators perform the calculations quickly.

Payback Method

The number referred to above as the investment/inflow ratio is also called the **payback period** because it is the number of years over which the investment outlay will be recovered (paid back) from the cash inflows if the estimates turn out to be correct. That is, the project will pay for itself in this number of years. If a machine costs $1,200 and generates cash inflows of $400 a year, it has a payback of three years.

The payback method is often used as a quick but crude method for appraising proposed investments. If the payback period is equal to, or only slightly less than, the economic life of the project, then the proposal is clearly unacceptable. If the payback period is considerably less than the economic life, then the project begins to look attractive.

If several investment proposals have the same general characteristics, then the payback period can be used as a valid way of screening out the unacceptable proposals. For example, if a company finds that equipment ordinarily has a life of 10 years and if it requires a return of at least 15 percent, then the company may specify that new equipment will be considered for purchase only if it has a payback period of five years or less. This is because Table B shows that a payback period of five years is equivalent to a return of approximately 15 percent if the life is 10 years.

The danger of using payback as a criterion is that it gives no consideration to differences in the length of the estimated economic lives of various projects. There may be a tendency to conclude that the shorter the payback period, the better the project. However, a project with a long payback may actually be better than a project with a short payback if it will produce cash inflows for a much longer period of time. Also, the payback method makes no distinction between projects whose entire investment is made at Time Zero and those for which the investment is incurred over a period of several years.

Discounted payback method

A more useful and more valid form of the payback method is the **discounted payback method.** In this method the present value of each year's cash inflows is found, and these are cumulated year by year until they equal or exceed the amount of investment. The year in which this happens is the **discounted payback period.** A discounted payback of five years means that the total cash inflows over a five-year period will be large enough to recover the investment *and* to provide the required return on investment. If the decision maker believes that the economic life will be at least this long, then the proposal is acceptable.

Unadjusted Return on Investment Method

The **unadjusted return on investment method** computes the net income expected to be earned from the project each year, in accordance with the principles of accrual accounting, including a provision for depreciation expense. The unadjusted return on investment is found by dividing the annual net income either by the amount of the investment or by one-half the amount of investment. (One-half of the investment is used on the premise that over the entire life of the project, an average of one-half the initial investment is outstanding because the investment is at its full amount at Time Zero and shrinks gradually to nothing by its terminal year.) This method is also referred to as the **accounting rate of return method.**

Since depreciation expense in accrual accounting provides, in a sense, for the recovery of the cost of a depreciable asset, one might suppose that the return on an investment could be found by relating the investment to its accrual accounting income after depreciation; but such is not the case. Earlier, we showed that an investment of $1,200 with cash inflows of $400 a year for four years has a return of 12 percent. In the unadjusted return method the calculation would be as follows (ignoring taxes):

Gross earnings	$400
Less depreciation (1/4 of $1,200)	300
Net income	$100

Dividing net income ($100) by the investment ($1,200) gives an indicated return of 8 1/3 percent. But we know this result is incorrect: The true return is 12 percent. If we divide the $100 net income by one-half the investment ($600), the result is 16 2/3 percent, which is also incorrect.

This error arises because the unadjusted return method makes no adjustment for the differences in present values of the inflows of the various years. It treats each year's inflows as if they were as valuable as those of every other year whereas the prospect of an inflow of $400 next year is actually more attractive than the prospect of an inflow of $400 two years from now, and the latter $400 is more attractive than the prospect of an inflow of $400 three years from now.

The unadjusted return method, based on the *gross* amount of the investment, will always *understate* the true return. The shorter the time period involved, the more serious is the understatement. If the return is computed by using *one-half* the investment, the result is always an *over*statement of the true return. A method that does not consider the time value of money cannot produce an accurate result.

Multiple Decision Criteria

Despite the conceptual superiority of the methods that involve discounting, surveys show that the payback and unadjusted return methods are widely used in practice. Surveys also show that most companies use two or more methods in their investment proposal analyses—and the larger the company's annual capital budget, the greater the variety of techniques used.[10]

Several factors explain the use of decision criteria that do not involve discounting. First, some corporate managers tend to be concerned about the short-run impact a proposed project would have on corporate profitability as reported in the published financial statements. Thus, a project acceptable according to the NPV criterion may be rejected because it will reduce the company's reported net income and accounting return on investment (ROI) in the first year or two of the project. If management believes that the accounting ROI is used by securities analysts in evaluating a company's securities, management may use the unadjusted return method as one of its decision criteria.

The manager of a profit center may have similar concerns. If the manager feels that his or her career advancement is related to near-term profitability of the profit center, then a proposal that would have an adverse short-run impact on those profits may never be submitted to corporate headquarters. This is particularly likely to happen if the manager has incentive compensation tied to the profit center's short-term profitability. In this regard one must remember that *people* generate capital budgeting proposals; these proposals do not magically materialize on their own.

Another factor explaining why projects that have an acceptable NPV or IRR are sometimes rejected (or not even proposed) is managers' risk aversion. Although a given proposal may constitute an acceptable gamble from an overall company point of view, a manager may fear being penalized if the project does not work out as anticipated.[11]

Risk aversion probably explains the widespread use, despite its conceptual flaws, of the payback criterion. If Project A has an estimated IRR of 20 percent and a payback of eight years whereas Project B's estimated IRR is 15 percent and its payback is three

[10] Klammer et al. (see footnote 9) report that for expansion projects 87 percent of the firms used the results of a discounting technique as their primary quantitative criterion. Of these about two-thirds used IRR and one-third used NPV as the primary technique. Most firms used more than one technique.

[11] Many studies have demonstrated that most people (with the notable exception of compulsive gamblers) are risk averse. One elegant study has even concluded that bumble bees are risk averse! (See Leslie A. Real, "Animal Choice Behavior and the Evolution of Cognitive Architecture," *Science*, August 30, 1991, pp. 980–86.)

years, the profit center manager may well prefer Project B. Project A's time horizon is long, increasing the uncertainty of the estimates made in calculating its IRR. Moreover, it will be a number of years until it is known for sure whether A was a good investment. By eight years from now, the manager hopes to have been promoted at least once, and some unknown successor will reap most of Project A's benefits. But Project B can make the manager look good in the near term and help him or her to be promoted.

In sum, factors other than the true economic return (i.e., IRR) of a project greatly—and understandably—influence whether a project is approved and even whether the project is formally proposed to top management.

Preference Problems

There are two classes of investment problems: screening problems and preference problems. In a **screening problem** the question is whether or not to accept a proposed investment. The discussion so far has been limited to this class of problem. Many individual proposals come to management's attention; by the techniques described above, those that are worthwhile can be screened out from the others.

In preference problems (also called *ranking,* or *capital rationing problems*), a more difficult question is asked: Of a number of proposals, each of which has an adequate return, how do they rank in terms of preference? If not all the proposals can be accepted, which ones are preferable? The decision may merely involve a choice between two competing proposals, or it may require that a series of proposals be ranked in order of their attractiveness. Such a ranking of projects is necessary when there are more worthwhile proposals than funds available to finance them, which is often the case.

Criteria for Preference Problems

Both the IRR and NPV methods are used for preference problems. If the internal rate of return method is used, the preference rule is as follows: The higher the IRR, the better the project. A project with a return of 20 percent is said to be preferable to a project with a return of 18 percent, *provided that the projects are of equal risk.* If the projects entail different degrees of risk, then judgment must be used to decide how much higher the IRR of the more risky project should be.

If the net present value method is used, the present value of the cash inflows of one project cannot be compared directly with the present value of the cash inflows of another unless the investments are of the same size. Most people would agree that a $1,000 investment that produced cash inflows with a present value of $2,000 is better than a $1,000,000 investment that produces cash inflows with a present value of $1,001,000, even though they each have an NPV of $1,000. In order to compare two proposals under the NPV method, therefore, we must relate the size of the discounted cash inflows to the amount of money risked. This is done simply by dividing the present value of the cash inflows by the amount of investment, to give a ratio that is called the **profitability index.** Thus, a project with an NPV of zero has a profitability index of 1.0. The preference rule is: The higher the profitability index, the better the project.

Comparison of Preference Rules

Conceptually, the profitability index is superior to the internal rate of return as a device for ranking projects. One reason is that higher discount rates will have been used in discounting the cash flows of more risky projects; thus, no judgmental adjustment of the profitability index ranking must be made. (Of course, deciding how much higher a discount rate to use was judgmental.) Also, the IRR method will not always give the correct preference between two projects with different lives or with different patterns of earnings.

Example Proposal A involves an investment of $1,000 and a cash inflow of $1,200 received at the end of one year; its IRR is 20 percent. Proposal B involves an investment of

$1,000 and cash inflows of $305 a year for five years; its IRR is only 16 percent. But Proposal A is not *necessarily* preferable to Proposal B. Proposal A is preferable only if the company can expect to earn a high return during the following four years on some other project in which the funds released from A at the end of the first year are reinvested. Otherwise, Proposal B, which earns 16 percent over the whole five-year period, is preferable.

The incorrect signal illustrated in this example is not present in the profitability index method. Assuming a discount rate of 12 percent, the two proposals described above would be analyzed as follows:

Proposal	(a) Cash Inflow	(b) Discount Factor	(c) Present Value (a) * (b)	(d) Investment	Index (c) ÷ (d)
A	$1,200–1 yr.	0.893	$1,072	$1,000	1.07
B	305–5 yrs.	3.605	1,100	1,000	1.10

The profitability index signals that Proposal B is better than Proposal A. This is, in fact, the case if the company can expect to reinvest the money released from Proposal A so as to earn no more than 12 percent on it. In most comparisons, however, IRR and the profitability index give the same relative ranking.

Although the profitability index method is conceptually superior to the IRR method and also easier to calculate (since there is no trial-and-error computation), the IRR method is widely used in practice for two reasons. First, the profitability index method requires that the required rate of return be established before the calculations are made. But many analysts prefer to work from the other direction—to find the IRR and then see how it compares with their idea of the rate of return that is appropriate in view of the risks involved. Second, the profitability index is an abstract number that is difficult to explain, whereas the IRR is similar to interest rates and earnings rates with which every manager is familiar.

Nonprofit Organizations

Nonprofit organizations make decisions involving the acquisition of capital assets, and their analytical techniques are essentially the same as those described above for profit-oriented companies.

The capital required for an investment in plant or equipment is obtained from either debt or equity capital or some combination of both. The cost of borrowed funds usually is easily measured. Equity capital is obtained either from past operations that have generated revenues in excess of expenses or from donors. If not invested in the project being analyzed, equity capital can be invested in other assets providing a return. The return on those alternative investments, adjusted for differences in risk, is the required rate of return.

In most respects estimates of cash inflows and outflows are the same in nonprofit organizations as for those described above. These organizations do not pay income taxes, so that part of the calculation is unnecessary. If the organization is reimbursed for services it performs (as is the case with hospitals and with university research contracts), then the proposal's effect on the calculation of the reimbursement amount must be taken into account. The net present value method is usually preferable to the internal rate of return method. The payback method and unadjusted return methods have the same weaknesses in nonprofit organizations as described above.

Summary

A capital investment problem is essentially one of determining whether the anticipated cash inflows from a proposed project are sufficiently attractive to warrant risking the investment of funds in the project.

In the net present value method the basic decision rule is that a proposal is acceptable if the present value of the cash inflows expected to be derived from it equals or exceeds the present value of the investment. To use this rule, one must estimate (1) the required rate of return, (2) the economic life, (3) the amount of cash inflow in each year, (4) the amount of investment, and (5) the terminal value.

The internal rate of return method finds the rate of return that equates the present value of cash inflows to the present value of the investment—the rate that gives the project an NPV of zero. The simple payback method finds the number of years of cash inflows that are required to equal the amount of investment. The discounted payback method finds the number of years required for the discounted cash inflows to equal the initial investment. The unadjusted return on investment method computes a project's net income according to the principles of accrual accounting and expresses this profit as a percentage of either the initial investment or the average investment. The simple payback and unadjusted return methods are conceptually weak because they ignore the time value of money.

In preference problems the task is to rank two or more investment proposals in order of their desirability. The profitability index, the ratio of the present value of cash inflows to the investment, is the most valid way of making such a ranking.

The foregoing are monetary considerations. Nonmonetary considerations are often as important as monetary considerations and in some cases are so important that no economic analysis is worthwhile. In some instances a manager's aversion to risk may cause a project with an acceptable return to be rejected or not even proposed.

Problems

Problem 27–1.

A company owned a plot of land that appeared in its fixed assets at its acquisition cost in 1910, which was $10,000. The land was not used. In 1989, the local boys club asked the company to donate the land as the site for a new recreation building. The donation would be a tax deduction of $110,000, which was the current appraised value. The company's tax rate was 40 percent. Some argued that the company would be better off to donate the land than to keep it or to sell it for $110,000. Assume that, other than the land, the company's taxable income as well as its accounting income before taxes was $10,000,000.

Required:

How would the company's aftertax cash inflow be affected if (*a*) it donated the land or (*b*) it sold the land for $110,000? How would its net income be affected?

Problem 27–2.

Plastic Recycling Company is just starting operations with new equipment costing $30,000 and a useful life of five years. At the end of five years the equipment probably can be sold for $5,000. The company is concerned with its cash flow and wants a comparison of straight-line and MACRS[1] depreciation to help management decide which depreciation method to use for financial statements and for its income tax return. Assume a 40 percent tax rate.

[1] Modified Accelerated Cost Recovery System (effective for assets placed in use after December 31, 1986.)

Required:

a. Calculate the difference in taxable income and cash inflow under each method. Assume MACRS allowances are 20, 32, 18, 15, and 15 percent for years 1–5 respectively.
b. Which deprecation method is preferable for tax purposes? Why?

Problem 27–3.

Corrine Company owns a warehouse that it no longer needs in its own operations. The warehouse was built at a cost of $270,000 10 years ago, at which time its estimated useful life was 15 years. There are two proposals for the use of the warehouse:

1. Rent it at $72,000 per year, which includes estimated costs of $27,000 per year for maintenance, heat, and utilities to be paid by the lessor.
2. Sell it outright to a prospective buyer who has offered $225,000. Any capital gain would be taxed at the 30 percent rate.

Required:

a. Calculate the aftertax income if (1) Corrine Company keeps the warehouse and (2) if Corrine Company sells the warehouse.
b. Which proposal should the company accept? Why?

Problem 27–4.

(Disregard income taxes in this problem.) Compute the following:

a. An investment of $10,000 has an investment/inflow ratio of 6.2 and a useful life of 12 years. What is the annual cash inflow and internal rate of return?
b. The internal rate of return for an investment expected to yield an annual cash inflow of $2,000 is 14 percent. How much is the investment if the investment/inflow ratio is 6.14?
c. What is the maximum investment a company would make in an asset expected to produce annual cash inflow of $5,000 a year for seven years if its required rate of return is 16 percent?
d. How much investment per dollar of expected annual operating savings can a company afford if the investment has an expected life of eight years and its required rate of return is 14 percent?

Problem 27–5.

Wellington Corporation estimates that it will have $500,000 available for capital investments next year. Half of this will be reserved for emergency projects and half will be invested in the most desirable projects from the following list. None of the investments has a residual value.

Project Number	Added Investment	Expected Aftertax Cash Inflow	Estimated Life of Project
1	$100,000	$25,000	6 years
2	100,000	30,000	4
3	40,000	5,000	15
4	20,000	10,000	2
5	50,000	12,500	3

Required:
Rank the projects in order of their desirability.

Problem 27–6.

Baxton Company manufactures short-lived, fad-type items. The research and development department came up with an item that would make a good promotional gift for office equipment dealers. Aggressive effort by Baxton's sales personnel has resulted in almost firm commitments for this product for the next three years. It is expected that the product's novelty will be exhausted after three years.

In order to produce the quantity demanded, Baxton will need to buy additional machinery and rent some additional space. About 25,000 square feet will be needed; 12,500 square feet of presently unused, but leased, space is available now. (Baxton's present lease with 10 years to run costs $3.00 a square foot.) There is another 12,500 square feet adjoining the Baxton facility that Baxton will rent for three years at $4.00 per square foot per year if it decides to make this product.

The equipment will be purchased for $900,000. It will require $30,000 in modifications, $60,000 for installation, and $90,000 for testing. All of the expenditures will be paid for on January 1, 1990. The equipment should have a salvage value of about $180,000 at the end of the third year. No additional general overhead costs are expected to be incurred.

The following estimates of revenues and expenses for this product for the three years have been developed:

	1990	1991	1992
Sales	$1,000,000	$1,600,000	$800,000
Material, labor, and direct overhead	400,000	750,000	350,000
Allocated general overhead	40,000	75,000	35,000
Rent	87,500	87,500	87,500
Depreciation	450,000	300,000	150,000
	977,500	1,212,500	622,500
Income before taxes	22,500	387,500	177,500
Income taxes (40%)	9,000	155,000	71,000
Net income	$ 13,500	$ 232,500	$106,500

Required:

a. Prepare a schedule that shows the differential aftertax cash flows for this project.
b. If the company requires a two-year payback period for its investment, would it undertake this project?
c. Calculate the aftertax accounting rate of return for the project.
d. A newly hired business school graduate recommends that the company use net present value analysis to study this project. If the company sets a required rate of return of 20 percent after taxes, will this project be accepted? (Assume all operating revenues and expenses occur at the end of the year.)
e. What is the internal rate of return of the proposed project?

(CMA adapted)

Cases

CASE 27–1 Sinclair Company*

A. Equipment Replacement

Sinclair Company is considering the purchase of new equipment to perform operations currently being performed on different, less efficient equipment. The purchase price is $250,000, delivered and installed.

A Sinclair production engineer estimates that the new equipment will produce savings of $72,000 in labor and other direct costs annually, as compared with the present equipment. She estimates the proposed equipment's economic life at five years, with zero salvage value. The present equipment is in good working order and will last, physically, for at least five more years.

The company can borrow money at 9 percent, although it would not plan to negotiate a loan specifically for the purchase of this equipment. The company requires a return of at least 15 percent before taxes on an investment of this type. Taxes are to be disregarded.

Questions

1. Assuming the present equipment has zero book value and zero salvage value, should the company buy the proposed equipment?
2. Assuming the present equipment is being depreciated at a straight-line rate of 10 percent, that it has a book value of $135,000 (cost, $225,000; accumulated depreciation, $90,000), and has zero net salvage value today, should the company buy the proposed equipment?
3. Assuming the present equipment has a book value of $135,000 and a salvage value today of $75,000 and that if retained for 5 more years its salvage value will be zero, should the company buy the proposed equipment?
4. Assume the new equipment will save only $37,500 a year, but that its economic life is expected to be 10 years. If other conditions are as described in (1) above, should the company buy the proposed equipment?

B. Replacement Following Earlier Replacement

Sinclair Company decided to purchase the equipment described in Part A (hereafter called "model A" equipment). Two years later, even better equipment (called "model B") comes on the market and makes the other equipment completely obsolete, with no resale value. The model B equipment costs $500,000 delivered and installed, but it is expected to result in annual savings of $160,000 over the cost of operating the model A equipment. The economic life of model B is estimated to be 5 years. Taxes are to be disregarded.

Questions

1. What action should the company take?
2. If the company decides to purchase the model B equipment, a mistake has been made somewhere, because good equipment, bought only two years previously, is being scrapped. How did this mistake come about?

C. Effect of Income Taxes

Assume that Sinclair Company expects to pay income taxes of 40 percent and that a loss on the sale or disposal of equipment is treated as a capital loss resulting in a tax saving of 28 percent of the loss. Sinclair uses an 8 percent discount rate for analyses performed on an aftertax basis. Depreciation of the new equipment for tax purposes is computed using the accelerated cost recovery system (ACRS) allowances; assume that these allowances were 35, 26, 15, 12, and 12 percent for years 1 to 5, respectively. The new equipment qualifies for a 5 percent investment tax credit, which will not reduce the cost basis of the asset for calculating ACRS depreciation for tax purposes.

Questions

1. Should the company buy the equipment if the facts are otherwise the same as those described in Part A (1)?
2. If the facts are otherwise the same as those described in Part A (2)?
3. If the facts are otherwise the same as those described in Part B?

D. Change in Earnings Pattern

Assume that the savings are expected to be $79,500 in each of the first three years and $60,750 in each of the next two years, other conditions remaining as described in Part A (1).

Questions

1. What action should the company take?
2. Why is the result here different from that in Part A (1)?
3. What effect would the inclusion of income taxes, as in Part C, have on your recommendation? (You are not expected to perform any more calculations in answering this question.)

CASE 27–2 Rock Creek Golf Club*

Rock Creek Golf Club (RCGC) was a public golf course, owned by a private corporation. In January the club's manager, Lee Jeffries, was faced with a decision involving replacement of the club's fleet of 40 battery-powered golf carts. The old carts had been purchased five years ago, and had to be replaced. They were fully depreciated; RCGC had been offered $200 cash for each of them.

Jeffries had been approached by two salespersons, each of whom could supply RCGC with 40 new gasoline-powered carts. The first salesperson, called here simply A, would sell RCGC the carts for $2,240 each. Their expected salvage value at the end of five years was $240 each.

Salesperson B proposed to lease the same model carts to RCGC for $500 per cart per year, payable at the end of the year for five years. At the end of five years, the carts would have to be returned to B's company. The lease could be canceled at the end of any year, provided 90 days' notice was given.

In either case, out-of-pocket operating costs were expected to be $420 per cart per year, and annual revenue from renting the carts to golfers was expected to be $84,000 for the fleet.

Although untrained in accounting, Jeffries calculated the number of years until the carts would "pay for themselves" if purchased outright, and found this to be less than two years, even ignoring the salvage value. Jeffries also noted that if the carts were leased, the five-year lease payments would total $2,500 per cart, which was more than the $2,240 purchase price; and if the carts were leased, RCGC would not receive the salvage proceeds at the end of five years. Therefore, it seemed clear to Jeffries that the carts should be purchased rather than leased.

When Jeffries proposed this purchase at the next board of directors meeting, one of the directors objected to the simplicity of Jeffries' analysis. The director had said, "Even ignoring inflation, spending $2,240 now may not be a better deal than spending five chunks of $500 over the next five years. If we buy the carts, we'll probably have to borrow the funds at 8 percent interest cost. Of course, our effective interest cost is less than this, since for every dollar of interest expense we report to the IRS we save 34 cents in taxes. But the lease payments would also be tax deductible, so it's still not clear to me which is the better alternative. There's a sharp new person in my company's accounting department; let's not make a decision until I can ask her to do some further analysis for us."

Questions

1. Assume that in order to purchase the carts, RCGC would have to borrow $89,600 at 8 percent interest for five years, repayable in five equal year-end installments. Prepare an amortization schedule for this loan, showing how much of each year's payment is for interest and how much is applied to repay principal. (Round the amounts for each year to the nearest dollar.)
2. Assume that salesperson B's company also would be willing to sell the carts outright at $2,240 per cart. Given the proposed lease terms, and assuming the lease is outstanding for five years, what interest rate is implicit in the lease? (Ignore tax impacts to the leasing company when calculating this implicit rate.) Why is this implicit rate different from the 8 percent that RCGC may have to pay to borrow the funds needed to purchase the carts?
3. Should RCGC buy the carts from A, or lease them from B? (Assume that if the carts are purchased, RCGC will use accelerated depreciation for income tax purposes, based on an estimated life of five years and an estimated residual value of $240 per cart. The accelerated depreciation percentages for years 1–5, respectively, are 35 percent, 26 percent, 15.6 percent, 11.7 percent, and 11.7 percent.)
4. Assume arbitrarily that purchasing the carts has an NPV that is $4,000 higher than the NPV of leasing them. (This is an arbitrary difference for purposes of this question and is not to be used as a "check figure" for your earlier calculations.) How much would B have to reduce the proposed annual lease payment to make leasing as attractive as purchasing the cart?

*Adapted by James S. Reece from an example used by Gordon B. Harwood and Roger H. Hermanson in "Lease-or-Buy Decisions," *Journal of Accountancy,* September 1976, pp. 83–87; © American Institute of Certified Public Accountants.

CASE 27–3 KLS Steel Company*

Headquartered in Milwaukee, KLS Steel Company is one of the larger regional steel service centers in the Midwest. KLS maintains warehouses in 15 medium-sized cities in the Midwest. Local firms purchase steel from these warehouses, rather than directly from steel producers, for a variety of reasons. Since service centers are able to buy in carload quantities, freight costs are often lower for a service center. Also, by purchasing for a large number of customers, a service center is able to obtain quantity discounts. Thus, the price to the user may be no higher than if the user were to purchase directly from a steel producer. At the same time, the user is able to reduce its steel inventories, since delivery time is often far shorter from a service center than from a steel producer.

*Copyright © by the President and Fellows of Harvard College. Harvard Business School case 181-102.

EXHIBIT 1

KLS STEEL COMPANY
CDS Department Income Statement
Year Ended December 31, 1987

Service revenues*	$3,083,000
Cost of sales†	2,665,000
Selling, general, and administrative	238,000
Income before taxes	180,000
Income taxes	90,000
Net income	$ 90,000

*Does not include revenues from the price of the "raw" steel that undergoes the cold-drawing process.

† Includes straight-line depreciation of $4,000 per year. All equipment will be fully depreciated in five years. The draw bench is already fully depreciated. Does not include "raw" steel cost, except for scrap losses.

EXHIBIT 2 Draw Bench Proposal (all amounts in 1987 dollars)

	1987	1/1/88	1988	1989	1990
Operating expense:					
1. Current equipment	288,000		290,000	350,000*	288,000
2. New draw bench			202,000	204,000	206,000
3. Savings (1 − 2)			88,000	146,000	82,000
4. Less: Depreciation (DDB)†			100,000	80,000	64,000
5. Net savings before tax (3 − 4)			(12,000)	66,000	18,000
6. State and federal tax (50%)			6,000	(33,000)	(9,000)
7. Investment tax credit			50,000	—	—
8. Net change in income (5 + 6 + 7)			44,000	33,000	9,000
9. Add: Depreciation			100,000	80,000	64,000
10. Add: Increase in salvage value‡			—	—	—
11. Cash flow (8 + 9 + 10)			144,000	113,000	73,000
Investment, net of trade-in		500,000			
NPV (10%)		59,203			
IRR		12.99%			

*Includes equipment overhaul and additional production overtime needed because of overhaul. All overhaul costs are expensed in the year in which they are incurred.

†Zero salvage value, double-declining-balance depreciation will be used for both income tax and financial reporting purposes.

‡Salvage value in 1997, aftertax, is estimated to be:

	New Draw Bench	Old Draw Bench
Draw bench	$ 85,000	$10,000
Remaining equipment	40,000	40,000
Total	$125,000	$50,000

As an additional incentive for their customers, steel service centers often provide special services, such as heat treating, cutting to length, and light assembly. A special service that KLS provides is cold-drawn steel (CDS). That service is performed in the Milwaukee warehouse for all 15 KLS warehouses. To cold-draw steel, one end of a steel bar is tapered, or pointed. The pointed end is then passed through a die (a block of hardened steel with a tapered hole through the center). On the other side of the die, a set of steel jaws grasps the pointed end of the bar and a heavy steel chain attached to the jaws pulls (or draws) the remainder of the steel bar through the die. That process compresses the steel slightly to provide more uniform qualities and to provide a smoother surface on the bar. Bars are then processed on a straightener, since the drawing process often puts a slight twist or bend in a bar. Finally, bars are cut to length on a saw. Although KLS owns other saws, one saw is required for the CDS department. In addition, an overhead crane is required specifically for that department. Several additional pieces of equipment are also used primarily by the CDS department.

The CDS department is of some concern to KLS's president:

> The previous president bought most of the drawing equipment from a bankrupt firm in 1957. We could just as easily purchase cold-drawn steel from firms who specialize in that process. There is no real reason for us to provide the service, other than that we own the equipment. Since we have the equipment, we may as well stay in the business. We process about 17,000 tons a year. Although the CDS charge is based on a number of factors, on average we charge about $180 a ton for the service. If we eliminated our CDS department, we would buy CDS from a specialty producer and then resell it. We would make about $5 a ton, after tax, if we used an outside supplier. That is reasonably close to what we do in-house (see Exhibit 1). If

EXHIBIT 2 (concluded)

1991	1992	1993	1994	1995	1996	1997
300,000	355,000*	290,000	304,000	360,000*	292,000	308,000
208,000	210,000	212,000	250,000*	210,000	212,000	214,000
92,000	145,000	78,000	54,000	150,000	80,000	94,000
51,200	40,960	32,770	32,770	32,770	32,770	32,760
40,800	104,040	45,230	21,230	117,230	47,230	61,240
(20,400)	(52,020)	(22,615)	(10,615)	(58,615)	(23,615)	(30,620)
—	—	—	—	—	—	—
20,400	52,020	22,615	10,615	58,615	23,615	30,620
51,200	40,960	32,770	32,770	32,770	32,770	32,760
—	—	—	—	—	—	75,000
71,600	92,980	55,385	43,385	91,385	56,385	138,380

we tried to sell our equipment, I know that we wouldn't get much more than $100,000 (after tax), so the department is performing reasonably well.

The problem is that some of the equipment is getting old. The crane, which was purchased in 1958, is still in pretty good shape. However, the draw bench and the straightener were originally purchased in the 1930s. The draw bench uses too much electricity, and scrap cost is too high. Both the draw bench and the straightener are often broken, and repair costs keep increasing. Even though the saw is only 15 years old and is still in good shape, newer ones are faster. The draw bench may be a good investment since a new one would save quite a bit on repairs and would also save on scrap and electricity. We can analyze the other equipment later.

We use discounted cash flow analysis to evaluate all corporate investments and expect to earn 10 percent, after tax, on the investment. I've had our accountants and engineers put together an estimate of operating costs for both the new and the old draw bench (Exhibit 2). I expect no real changes in our operations. Sales, adjusted for inflation, will probably stay at the 1987 level. I would expect our costs to go up at about the same rate as inflation, except for repair costs on the equipment. Exhibit 2 shows all amounts in 1987 dollars, since the 10 percent goal is in addition to inflation.

I'm concerned about one other thing. I have a friend at a consulting firm in Boston. She claims that you shouldn't invest in businesses where you have a low market share and low growth. That is clearly the case with our CDS department, but if an investment in that department has a greater discounted cash flow than an investment in other departments, it seems to me we have to invest in the CDS department. I asked her about that, but she seemed to think that discounted cash flow didn't work for such businesses.

Questions

1. Should KLS purchase the new draw bench?
2. Evaluate the consultant's comment.

CASE 27–4 Climax Shipping Company*

The controller of the Climax Shipping Company, located near Pittsburgh, was preparing a report for the executive committee regarding the feasibility of repairing one of the company's steam riverboats or of replacing the steamboat with a new diesel-powered boat.

Climax was engaged mainly in the transportation of coal from nearby mines to steel mills, public utilities, and other industries in the Pittsburgh area. The company's steamboats also, on occasion, carried cargoes to places as far away as New Orleans. The boats owned by Climax were all steam-powered, and were between 15 and 30 years old.

The steamboat the controller was concerned about, the Cynthia, was 23 years old and required immediate rehabilitation or replacement. It was estimated that the Cynthia had a useful life of another 20 years provided that adequate repairs and maintenance were made. Whereas the book value of the Cynthia was $165,900, it was believed that she would bring somewhat less than this amount, possibly around $105,000, if she were to be sold. The total of immediate rehabilitation costs for the Cynthia was estimated to be $483,000. It was estimated that these general rehabilitation expenditures would extend the useful life of the Cynthia for about 20 years.

New spare parts from another boat, which had been retired recently, were available for use in the rehabilitation of the Cynthia. An estimate of their fair value, if used on the Cynthia, was $182,700, which was their book value. Use of these parts would, in effect, decrease the immediate rehabilitation costs from $483,000 to $300,300. It was believed that if these parts were sold on the market, they would bring only around $126,000. They could not be used on any of the other Climax steamboats.

Currently, the Cynthia was operated by a 20-member crew. Annual operating costs for this crew would be approximately as follows:

Wages and fringes	$488,400
Commissary supplies	64,760
Repairs and maintenance	102,500
Fuel and lubricants	147,200
Misc. service and supplies	50,400
Total	$853,260

It was estimated that the cost of dismantling and scrapping the Cynthia at the end of her useful life after the overhaul would be offset by the value of the scrap and used parts taken off the boat.

An alternative to rehabilitating the steamboat was the purchase of a diesel-powered boat. Quapelle Company, a local boat manufacturer, quoted the price of $1,365,000 for a diesel boat. An additional $315,000 for a basic parts inventory would be necessary to service a diesel boat, and such an inventory would be sufficient to service up to three diesel boats. If four or more diesels were purchased, however, it was estimated that additional spare parts inventory would be necessary.

The useful life of a diesel-powered boat was estimated to be 25 years, at the end of which time the boat either would be scrapped or would be completely rehabilitated at a cost approximating that of a new boat. The controller did not contemplate the possibility of diesel engine replacement during the 25-year life, since information from other companies having limited experience with diesel-powered riverboats did not indicate that such costs needed to be anticipated. But a general overhaul of the engines, costing at current prices $250,000, would be expected every 10 years.

One of the features Quapelle pointed out was the 12 percent increase in average speed of diesel-powered boats over the steamboats. The controller discounted this feature, however, because the short runs and lock-to-lock operations involved in local river shipping would prohibit the diesel boats from taking advantage of their greater speed. There was little opportunity for passing, and diesel-powered boats would have to wait in turn at each lock for the slower steamboats. The controller felt it would be many years, if at all, before diesel boats displaced the slower steamboats.

After consulting Quapelle and other companies operating diesel-powered boats, the controller estimated that the annual operating costs of a diesel-powered boat would total $657,880, broken down as follows:

Wages and fringes, crew of 13	$342,170
Commissary supplies	42,080
Repairs and maintenance*	91,140
Fuel and lubricants	120,960
Extra stern repairs	8,400
Misc. service and supplies	53,130
Total	$657,880

*Excluding possible major overhaul of diesel engines.

Although the controller had not considered the matter, you may assume that at the end of the 20th year the diesel boat would have a realizable value of $140,000, and the remaining inventory of parts would have a book and realizable value of $157,500.

The controller was also concerned about a city smoke ordinance that would take effect in two years. To comply with the ordinance, all hand-fired steamboats had to be converted to stoker firing. Several of the Climax steamboats were already stoker-fired; the Cynthia, however, was hand-fired. The additional cost of converting the Cynthia to stoker firing was estimated to be $168,000, provided it was done at the same time as the general rehabilitation. This $168,000 included the cost of stokers and extra hull conversion and was not included in the $483,000 rehabilitation figure.

The controller also knew that if $483,000 were spent presently in rehabilitating the Cynthia and it was found out later that no relief, or only temporary relief for one or two years, was to be granted under the smoke ordinance, the cost of converting to stoker firing would no longer be $168,000, but around $290,000. The higher cost would be due to rebuilding, which would not be necessary if the Cynthia was converted to stoker firing at the time of her general rehabilitation.

Conversion would reduce the crew from 20 to 18, with the following details:

Wages and fringes	$445,700
Commissary supplies	58,300
Repairs and maintenance*	102,500
Fuel and lubricants*	147,200
Misc. service and supplies*	50,400
Total	$804,100

*These costs would be the same for a crew of 20 or 18.

All of the operating data the controller had collected pertaining to crew expenses were based on a two-shift, 12-hour working day, which was standard on local riverboats. He had been informed, however, that the union representing crew members wanted a change to a three-shift, eight-hour day. If the union insisted on an eight-hour day, accommodations on board the steamers or the diesels would have to be enlarged. The controller was perturbed by this fact because he knew the diesels could readily be converted to accommodate three crews whereas steamers could not.

How strongly the union would insist on the change and when it would be put into effect, if ever, were questions for which the controller could get no satisfactory answers. He believed that the union might have a difficult time in getting acceptance of its demands for three eight-hour shifts on steamers, since it would be very difficult, if not impossible, to convert the steamers to hold a larger crew because of space limitations. The controller thought that the union might succeed in getting its demands accepted, however, in the case of diesel-powered boats. One of the diesel boats currently operating in the Pittsburgh area had accommodations for three crews, although it was still operating on a two-shift basis. The diesel boats that Quapelle offered to build for Climax could be fitted to accommodate three crews at no additional cost.

Another factor the controller was considering was alternative uses of funds. Climax had sufficient funds to buy four diesel-powered boats; however, there were alternative uses for these funds. The other projects management was considering had an estimated return of at least 10 percent after taxes. The income tax rate at the time was 45 percent.

As a further inducement to secure a contract to build a diesel boat, Quapelle offered to lease a diesel boat to Climax. The lease terms offered called for year-end annual payments of $222,235 for 15 years. At the end of 15 years, when Quapelle had in effect recovered the value of the boat, it would charge a nominal rental of $11,760 a year. Title to the boat would continue to remain in the hands of Quapelle. Climax would incur all costs of operating and maintaining the boat, including general overhaul every 10 years, and would still need to invest $315,000 in a basic spare parts inventory.

Questions

1. If management chooses to rehabilitate the Cynthia, should the stoker conversion be done immediately or delayed for two years? (For simplicity, assume straight-line depreciation in all of your analyses. Also, assume that no investment tax credit was in effect at the time.)
2. If Climax acquires the diesel-powered boat, should they buy it or lease it?
3. Which alternative would you recommend?
4. (Optional) What is the effective interest rate on the 15-year Quapelle lease?