

Accounting and Finance for Business Analysis

Accounting and Finance for Business Analysis

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Course Description

This course covers what everything business people and managers need to know about accounting and finance. It is directed toward the businessperson who must have financial and accounting knowledge but has not had formal training in finance or accounting—perhaps a newly promoted middle manager or a marketing manager of a small company who must know some basic finance concepts. The entrepreneur or sole proprietor also needs this knowledge; he or she may have brilliant product ideas, but not the slightest idea about financing. The goal of the course is to provide a working knowledge of the fundamentals of finance and accounting that can be applied, regardless of the firm size, in the real world. It gives nonfinancial managers the understanding they need to function effectively with their colleagues in finance.

Field of Study	Accounting
Level of Knowledge	Basic to Intermediate
Prerequisite	Basic Math and Accounting
Advanced Preparation	None

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Preface

This course is directed toward the businessperson who must have financial and accounting knowledge but has not had formal training in finance or accounting—perhaps a newly promoted middle manager or a marketing manager of a small company who must know some basic finance concepts. The entrepreneur or sole proprietor also needs this knowledge; he or she may have brilliant product ideas, but not the slightest idea about financing.

The goal of the course is to provide a working knowledge of the fundamentals of finance and accounting that can be applied, regardless of the firm size, in the real world. It gives non-financial managers the understanding they need to function effectively with their colleagues in finance.

We show you the strategies for evaluating investment decisions such as return on investment analysis. You will see what you need to know, what to ask, which tools are important, what to look for, what to do, how to do it, and what to watch out for. You will find the course easy to read and useful. Many practical examples, illustrations, guidelines, measures, rules of thumb, graphs, diagrams, and tables are provided to aid comprehension of the subject matter.

You cannot avoid financial information. Profitability statements, rates of return, budgets, variances, asset management, and project analyses, for example, are included in the non-financial manager's job.

The financial manager's prime functions are to plan for, obtain, and use funds to maximize the company's value. The financial concepts, techniques, and approaches enumerated can also be used by any non-financial manager, irrespective of his or her primary duties. All non-financial managers are in some way involved with the financial areas of business.

This course is designed for non-financial executives in every functional area of responsibility in any type of industry. Whether you are in marketing, manufacturing, personnel, operations research, economics, law, behavioral sciences, computers, personal finance, taxes, or engineering, you must have a basic knowledge of finance. Because your results will be measured in dollars and cents, you must understand the importance of these numbers so as to optimize results in both the short and long term.

Knowledge of the content of this course will enable you to take on additional managerial responsibilities. You will be better equipped to prepare, appraise, evaluate, and approve plans to accomplish departmental objectives. You will be able to back up your recommendations with carefully prepared financial support as well as state your particular measure of performance. By learning how to think in terms of finance and accounting, you can intelligently express your ideas, whether they are based on marketing, production, personnel, or other concepts.

You'll learn how to appraise where you have been, where you are, and where you are headed. Financial measures show past, current, and future performance. Criteria are presented by which you can examine the performance of your division and product lines and also formulate realistic profit goals.

Non-financial managers should have a grasp of financial topics, but need not be able to arrive at the mathematical answer (e.g., discounted rate of return problem). Non-financial managers mainly need to know enough to *ask* their financial colleagues what the discounted rate of return is for a variety of investment decisions. A decision can then be based on their answer.

You should have a basic understanding of financial information so as to evaluate the performance of your responsibility center. Are things getting better or worse? What are the possible reasons? Who is responsible? What can you do about it?

You need to know whether your business segment has adequate cash flow to meet requirements. Without adequate funds, your chances of growth are restricted.

You must know what your costs are in order to establish a suitable selling price. What sales are necessary for you to break even?

You may have to decide whether it is financially advantageous to accept an order at below the normal selling price. If you have idle facilities, a lower price may still result in profitability.

You need to be able to express your budgetary needs in order to obtain proper funding for your department. You may have to forecast future sales, cash flows, and costs to see if you will be operating effectively in the future.

Variance analysis helps you to spot areas of inefficiency or efficiency by comparing actual performance to standards. What are the reasons that sales targets differ from actual sales? Why are costs much higher than expected? The causes must be searched out so that corrective action may be taken.

You can undertake certain strategies to improve return on investment by enhancing profitability or using assets more efficiently. You have to understand that money has associated with it a time value. Thus, you would prefer projects that generate higher cash flows in earlier years. You may also want to compute growth rates.

You are often faced with a choice of alternative investment opportunities. You may have to decide whether to buy machine A or machine B, whether to introduce a certain product line, or whether to expand.

In managing working capital, you have to get the most out of your cash, receivables, and inventory. How do you get cash faster and delay cash payments? Don't forget that you need liquid funds to meet ongoing expenditures. Should you extend credit to marginal customers? How much inventory should you order at one time? When should you order the inventory?

In financing the business, a decision has to be made whether short-term, intermediate-term, or long-term financing is suitable. The financing mix of the company in terms of equity or debt affects the cost of financing and influences the firm's risk position. What is the best financing source in a given situation?

Taxes are important in any business decision; the after-tax effect is what counts. Proper tax planning will make for wise decisions. Are you maximizing your allowable tax deductions?

Financial decisions are usually formulated on the basis of information generated by the accounting system of the firm. Proper interpretation of the data requires an understanding of the assumptions and rules underlying such systems, the convention adopted in recording information, and the limitations inherent in the information presented. To facilitate this understanding, an understanding of basic accounting concepts and conventions is helpful. You should be able to make an informed judgment on the financial position and operating performance of the entity. The balance sheet, the income statement, and the statement of cash flows are the primary documents analyzed to determine the company's financial condition. These financial statements are included in the annual report.

What has been the trend in profitability and return on investment? Will the business be able to pay its bills? How are the receivables and the inventory turning over? Various financial statement analysis tools are useful in evaluating the company's current and future financial conditions. These techniques include horizontal, vertical, and ratio analyses.

Keep this course handy for easy reference throughout your career; it will help you answer financial questions in all the areas mentioned here and in any other matter involving money.

Field of Study	Accounting
Level of Knowledge	Overview
Prerequisite	Basic Math
Advanced Preparation	None

Chapter 1:

Essentials of Accounting and Finance

Learning Objectives

After studying this chapter, you will be able to:

- Identify the non-financial manager's concern with financial planning
 - List characteristics of capital investment.
 - Recognize the responsibilities of financial managers.
 - Distinguish between different business entities.
-

A company exists to increase the wealth of its owners. Management is concerned with determining which products and services are needed and putting them into the hands of its customers. Financial management deals with planning decisions to achieve the goal of maximizing the owners' wealth. Because finance is involved in every aspect of a company's operations, non-financial managers, like financial managers, cannot carry out their responsibilities without accounting and financial information.

In this chapter, you will learn about the non-financial manager's concern with finance, the scope and role of finance, the language of finance, the responsibilities of financial managers, the relationship between accounting and finance, and the financial and operating environment in which finance is situated.

The Non-Financial Manager's Concern with Finance

You should have knowledge of finance and know how to apply it successfully in your particular departmental functions. This is true whether you are a manager in production, marketing, personnel, operations, or any other department. You should know what to look for, the right questions to ask, and where to get the answers. Financial knowledge aids in planning, problem solving, and decision making. Finance provides a road map in numbers and analysis so that you can optimally perform your duties. Further, you must have financial and accounting knowledge in order to understand the financial reports prepared by other segments of the organization. You must know what the numbers mean even if you do not have to determine them.

Non-financial managers spend a good portion of their time planning. They set objectives and plan efficient courses of action to obtain those objectives. There are many types of plans a non-financial manager might have to deal with: production plans, financial plans, marketing plans, personnel plans, and so on. All of these plans are very different, and all require some kind of financial knowledge.

Finance provides a link that facilitates communication among different departments. For example, the budget communicates overall corporate goals to the department managers so they clearly know what is expected of them; it also provides guidelines for how each department may conduct its activities. Most importantly you as a department manager must present a strong case to upper management to justify budgetary allowances. You are typically a participant providing input when the budget is prepared. You must identify any problems with the proposed budget so they are rectified before the budget is finalized. Even after the budget is implemented, you may suggest changes in subsequent budgetary formulations. Also, you must intelligently discuss the budget with other organizational members. If you do not adequately understand the budget or communicate requirements your department may fail to achieve its goals.

You have to formulate and provide upper management with documented information to obtain approval for activities and projects (e.g., new product line). Your request for resources will entail financial plans for the contemplated project. Here, a knowledge of forecasting and capital budgeting (selecting the most profitable of several alternative long-term projects) is required. You may be involved in a decision of whether to lease or buy an asset, such as equipment or an auto. Thus, you must consider the feasibility of the purchase. You must evaluate and appraise monetary and manpower requests before submission. If you show signs of being ill-prepared, you will give a negative impression that may result in the loss of resources.

In certain situations you may obtain financial information about competitors. You should be able to understand such information to make intelligent decisions.

Because many of your decisions have financial implications, you are continually interacting with financial managers. For instance, marketing decisions influence growth in sales and, as a result, there will be changes in plant and equipment requirements that dictate increased external funding. Thus, the marketing manager must have knowledge of the constraints of fund availability, inventory policies, and plant utilization. The purchasing manager must know whether sufficient funds exist to take advantage of volume discounts. The cost of raw materials is one of the most important manufacturing costs. The cost of alternative materials along with their quality must be known since cost affects selling price, and inferior materials may create production problems that eat into divisional profitability. Further, if materials are not delivered on time, customer orders may not be filled in a timely fashion, thus adversely affecting future sales. Advertising managers also make key decisions related to finance. They can justify costs associated with an advertising campaign by estimating its value. If customers want to buy your products, you have something of value that will pay off in future earnings.

Capital investment projects (property, plant, and equipment) are closely tied to plans for product development, marketing, and production. Thus, managers in these areas must be involved with planning and analyzing project performance. As one non-financial manager I interviewed who was working for an electronics company, put it:

My knowledge of accounting and finance helps me to report results, understand reports, control expenses, allocate resources, budget for proper staffing, and decide the direction of my department. There are thirty non-financial managers at my level within the company, and we work in a very competitive environment as the company only promotes from within. Therefore, I need every edge I can get in order to continue moving ahead, and my financial knowledge is a very important tool in my career development.

For these reasons, as well as a host of others, you need basic financial knowledge to successfully conduct daily activities.

The Scope and Role of Finance

You will learn in this section the language of finance as well as the what and why. You will see the responsibilities of financial managers, and the relationship between accounting and finance will be explained.

The Importance of Finance

Finance provides discipline to all the components of the organization involved in decision making. Therefore, you need knowledge of it to perform effectively. A knowledge of finance terminology, concepts, techniques, and applications aids in the overall management of your departmental affairs.

For effective communication, you must be able not only to understand what financial people are saying, but also to express your ideas in their language. You can "open the door" to the finance department by having a better understanding of the finance function and more productive working relationships with finance professionals.

If you master the finance vocabulary, you will be able to comprehend financial information (e.g., budgets), use that information effectively, and communicate clearly about the quantitative aspects of performance and results. You must clearly and thoughtfully express what you need to financial officers in order to perform effectively. To do so, you have to be familiar with the *basics* of accounting, taxes, economics, and other aspects of finance.

Finance uses *accounting information* to make decisions regarding the receipt and use of funds to meet corporate objectives. Accounting is generally broken down into two categories: financial accounting and managerial accounting. Financial accounting records the financial *history* of the business and involves the preparation of reports for use by external parties such as investors and creditors. Managerial accounting provides financial information useful in making better decisions regarding the future. Financial and managerial accounting are discussed later in this chapter. Chapter 18-21 covers financial accounting while chapters 2-7 and 13-14 zero in on managerial accounting.

The What and Why of Finance

Finance involves many interrelated areas such as obtaining funds, using funds, and monitoring performance. It enables you to look at current and prospective problems and find ways of solving them.

One important aspect of finance is the analysis of the return-risk tradeoff, which helps to determine if the expected return is sufficient to justify the risks taken. The greater the risk with any decision (e.g., new Product line, new territory), the greater the return required. In managing your inventory of stock, for example, the less inventory (merchandise held for resale) you keep, the higher the expected return (since less cash is tied up), but also the greater the risk of running out of stock and thus losing sales and customer goodwill.

No matter who you are, you are involved with finance in one way or another. Financial knowledge is required of marketing managers, production people, business managers, investment planners, economists, public relations managers, operations research staff, lawyers, and tax experts, among others. For example, marketing managers have to know product pricing and variance analysis. Financial managers must know how to manage assets so as to optimize the rate of return. Production managers have to be familiar with budgeting and effective handling of productive assets. Personnel executives must know about planning. Public relations managers must know about the financial strengths of the business. Operations research staff has to know about the time value of money. Investment planners have to be familiar with the valuation of stocks, bonds, and other investments.

What are Financial Managers Supposed to Do?

The financial manager plays an important role in the company's goals, policies, and financial success. The financial manager's responsibilities include the following:

- **Financial analysis and planning** - determining the proper amount of funds to employ in the firm; that is, designating the size of the firm and its rate of growth.
- **Investment decisions** - allocating funds to specific assets (things owned). The financial manager makes decisions regarding the mix and type of assets acquired, as well as modification or replacement of assets.
- **Financing and capital structure decisions** - raising funds on favorable terms; that is, determining the nature of the company's liabilities (obligations). For instance, should funds be obtained from short-term or long-term sources?
- **Management of financial resources** - managing cash, receivables, and inventory to accomplish higher returns without undue risk.

The financial manager affects stockholder wealth maximization by influencing.

1. Present and future earnings per share (EPS).
2. Timing and risk of earnings.
3. Dividend policy.
4. Manner of financing.

Table 1-1 presents the functions of the financial manager.

Table1.1. Functions of the Financial Manager

A. Planning

- Long- and short-range financial and corporate planning
- Budgeting for operations and capital expenditures
- Evaluating performance
- Pricing policies and sales forecasting
- Analyzing economic factors
- Appraising acquisitions and divestment

B. Provision of capital

- Short-term sources; cost and arrangements
- Long-term sources; cost and arrangements
- Internal generation

C. Administration of Funds

- Cash management
- Banking arrangements
- Receipt, custody and disbursement of companies' securities and moneys
- Credit and collection management
- Pension money management
- Investment portfolio management

D. Accounting and Control

- Establishment of accounting policies
- Development and reporting of accounting data
- Cost accounting
- Internal auditing
- System and procedures
- Government reporting
- Report and interpretation of results of operations to management
- Comparison of performance with operating plans and standards

E. Protection of Assets

- Provision for insurance
- Establishment of sound internal controls

F. Tax Administration

- Establishment of tax policies
- Preparation of tax reports
- Tax planning

G. Investor Relations

- Maintaining liaison with the investment community
- Counseling with analyst-public financial information

H. Evaluation and Consulting

- Consultation with and advice to other corporate executives on company policies, operations, objectives, and their degree of effectiveness

I. Management Information Systems

- Development and use of computerized facilities
- Development and use of management information systems
- Development and use of systems and procedures

What is the Relationship Between Accounting and Finance?

Accounting is a necessary input and sub function to finance. The primary distinctions between accounting and finance relate to the treatment of funds and decision making.

If you are employed by a large firm, the financial responsibilities are probably carried out by the treasurer, controller, and financial vice president (chief financial officer). Figure 1-1 shows an organization chart of the finance structure within a company. Note that the controller and treasurer report to the vice president of finance. You should know the responsibilities of these financial officers within your own organization and how the function of each affects you.

The financial vice president is involved with financial policy making and planning. He or she has financial and managerial responsibilities, supervises all phases of financial activity, and serves as the financial adviser to the board of directors.

The effective, competent, and timely handling of controllership and treasurer functions will ensure corporate success. Table 1-2 lists the typical responsibilities of the treasurer and controller, but there is no universally accepted precise distinction between the two jobs. The functions may differ slightly between organizations

because of personality and company policy, but typically controllers are concerned with *internal functions* whereas treasurers are responsible for *external functions*.

Management is involved with finance primarily in two ways. First, there is the record keeping, tracking, and controlling of the financial effects of prior and present operations, as well as obtaining funds to satisfy current and future requirements. This function is of internal nature. The external function involves outside entities.

Figure 1-1. Financial Activity Organization

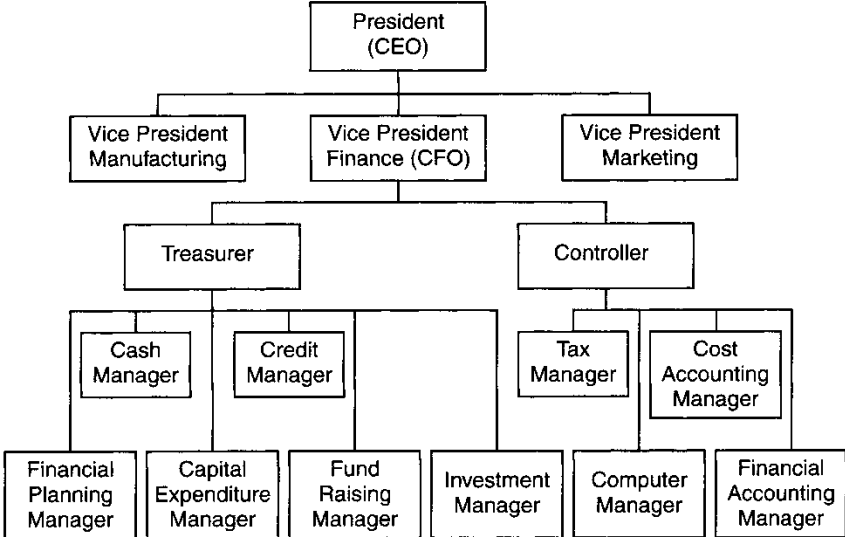


Table 1-2. Responsibilities of Controller and Treasurer

Controller

- Accounting
- Financial reporting
- Custody of records
- Interpretation of financial data
- Budgeting
- Controlling operations
- Appraisal of results and making recommendations
- Preparation of taxes
- Managing assets
- Internal auditing
- Protection of assets
- Reporting to the government
- Payroll

Treasurer

- Obtaining Financing
- Banking relationship
- Investment of funds
- Investor relations
- Cash management
- Insuring assets
- Fostering relationship with creditors and investors
- Credit appraisal and collecting funds
- Deciding on the financing mix
- Dividend disbursement
- Pension management

Controller

The internal matters of concern to the controller include financial and cost accounting, taxes, control, and audit functions. The controller is primarily involved in collecting and presenting financial information. He or she typically looks at what *has* happened instead of what should or will happen. The controller prepares the annual report and Securities and Exchange Commission (SEC) filings as well as tax returns. The SEC filings include Form 10-K, Form 10-Q, and Form 8-K. The primary function of the controller is ensuring that funds are used efficiently.

The control features of the finance function are referred to as *managerial accounting*. Managerial accounting is the preparation of reports used by management for internal decision making, including budgeting, costing, pricing, capital budgeting, performance evaluation, break-even analysis (sales necessary to cover costs), transfer pricing (pricing of goods or services transferred between departments), and rate of return analysis. Managerial accounting relies heavily on historical information generated in *the financial accounting* function, but managerial accounting differs from financial accounting in that it is future-oriented (making decisions that ensure future performance).

Managerial accounting information is vital to the non-financial person. For example, the break-even point is useful to marketing managers in deciding whether to introduce a product line. Variance analysis is used to compare actual revenue and costs to standard revenue and costs for performance evaluation so that inefficiencies can be identified and corrective action taken. Budgets provide manufacturing guidelines to production managers.

Many controllers are involved with management information systems that analyze prior, current, and emerging patterns. The controller function also involves reporting to top management and analyzing the financial implications of decisions.

Treasurer

The treasurer's responsibility is mostly custodial in obtaining and managing the company's capital. Unlike the controller, the treasurer is involved in external activities primarily involving financing matters. He or she deals with creditors (e.g., bank loan officers), stockholders, investors, underwriters for equity (stock) and bond issuances, and governmental regulatory bodies such as the SEC. The treasurer is responsible for managing corporate assets (e.g., accounts receivables inventory) and debt, planning the finances, planning capital expenditures, obtaining funds, formulating credit policy, and managing the investment portfolio.

The treasurer concentrates on keeping the company afloat by obtaining cash to meet obligations and to buy the assets needed to achieve corporate objectives. Whereas the controller concentrates on profitability, the treasurer emphasizes the sources and uses of cash flow. Even a company that has been profitable may have a significant negative cash flow. For example, there may exist substantial long-term receivables (debts owed to the company but not yet paid). In fact, without sufficient cash flow, a company may fail. By concentrating on

cash flow, the treasurer should prevent bankruptcy and accomplish corporate goals. The controller appraises the financial statements, formulates additional data, and makes decisions based on the analysis.

Financial and Operating Environment

You operate in the financial environment and are indirectly affected by it. This section will discuss financial institutions and markets, financial versus real assets, and the alternative forms of business organizations.

Financial Institutions and Markets

A healthy economy depends heavily on efficient transfer of funds from savers to individuals, businesses, and governments who need capital. Most transfers occur through *specialized financial institutions*, which serve as intermediaries between suppliers and users of funds.

In the financial *markets*, companies demanding funds are brought together with those having surplus funds. Financial markets provide a mechanism through which the financial manager obtains funds from a wide range of sources, including financial institutions. The financial markets are composed of money markets and capital markets. Figure 1-2 depicts the general flow of funds among financial institutions and markets.

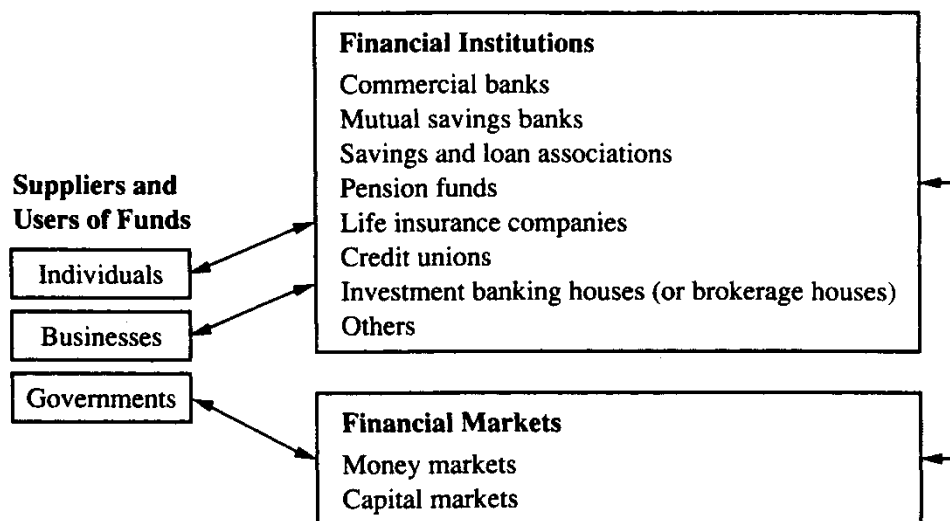
Money markets are the markets for short-term (less than one year) debt securities. Examples of money market securities include US Treasury bills, commercial paper, and negotiable certificates of deposit issued by government, business, and financial institutions.

Capital markets are the markets for long-term debt and corporate stocks. The New York Stock Exchange, which handles the stocks of many of the larger corporations, is an example of a major capital market. In addition, securities are traded through the thousands of brokers and dealers on *over-the-counter (OTC) market*, a term used to denote all buying and selling activities in securities that do not occur on an organized stock exchange.

Financial Assets Versus Real Assets

The two basic types of investments are financial assets and real assets. Your *financial assets* comprise intangible investments (things you cannot touch). They represent your equity ownership of a company, or they provide evidence that someone owes you a debt, or they show your right to buy or sell your ownership interest at a subsequent date. Financial assets include common stock, options and warrants to buy stock at a later date, money market certificates, savings accounts, Treasury bills, commercial paper (unsecured short-term debt), bonds, preferred stock, and financial futures (contracts to buy financial instruments at a later date). *Real assets* are investments you can put your hands on. Sometimes referred to as real property, they include real estate, machinery and equipment, precious and common metals, and oil.

Figure 1-2. General Flow of Funds among Financial Institutions and Financial Markets



Basic Forms of Business Organizations

The basic types of businesses are sole proprietorship, partnership, and corporation. Of the three, corporations are usually of the largest size (in terms of sales, total assets, or number of employees), whereas partnerships and proprietorships emphasize entrepreneurship to a greater degree.

Sole Proprietorship

A sole proprietorship is owned by one individual. Sole proprietorships are the most numerous of the three types of organizations. The typical sole proprietorship is a small business; usually, only the proprietor and a few employees work in it. Funds are raised from personal resources or through borrowings. The sole proprietor makes all the decisions. Sole proprietorships are common in the retail, wholesale, and service industries.

The advantages of a sole proprietorship are:

- No formal charter is required.
- Organizational costs are minimal.
- Profits and control are not shared with others.
- The income of the business is taxed as personal income.
- Confidentiality is maintained.

The disadvantages are:

- The ability to raise large sums of capital is limited.
- Unlimited liability exists for the owner.

- The life of the business is limited to the life of the owner.
- The sole proprietor must be a "jack-of-all-trades."

Partnership

A partnership is similar to the sole proprietorship except that the business has more than one owner. Partnerships are often formed to bring together different skills or talents, or to obtain the necessary capital. Although partnerships are generally larger than sole proprietorships, they are not typically large businesses. Partnerships are common in finance, real estate, insurance, public accounting, brokerage, and law.

The partnership contract (articles of partnership) spells out the rights of each partner concerning such matters as profit distribution and fund withdrawal. Partnership property is *jointly* owned. Each partner's interest in the property is based on his or her proportionate capital balance. Profits and losses are divided in accordance with the partnership agreement. If nothing about distribution is stated, they are distributed equally.

Each partner acts as an *agent* for the others. The partnership (and thus each individual partner) is legally responsible for the acts of any partner. However, the partnership is not bound by acts committed beyond the scope of the partnership.

Forming a partnership creates these advantages:

- Partnerships can be easily established, with minimal organizational effort
- Partnerships are free from special governmental regulation, at least compared to corporations.
- Income of the partnership is taxed as personal income to the partners.
- More funds are typically obtained than by a sole proprietorship.
- Better credit standing results from the availability of partners' personal assets to meet creditor claims.
- Partnerships attract good employees because of potential partnership opportunity.

Its disadvantages are as follows:

- It carries unlimited liability for the partners; each member is held personally liable for all partnership debts.
- It dissolves upon the withdrawal or death of any partner.
- Because it cannot sell stock, its ability to raise significant capital is limited, which may restrict growth.

Corporation

A corporation is a legal entity existing apart from its owners (stockholders). Ownership is evidenced by possession of shares of stock. The corporate form is not the most numerous type of business, but it is the most important in terms of total sales, assets, profits, and contribution to national income. The corporate form is

implicitly assumed throughout this course. Corporations are governed by a distinct set of state or federal laws and come in two forms: a state *C Corporation* or *federal Subchapter S*.

The advantages of a C corporation are:

- Unlimited life.
- Limited liability for its owners, as long as no personal guarantee on a business-related obligation such as a bank loan or lease exists.
- Ease of transfer of ownership through transfer of stock.
- Ability to raise large sums of capital.

Its disadvantages are:

- Difficult and costly to establish, as a formal charter is required.
- Subject to double taxation on its earnings and dividends paid to stockholders.
- Bankruptcy, even at the corporate level, does not discharge tax obligations.

The general structure of a corporation is depicted in Figure 1-3.

Figure 1-3. Corporate Structure



Subchapter S Corporation

A Subchapter S Corporation is a form of corporation whose stockholders are taxed as partners.

To qualify as an S corporation, the following is necessary:

- A corporation must not have more than 100 shareholders.

- It cannot have any nonresident foreigners as shareholders.
- It cannot have more than one class of stock.
- It must properly elect Subchapter S status.

The S Corporation can distribute its income directly to shareholders and avoid the corporate income tax while enjoying the other advantages of the corporate form. *Note:* Not all states recognize Subchapter S corporations.

Limited-Liability Company and Limited-Liability Partnership

Limited Liability Companies (LLCs) are a relatively recent development. Most states permit the establishment of LLCs. LLCs are typically not permitted to carry on certain service businesses (e.g., law, medicine, and accounting). An LLC provides limited personal liability, as a corporation does. Owners, who are called members, can be other corporations. The members run the company unless they hire an outside management group. The LLC can choose whether to be taxed as a regular corporation or pass through to members. Profits and losses can be split among members any way they choose. *Note:* The LLC and LLP rules vary by state. A limited-liability partnership (LLP) is similar to an LLC; but LLPs are used for professional firms in the fields of accounting, law, and architecture.

Conclusion

The chapter discussed the functions of finance, and the environment which finance operates, and how the non-financial manager fits in a typical company's structure.

The financial functions of the business impact non-financial activities such areas as record keeping, performance evaluation, variance analysis, and getting and utilization of resources. The non-financial manager must comprehend the goals, procedures, techniques, yardsticks, and functions of finance to optimally perform his or her duties. Ignorance of finance will not only lead to incorrect analysis and decisions but will also prevent you from moving up in the organization.

An important reason for which you need financial and accounting knowledge is that without a good understanding of these disciplines you do not have the tools needed for effective management decision making. You will have to rely totally on the financial manager, whose recommendations you may not be able to totally understand or, if necessary, dispute. A successful operation blends production, marketing, and finance with some degree of goal congruence. Decisions that make sense in terms of marketing and sales must also make financial sense. Without some financial background, you cannot contribute sound input to the decision process.

Chapter 1 Review Questions

1. Controllers are ordinarily NOT concerned with

- A. Preparation of tax returns.
- B. Investor relations.
- C. Reporting to government.
- D. Protection of assets.

2. The treasury function is usually NOT concerned with

- A. Financial reporting.
- B. Short-term financing.
- C. Cash custody and banking.
- D. Credit extension and collection of bad debts.

3. In which legal form of business organization do the owners of the business enjoy limited liability?

- A. Partnership.
- B. Sole proprietorship.
- C. Corporation.
- D. Oligopoly.

Chapter 1 Review Answers

1. Controllers are ordinarily NOT concerned with

- A. Incorrect. The preparation of tax returns is a typical responsibility of the controller.
- B. **Correct.** Controllers are usually in charge of budgeting, accounting, accounting reports, and related controls. Treasurers are most often involved with control over cash receivables, short-term investments, financing, and insurance. Thus, treasurers rather than controllers are concerned with investor relations.
- C. Incorrect. External reporting is a function of the controller.
- D. Incorrect. The accounting system helps to safeguard assets.

2. The treasury function is usually NOT concerned with

- A. **Correct.** Treasurers are usually concerned with investing cash and near-cash assets, the provision of capital, investor relations, insurance, etc. Controllers, on the other hand, are responsible for the reporting and accounting activities of an organization, including financial reporting.
- B. Incorrect. Short-term financing lies within the normal range of a treasurer's functions.
- C. Incorrect. The treasurer has custody of assets.
- D. Incorrect. Credit operations are often within the treasurer's purview.

3. In which legal form of business organization do the owners of the business enjoy limited liability?

- A. Incorrect. General partners share profits and losses of the venture. Debts of a partnership are ultimately the debts of the individual general partners.
- B. Incorrect. A sole proprietorship is owned by one person. The sole proprietor is personally liable for all debts.
- C. **Correct.** Shareholders of a corporation own an equity interest in the underlying net assets of the corporation and are entitled to share in its profits. Unlike a sole proprietor or a general partner, the shareholder is not subject to liability beyond his/her investment.
- D. Incorrect. An oligopoly is not a legal form of business organization.

Chapter 2:

Types of cost data and cost analysis

Learning Objectives

After studying this chapter, you will be able to:

- Identify the importance of cost data.
 - Understand and define different types of costs.
 - Recognize costs and their allocation.
-

Cost is an expenditure incurred to obtain revenue. In establishing a price for your product or service, you must know total costs and costs per unit. You must also be familiar with the various cost concepts that are useful for income determination, short-term and long-term decision making, and planning, evaluation, and control. Different types of costs are used for different purposes, and proper costing will ensure the appropriate use of and accountability for your department's resources.

The Importance of Cost Data

Obtaining and understanding cost information is essential to your business success. First, your costs determine your selling price; if your costs exceed your selling price, you will incur a loss. All costs applicable to a product or service must be considered, (including manufacturing, selling, and other expenses) when determining a selling price. It should also account for expected inflationary price increases. For example, if inflation is expected to be 6 percent next year, the selling price should similarly be increased by 6 percent.

Cost information also assists in determining (1) the minimum order to be accepted; (2) the profitability of a particular product, territory, or customer; and (3) the method of servicing particular types of accounts (e.g., through jobbers, by telephone, or by mail order). In addition, cost information allows the purchasing manager to evaluate which suppliers are the least costly to use (the total cost associated with buying their merchandise, including any transportation charges). Cost information is also useful in planning and budgetary decisions.

Types of Costs

Costs are classified according to: function, ease of traceability, timing of charges against revenue, behavior, averaging, controllability, and other important cost concepts.

Costs by Function

Manufacturing costs include any costs to produce a product consisting of direct material, direct labor, and factory overhead.

- **Direct material** becomes an integral part of the finished product (e.g., steel used to make an automobile).
- **Direct labor** is labor directly involved in making the product (e.g., the wages of assembly workers on an assembly line).
- **Factory overhead** includes all costs of manufacturing except direct material and direct labor (e.g., depreciation, rent, taxes, insurance, waste control costs, quality costs, engineering, workmen's compensation, cost of idle time, and fringe benefits).

Nonmanufacturing costs (operating expenses) are expenses related to operating the business rather than producing the product. These costs include selling and general and administrative expenses.

- **Selling (marketing) expenses** include the cost of obtaining the sales (e.g., commissions and/or salespersons' salaries) and distributing the product to the customer (e.g., delivery charges). Selling expenses may be analyzed for reasonableness by product, territory, customer class, distribution outlet, and method of sale. Marketing expenses should be evaluated based on the success of distribution methods (e.g., direct selling to retailers and wholesalers versus mail order sales).
- **General and administrative expenses** include the costs incurred for administrative activities (e.g., executive salaries and legal expenses).

Note: Many costs overlap within their categories. For example, direct materials and direct labor when combined are called *prime costs*. Direct labor and factory overhead when combined are termed *conversion costs* (or processing costs).

Costs by Ease of Traceability

Direct costs are directly traceable to a particular object of costing such as a department, product, job, or territory (e.g., depreciation on machinery in a department and advertising geared to a particular sales territory).

Indirect (common) costs are more difficult to trace to a specific costing object because they are shared by different departments, products, jobs, or territories. Therefore, such costs are allocated on a rational basis (e.g., rent is allocated to a department based on square footage). A cost may be direct in one area and indirect in

another. For example, in analyzing salespeople, traveling and entertainment expenses are direct; however, in an analysis by product, these expenses are indirect.

Costs by Timing of Charges Against Revenue

Period costs are related to time rather than to producing the product (e.g., advertising costs, sales commissions, and administrative salaries). They are charged against revenue in full in the year incurred.

Product costs are related to manufacturing a product (e.g., material and labor costs). They are charged to inventory first and then to cost of sales when sales are made.

Costs by Behavior

Fixed costs include the costs that remain constant regardless of activity (e.g., rent, property taxes, insurance). As sales increase, fixed costs do not increase; therefore, profits can increase rapidly during good times. However, during bad times fixed costs do not decline, which causes profits to fall rapidly.

Variable costs include the costs that vary directly with changes in activity (e.g., direct material, direct labor). Thus, a 20 percent increase in variable cost accompanies a 20 percent increase in sales.

Semi-variable (mixed) costs include the costs that are part fixed and part variable. A semi-variable cost varies with changes in volume but, unlike a variable cost, does not vary in direct proportion. Such examples include telephone bills, electricity bills, and car rental charged as a fixed rental fee plus a variable mileage fee. The breakdown of costs into their variable and fixed components is important in many areas including flexible budgeting, break-even analysis, and short-term decision making.

Costs by Averaging

Average costs are the total costs divided by total units. For example, if total cost is \$10,000 for the production of 1,000 units, the average cost is \$10 per unit.

Costs by Controllability

Controllable costs are those costs over which a manager has direct control (e.g., advertising if it is at the discretion of the manager).

Uncontrollable costs are those costs over which a manager has no control (e.g., property taxes).

Other Important Cost Concepts Useful for Planning, Control and Decision Making

Standard costs are the carefully predetermined production or operating costs that serve as target costs. Standard costs are compared with actual costs in order to measure the performance of a given department.

Joint costs are the common costs of producing two or more inseparable products up to the point at which they become separable (the split-off point). The products are then sold as identifiably separate products or are processed further.

Incremental (differential) costs are determined by calculating the difference in costs between two or more alternatives. For example, if the direct labor costs for products A and B are \$10,000 and \$15,000, respectively, the incremental cost is \$5,000.

Sunk costs are those costs of resources that have already been incurred, and, therefore, they will not change regardless of which alternative is chosen. They represent past or historical costs. For example, a \$50,000 machine paid for three years ago now has a book value of \$20,000. This \$20,000 book value is a sunk cost that does not affect a future decision.

Relevant costs include expected costs that will differ between alternatives. The incremental cost is relevant to a decision, but the sunk cost is irrelevant.

Opportunity costs include the net revenue foregone by rejecting an alternative. For example, if you have the choice of using your department's capacity to produce an extra 10,000 units or renting it out for \$20,000, the opportunity cost of using the capacity is \$20,000.

Discretionary costs are those costs that can be discontinued without affecting the accomplishment of essential managerial objectives in the short-term (e.g., bonuses).

How Do Your Costs Behave?

Costs by Behavior

From a planning and control standpoint, perhaps the most important way to classify costs is by how they behave in accordance with changes in volume or some measure of activity. Assuming idle capacity (not using your entire department's capacity), the cost behavior relationships of fixed cost, variable cost, and unit cost are shown in Table 2-1. Table 2-2 illustrates the cost behavior for a fixed cost, such as rent, and Figure 2-1 shows the behavior pattern for a fixed cost.

Table 2-1, Relationships of Fixed Cost, Variable Cost, and Unit Cost

Fixed costs are \$1,000 per period and variable costs are \$.10 per unit. The total and unit (average) costs at various production levels are as follows:

Volume in units	Total Fixed Costs	Total Variable Costs	Total Costs (b)+(c)	Variable Cost per unit (c)/(a)	Fixed Cost per unit (b)/(a)	Unit Average Cost (d)/(a) or (e)+(f)
(a)	(b)	(c)	= (d)	= (e)	= (f)	
1,000	\$1,000	\$ 100	\$1,100	\$.10	\$1.00	\$1.10
5,000	1,000	500	1,500	.10	.20	.30
10,000	1,000	1,000	2,000	.10	.10	.20

<u>Volume</u>	<u>Rent</u>	<u>Unit Cost</u>
100,000	\$100,000	\$1.00
150,000	100,000	.67
200,000	100,000	.50

Example 2-1. Your company is operating at idle capacity. Current production is 100,000 units. Total fixed cost is \$100,000, and variable cost per unit is \$3. If production increases to 110,000 units, the following results:

1. Total fixed cost is still \$100,000.
2. Fixed cost per unit is \$.91 (\$100,000/110,000 units)
3. Total variable cost is \$330,000.
4. Variable cost per unit is \$3.

Table 2-3 illustrates the cost behavior for a variable cost, such as commissions, and Figure 2-2 shows the behavior pattern for a variable cost.

You can estimate the total cost of an item, such as a product line, by combining the variable cost and fixed cost.

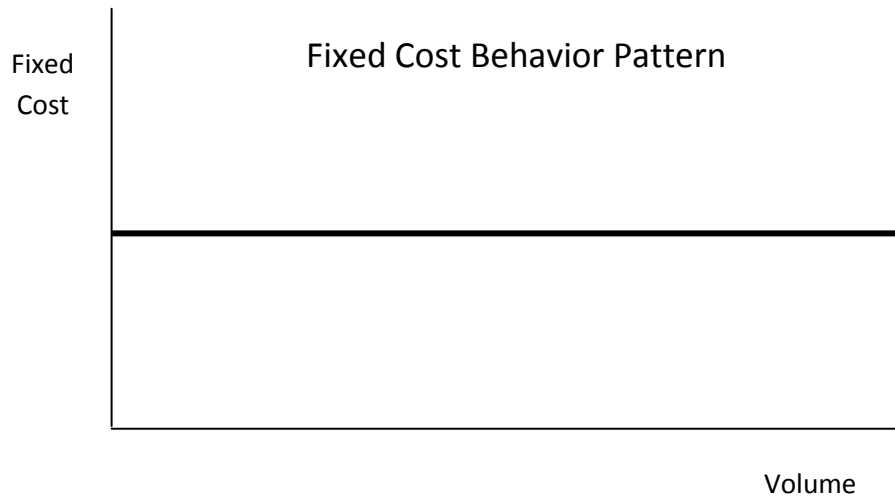


Figure 2-1. Fixed cost behavior pattern

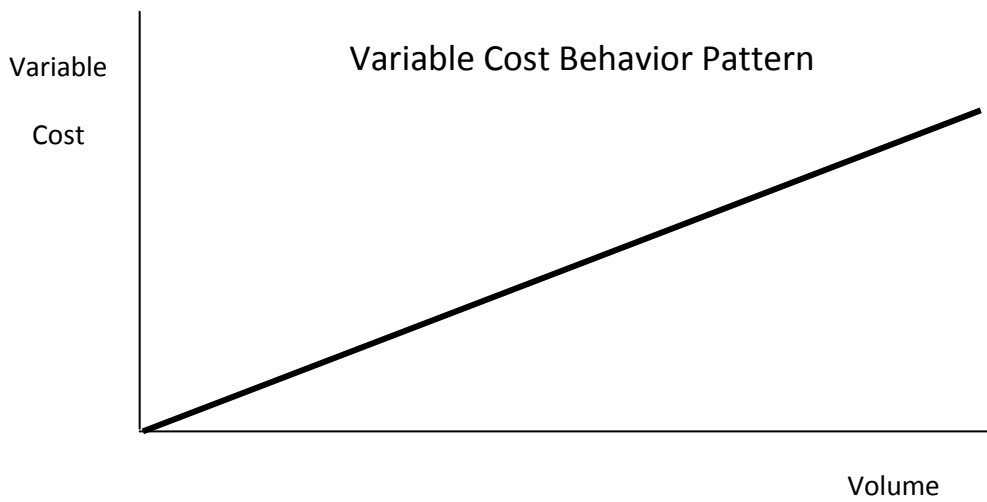


Figure 2-2. Variable cost behavior pattern

<i>Table 2-3. Cost Behavior for Commissions</i>		
Volume	Commissions	Unit Cost
100,000	\$10,000	\$.10
150,000	15,000	.10
200,000	20,000	.10

Example 2-2. There are 100 estimated units for product line X. The fixed cost is \$600, and the variable cost is \$2.25 per unit. The total cost is:

Fixed cost	\$600	
Variable cost	<u>+225</u>	(100 x \$2.25)
Total cost	<u>\$825</u>	

Segregating Fixed Cost and Variable Cost

If you know the total cost you can determine the fixed and variable costs using the high-low method. The variable cost per unit may be computed by comparing the change in expense between high and low levels with the change in volume.

Example 2-3. Your company reached its sales volume high in May. The lowest volume occurred in February.

	Total Cost	Unit Volume
High Point (May)	\$4,000	32,000
Minus Low Point (February)	<u>2,800</u>	<u>20,000</u>
Change due to volume	<u>\$1,200</u>	<u>12,000</u>

$$\text{Change in cost per unit} = \frac{\$1,200}{\$12,000} = \$0.10$$

Thus, the variable cost per unit is \$.10. You can now determine the fixed portion of the expense using either the lowest or highest volume level. For example, using the high point:

$$\text{Total Fixed Cost} = \text{Total Cost} - \text{Total Variable Cost}$$

$$\text{Total Fixed Cost} = \$4,000 - (\$.10 \times 32,000) = \$800$$

Cost Allocation

Cost allocation assigns a common cost to two or more departments. The costs are allocated in proportion to each department's responsibility for their incurrence. Possible allocation bases include units produced, direct labor cost, direct labor hours, machine hours, and number of employees. Criteria in selecting an allocation base include cost benefit, ease of use, and industry standards. Cost allocation enhances control, aids efficiency evaluation, and promotes sound decision making. Accurate cost figures are necessary for product costing and pricing.

Cost Analysis

Cost analysis allows management to move carefully and to control costs accurately in the following ways:

- Compensation and expenses for salespeople should be analyzed and compared to budget, salary structure, and industry standards.
- Cost estimates may be made for alternative methods of selling products (e.g., evaluation can be performed related to the distribution of samples and the effect on costs and sales trends).
- Cost data of potential sales by product or territory may aid in the assignment of sales people.
- Cost information for advertising programs aid in making decisions for future media communications. Special cost structure may be formulated for market test cases to examine cost effectiveness.
- An analysis of entertainment expense should be made by customer, salesperson, or territory, in order to determine whether expenses are in line with the revenue obtained and whether the cost per dollar of net sales and the cost per customer are reasonable.
- The following costs should also be analyzed for control purposes: cost per order received, cost per customer account, cost per item handled, cost per shipment, and cost per order filled.
- The cost per month and cost per mile for auto expenses should be considered for reasonableness.
- Material costs should be evaluated for changes. Costs per unit may drop as a result of quantity discounts and changes in the suppliers' freight charges and terms, or they may change due to substitution of different materials, changing suppliers, and difference in the quality of material.
- Direct labor costs should also be evaluated for changes. Costs per unit can decline due to increased worker experience in performing the task. Also, new material waste will decline as increased maturity in the operation exists.

What You Can Learn from the Japanese

Japanese manufacturing companies place high standards on quality, timely delivery, and low-cost production. To lower costs they reduce the number of parts and use standard parts across product lines with a variety of products. Japanese companies also recognize that the best area to support low-cost production is usually in a product's design stage. They design and build products and sell them at selling prices to ensure market success. Note that such selling prices may be lower than that supported by current manufacturing costs. In an attempt to improve machine efficiency, Japanese companies practice preventive and corrective maintenance, instead of breakdown maintenance.

Conclusion

Cost information is imperative in the decision-making process and is necessary for operational and control purposes as well. The project manager should have a basic knowledge of cost control so as to keep track of the expenses of his or her product. Such knowledge would be useful in analysis of payment requests from vendors, equipment purchasing and rentals, lump-sum versus cost plus contracts, analysis of labor cost, preparation of the progress report and evaluation of project status.

Chapter 2 Review Questions

1. When a decision is made in an organization, it is selected from a group of alternative courses of action. The loss associated with choosing the alternative that does not maximize the benefit is the

- A. Net realizable value.
- B. Expected value.
- C. Opportunity cost.
- D. Incremental cost.

2. Controllable costs

- A. Arise from periodic appropriation decisions and have no well-specified function relating inputs to outputs.
- B. Are primarily subject to the influence of a given manager of a given responsibility center for a given time span.
- C. Arise from having property, plant, and equipment, and a functioning organization.
- D. Result specifically from a clear-cut measured relationship between inputs and outputs.

3. Incremental cost is

- A. The difference in total costs that results from selecting one choice instead of another.
- B. The profit forgone by selecting one choice instead of another.
- C. A cost that continues to be incurred in the absence of activity.
- D. A cost common to all choices in question and not clearly or feasibly allocable to any of them.

4. Joint costs are those costs

- A. Of products requiring the services of two or more processing departments.
- B. Of a product from a common process that has relatively little sales value and only a small effect on profit.
- C. Of production that are combined in the overhead account.
- D. Of two or more products produced from a common process.

5. The difference between variable costs and fixed costs is

- A. Unit variable costs fluctuate, and unit fixed costs remain constant.

- B. Unit variable costs are fixed over the relevant range, and unit fixed costs are variable.
- C. Total variable costs are variable over the relevant range and fixed in the long term, while fixed costs never change.
- D. Unit variable costs change in varying increments, while unit fixed costs change in equal increments.

6. Sales commission is classified as what type of cost?

- A. Product cost.
- B. Semi-variable.
- C. Variable.
- D. Fixed.

Chapter 2 Review Answers

1. When a decision is made in an organization, it is selected from a group of alternative courses of action. The loss associated with choosing the alternative that does not maximize the benefit is the

- A. Incorrect. Net realizable value is the value of an asset net of any disposal costs.
- B. Incorrect. Expected value is a weighted average of potential outcomes with weights being probabilities.
- C. **Correct.** Opportunity costs include the net revenue foregone by rejecting an alternative. For example, if you have the choice of using your department's capacity to produce an extra 10,000 units or renting it out for \$20,000, the opportunity cost of using the capacity is \$20,000.
- D. Incorrect. An incremental cost is the additional cost of selecting one option rather than another.

2. Controllable costs

- A. Incorrect. Periodic appropriation decisions that have no well-specified function relating inputs to outputs apply to discretionary costs.
- B. **Correct.** Controllable costs are those costs over which a manager has direct control (e.g., advertising if it is at the discretion of the manager). All costs are controllable, but they are controlled at different management levels; e.g., the decision to build another plant is made at a higher level of management than the decision to buy office supplies.
- C. Incorrect. Property, plant, and equipment costs are committed costs.
- D. Incorrect. Engineered costs result from a measured relationship between inputs and outputs.

3. Incremental cost is

- A. **Correct.** Incremental (differential) costs are determined by calculating the difference in costs between two or more alternatives. For example, if the direct labor costs for products A and B are \$10,000 and \$15,000, respectively, the incremental cost is \$5,000.
- B. Incorrect. Opportunity cost is the profit forgone by selecting one choice instead of another.
- C. Incorrect. A fixed cost is incurred even though no output is produced.
- D. Incorrect. Common or joint costs are not allocable among the possible choices.

4. Joint costs are those costs

- A. Incorrect. The costs accumulated in prior processing steps are considered raw materials costs for purposes of subsequent processing.
- B. Incorrect. Common products with relatively little sales value are by-products, e.g., woodchips from a sawmill. Joint cost is usually not allocated to them.

- C. Incorrect. Indirect costs are combined in the overhead account.
- D. **Correct.** Joint costs are the common costs of producing two or more inseparable products up to the point at which they become separable (the split-off point). The products are then sold as identifiably separate products or are processed further.

5. The difference between variable costs and fixed costs is

- A. Incorrect. Variable costs are fixed per unit; they do not fluctuate. Fixed costs per unit change as production changes.
- B. **Correct.** Fixed costs remain unchanged within the relevant range for a given period despite fluctuations in activity, but per-unit fixed costs do change as the level of activity changes. Thus, fixed costs are fixed in total but vary per unit as activity changes. Total variable costs vary directly with activity. They are fixed per unit within a given range, but vary in total.
- C. Incorrect. All costs, including fixed costs, are variable in the long term.
- D. Incorrect. Unit variable costs are fixed in the short term.

6. Sales commission is classified as what type of cost?

- A. Incorrect. Product costs are related to manufacturing a product (e.g., material and labor costs). Sales commission is an example of period costs.
- B. Incorrect. Semi-variable (mixed) costs include the costs that are part fixed and part variable. Such examples include electricity bills and car rental charged as a fixed rental fee plus a variable mileage fee.
- C. **Correct.** A variable cost is uniform per unit but, in total, fluctuates in direct proportion to changes in the related activity or volume. Thus, sales commission changes with sales.
- D. Incorrect. Total fixed costs do not fluctuate with activity levels; they are not based on units produced.

Chapter 3:

Contribution Analysis

Learning Objectives

After studying this chapter, you will be able to:

- Recognize financial components critical to decision analysis.
 - Understand and define contribution margin.
 - Apply the contribution margin ratio.
-

Contribution margin analysis is another tool managers use for decision making. In the contribution margin approach, expenses are categorized as either fixed or variable. The variable costs are deducted from sales to obtain the contribution margin. Fixed costs are then subtracted from contribution margin to obtain net income. This information helps the manager to (1) decide whether to drop or push a product line, (2) evaluate alternatives arising from production, special advertising, and so on, (3) decide on pricing strategy and products or services to emphasize, and (4) appraise performance. For example, contribution analysis involves how to formulate a bid price on a contract, and whether to accept an order even if it is below the normal selling price. Gross margin, found in the conventional income statement, which is sales minus the cost of goods sold, is not useful for this type of decision analysis.

The format of the contribution margin income statement follows:

Sales
Less: Variable cost of sales
Variable selling and administrative expenses
Contribution margin
Less: Fixed cost
Net Income

Example 3-1. If the selling price is \$10 per unit and the variable cost is \$8 per unit, a contribution margin of \$2 per unit is earned. The contribution margin ratio (contribution margin/sales) is 20% (\$2/\$10).

Example 3-2. You sell 40,000 units of a product at \$20 per unit. The variable cost per unit is \$5, and the fixed cost is \$250,000; the contribution margin income statement is as follows:

Sales (40,000 x \$20)	\$	800,000
Less: Variable cost (40,000 x \$5)		<u>200,000</u>
Contribution margin (40,000 x \$15)	\$	600,000
Less: Fixed Cost		<u>250,000</u>
Net Income	\$	<u><u>350,000</u></u>

Example 3-3. The following data applies to your department: sales \$50,000, variable cost \$45,000, and fixed cost \$3,000. If there is an expected 10 percent increase in sales volume, the expected departmental income will be as follows:

Sales (\$50,000 x 110%)	\$	55,000
Less: Variable cost (\$45,000 x 110%)		<u>49,500</u>
Contribution margin	\$	5,500
Less: Fixed cost		<u>3,000</u>
Departmental income	\$	2,500

Should You Accept a Special Order?

When idle capacity exists, an order should be accepted at below the normal selling price, provided a contribution margin is earned. Note that with idle capacity fixed cost will not change.

Example 3-4. You currently sell 8,000 units at \$30 per unit. The variable cost per unit is \$15, and the fixed cost is \$60,000 (fixed cost per unit is \$60,000/8,000, or \$7.50). Idle capacity exists. A potential customer is willing to purchase 500 units at \$21 per unit. The contribution margin income statement for this special order would be as follows:

Sales (500 x \$21)	\$10,500
Less: Variable cost (500 x \$15)	<u>7,500</u>
Contribution Margin	\$3,000
Less: Fixed cost (incremental)	<u>0</u>
Net Income	\$ <u><u>3,000</u></u>

You should accept this order because it increases your profitability. If idle capacity exists, the acceptance of an additional order does not generally increase fixed cost. However, even if fixed costs were to increase, say, by \$1,200 to buy a special tool for this job, it still would be financially attractive to accept this order because you would still realize a profit of \$1,800 (\$3,000 - 1,200).

Example 3-5. Financial data for your department follows:

Selling price	\$	15.00
Direct material	\$	2.00
Direct labor	\$	1.90
Variable overhead	\$.50
Fixed overhead (\$100,000/20,000 units)	\$	5.00

Selling and administrative expenses are fixed except for sales commissions, which are 14% of the selling price. Idle capacity exists. You receive an additional order for 1,000 units from a potential customer willing to pay \$9 per unit. The contribution margin income statement for this special order would be as follows:

Sales (1,000 x \$9)	\$9,000
Less: Variable manufacturing costs (1,000 x \$4.40)*	<u>4,400</u>
Manufacturing contribution margin	\$4,600
Less: Variable selling and administrative expenses (14%x \$9,000)	<u>1,260</u>
Contribution margin	\$3,340
Less: Fixed cost	<u>0</u>
Net income	<u>\$3,340</u>

*Variable manufacturing cost = \$2.00 + \$1.90 + \$.50 = \$4.40

Even though the offered selling price of \$9 is much less than the current selling price of \$15, the order should be accepted.

Example 3-6. You want a markup of 40% over cost on a product. You can determine your selling price by using the following data:

Direct material	\$	5,000
Direct labor		12,000
Overhead		<u>4,000</u>
Total cost	\$	21,000
Markup on cost (40%)		<u>8,400</u>
Selling price	\$	<u>29,400</u>

Total direct labor for the year is \$1,800,000. Total overhead for the year is 30% of direct labor. The overhead is 25% fixed and 75% variable. A customer offers to buy the item for \$23,000. There is idle capacity. The following contribution margin income statement will show you whether you should accept the special offer.

Selling price		\$ 23,000
Less: Variable costs		
Direct material	\$ 5,000	
Direct labor	12,000	
Variable overhead (\$12,000 x 22.5%)*	<u>2,700</u>	
	19,700	<u>19,700</u>
Contribution margin		\$3,300
Less: Fixed cost		<u>0</u>
Net income		<u>\$ 3,300</u>

* Total overhead $0.30 \times \$1,800,000 = \$540,000$; Variable overhead = 22.5% of direct labor, computed as follows:

$$\text{Variable overhead (\% of Direct labor)} = \frac{0.75 \times \$540,000}{\$1,800,000} = \frac{\$405,000}{\$1,800,000} = 22.5\%$$

In this case, you should accept the incremental order since it will be profitable. However, if you are not the one who decides whether to accept or reject special orders, you still need to understand why your company asks you to sell an item at a lower price.

How Do You Determine a Bid Price?

Pricing policies using contribution margin analysis may be helpful in contract negotiations. Often such business is sought during the slack season, when it may be financially beneficial to bid on extra business at a competitive price that covers all variable costs and makes some contributions to fixed costs plus profits. A knowledge of your variable and fixed costs is necessary to make an accurate bid price determination.

Example 3-7. You receive an order for 10,000 units and want to know the minimum bid price that will result in a \$20,000 increase in profits. The current income statement is as follows:

Sales (50,000 units x \$25)		\$1,250,000
Less: Cost of sales		
Direct material	\$120,000	
Direct labor	200,000	
Variable overhead (\$200,000 x 0.30)	60,000	
Fixed overhead	<u>100,000</u>	
	480,000	<u>480,000</u>
Gross margin		\$ 770,000
Less: Selling and administrative expenses		
Variable (includes freight costs of \$0.40 per unit)		
	\$ 60,000	
Fixed cost	<u>30,000</u>	
	<u>90,000</u>	<u>90,000</u>
Net income		<u>\$ 680,000</u>

Cost patterns for the incremental order are the same except that

- Freight costs will be borne by the customer.
- Special tools costing \$8,000 will be required and will not be reused again.
- Direct labor time for each unit under the order will be 20% longer.

Preliminary computations indicate the following per-unit costs:

Direct material (\$120,000/50,000)	\$2.40
Direct labor (\$200,000/50,000)	4.00
Variable selling and administrative expense (\$60,000/50,000)	1.20

A forecasted income statement, like the one on Table 3-1., provides more information on how to determine a bid price.

The contract price for the 10,000 units should be \$122,400 (\$1,372,400 - \$1,250,000), or \$12.24 per unit (\$122,400/10,000). The contract price per unit of \$12.24 is below the \$25 current selling price per unit. Keep in mind that total fixed cost is the same except for the \$8,000 expenditure on the special tool.

Table 3-1. A Forecasted Income Statement

	Current	Projected	
Units	<u>50,000</u>	<u>60,000</u>	
Sales	<u>\$1,250,000</u>	<u>\$1,372,400</u> ^(a)	Computed last
Cost of sales			
Direct material	\$120,000	\$144,000	(\$2.40 x 60,000)
Direct labor	200,000	248,000	(\$200,000 + [10,000 x \$4.80 ^(b)])
Variable overhead	60,000	74,400	(\$248,000 x 30%)
Fixed overhead	<u>100,000</u>	<u>108,000</u>	
Total	<u>\$480,000</u>	<u>\$574,400</u>	
Selling and Admin costs			
Variable	\$60,000	\$68,000	(\$60,000 + [10,000 x \$0.80 ^(c)])
Fixed	<u>30,000</u>	<u>30,000</u>	
Total	<u>\$90,000</u>	<u>\$98,000</u>	
Net income	<u>\$680,000</u>	<u>\$700,000</u> ^(d)	

(a) Net income + selling and administrative expensive + cost of sales = \$700,000 + \$98,000 + \$574,400

= 1,372,400

(b) \$4 x 1.20 = \$4.80

(c) \$1.20 - \$0.4 = \$0.80

(d) \$680,000 + \$20,000 = \$700,000

Determining Profit from Year to Year

Contribution margin analysis also aids in determining how to obtain the same profit as the previous year even with decreased sales volume,

Example 3-8. In 2X11, sales volume was 200,000 units, the selling price was \$25, the variable cost per unit was \$15, and the fixed cost was \$500,000. In 2X12, sales volume is expected to total only 150,000 units. As a result, fixed costs have been slashed by \$80,000. On 2X12, 40,000 units have already been sold. You wish to compute the contribution margin that must be earned on the remaining units for 2X12 in order to make the same net income as in 2X11.

Net income (P) computation for 2X11:

$$\begin{aligned}
 \text{Sales} &= \text{Fixed Cost} + \text{Variable Cost} + P \\
 \$25 \times 200,000 &= \$500,000 + (\$15 \times 200,000) + P \\
 \$1,500,000 &= P
 \end{aligned}$$

Contribution margin to be earned in 2X12:

Total fixed cost (\$500,000 - \$80,000)	\$ 420,000
Net income	<u>1,500,000</u>
Contribution margin needed for year	\$1,920,000
Contribution margin already earned:	
(Selling price - variable cost) x units	
(\$25 - \$15) \$10 x 40,000 units	<u>400,000</u>
Contribution margin remaining	<u>\$1,520,000</u>

$$\begin{aligned}
 \text{Contribution margin per unit needed} &= \frac{\text{Contribution margin remaining}}{\text{Units remaining}} \\
 &= \frac{\$1,520,000}{110,000} = \underline{\underline{\$13.82}}
 \end{aligned}$$

Are You Utilizing Capacity?

Contribution margin analysis can be used to determine the best way of utilizing capacity.

Example 3-9. You can produce a raw metal that can either be sold at this stage or processed further and sold as an alloy.

	Raw Material	Alloy
Selling price	\$200	\$315
Variable cost	90	120

Total fixed cost is \$400,000, and 100,000 hours of capacity are interchangeable between the products. There is unlimited demand for both products. Three hours are required to produce the raw metal, and five hours are needed to make the alloy. The contribution margin per hour is as follows:

	Raw Metal	Alloy
Selling price	\$200	\$315
Less: Variable cost	<u>90</u>	<u>120</u>
Contribution margin	<u>\$110</u>	<u>\$195</u>
Hours per ton	3	5
Contribution margin per hour	\$ 36.67	\$ 39

You should sell only the alloy because it results in the highest contribution margin per hour. Fixed costs are not considered because they are constant and are incurred irrespective of which product is manufactured.

Conclusion

Contribution margin analysis aids you in making sound departmental decisions. Is an order worth accepting even though it is below the normal selling price? What should the price of your product or service be? Is a proposed contract advantageous? What is your incremental profitability? What is the best way of using departmental capacity and resources?

In some cases, your bonus may be based on the contribution margin you earn for your department. Thus, an understanding of the computation of contribution margin is necessary.

Chapter 3 Review Questions

1. The difference between sales and the cost of goods sold is
 - A. Gross margin.
 - B. Contribution margin (CM).
 - C. Net profit.
 - D. The breakeven point.

2. A characteristic of a contribution income statement is that fixed and variable expenses are combined as one line. True or False?

3. Sales of a company's product have suffered because of intense price competition. As a result, the company must lower the price of the product. The lowest feasible short-run price would just exceed the product's
 - A. Fixed cost per unit.
 - B. Variable cost per unit.
 - C. Fixed cost per unit plus variable cost per unit.
 - D. Variable cost per unit minus fixed cost per unit.

4. Sohu Industries manufactures three products at its highly automated factory. The products are very popular, with demand far exceeding the company's ability to supply the marketplace. To maximize profit, management should focus on each product's contribution margin (CM) per machine hour. True or False?

5. The contribution margin (CM) increases when revenues remain the same and
 - A. Variable cost per unit decreases.
 - B. Variable cost per unit increases.
 - C. Fixed costs decrease.
 - D. Fixed costs increase.

Chapter 3 Review Answers

1. The difference between sales and the cost of goods sold is

- A. **Correct.** Gross margin results from deducting all costs of sales from sales.
- B. Incorrect. Contribution margin (CM) equals sales revenue minus all variable costs. It is the portion of sales available for covering fixed costs and profit.
- C. Incorrect. Net profit is the remainder after deducting all costs from revenue.
- D. Incorrect. The breakeven point is the level of sales that equals the sum of fixed and variable costs.

2. A characteristic of a contribution income statement is that fixed and variable expenses are combined as one line. True or False?

True is incorrect. The contribution income statement shows the contribution margin (sales - variable costs) before it subtracts the fixed costs. Fixed costs are not combined with variable costs.

False is correct. The contribution income statement emphasizes the distinction between fixed and variable costs. Making this distinction facilitates determination of CVP relationships and the effects of changes in sales volume on income. Thus, fixed manufacturing costs and other fixed costs are separated from variable manufacturing costs and other variable costs. The basic categories in the contribution income statement are variable costs, contribution margin, fixed costs, and operating income.

3. Sales of a company's product have suffered because of intense price competition. As a result, the company must lower the price of the product. The lowest feasible short-run price would just exceed the product's

- A. Incorrect. Fixed costs are sunk costs. In the short run, a loss-minimizing firm must cover its incremental (variable) costs. A price equal to unit fixed cost may or may not accomplish that goal.
- B. **Correct.** Fixed costs are usually sunk costs in the short run: they will be incurred even if the firm closes down. The decision to continue in operation is therefore dependent on whether the firm can recover its incremental (variable) costs. Consequently, the firm should continue to operate in the short run if it can recover its variable costs and some portion of its fixed costs. In the short run, closing down results in the loss of the full amount of fixed costs (those incurred without regard to the level of production). Thus, a price just in excess of unit variable cost permits the firm to continue to operate. In the long run, all costs are variable, and the price must be set accordingly.
- C. Incorrect. Fixed cost per unit plus variable cost per unit is higher than the lowest feasible short-run price. The lowest possible price should be variable cost. A price in excess of unit variable cost permits the firm to continue to operate.
- D. Incorrect. Variable cost per unit minus fixed cost per unit is a lower than feasible short-run price. The company would suffer a loss below variable cost.

4. Sohu Industries manufactures three products at its highly automated factory. The products are very popular, with demand far exceeding the company's ability to supply the marketplace. To maximize profit, management should focus on each product's contribution margin (CM) per machine hour. True or False?

True is correct. When demand far exceeds a company's ability to supply the marketplace, management will want to maximize its CM per unit of scarce resource. If the scarce resource is raw materials, the products that provide the greatest contribution margin per unit of raw materials should be emphasized. If machine hours are the constraint, profits are maximized by emphasizing the CM per machine hour.

False is incorrect. The company can sell as much of each product as it can produce. Thus, sales are limited by constraints, e.g., machine hours. The company should therefore seek to maximize its return per unit of the constraint.

5. The contribution margin (CM) increases when revenues remain the same and

- A. **Correct.** CM equals sales minus variable costs. With constant revenues, an increase in the CM may occur only if either the unit sales price increases or the variable costs decrease.
- B. Incorrect. When variable cost per unit increases, CM decreases if revenues and price remain the same.
- C. Incorrect. The CM does not vary with fixed costs.
- D. Incorrect. The CM only varies with sales volume. Not with fixed costs.

Chapter 4:

Break-Even and Cost-Volume-Profit Analysis

Learning Objectives

After studying this chapter, you will be able to:

- Recognize the relationships among costs, volume, and profit.
 - Identify the what and why of break-even sales.
 - Identify key financial ratio concept.
 - Define the importance of sales mix and sales margin ratio.
-

Before your business can realize "profit," you must first understand the concept of breaking even. To break even on your department's product lines and/or services, you must be able to calculate the sales volume needed to cover your costs and how to use this information to your advantage. You must also be familiar with how your costs react to changes in volume.

In an interview, a non-financial manager employed by a publishing company commented that:

Our advertising percentage (paid advertisements appearing in a given issue) represents our break-even point. We always had to attain an advertising percentage of .67 or better. If the number fell below .67 and the paper was printed, it would cost the company money. The higher the percentage above .67, the more profit the company would make on a given issue. Thus, .67 is the paper's break-even point, because at this percentage our revenue from advertisers is equal to the costs incurred from printing and distributing the paper.

What is Cost-Volume Profit Analysis?

Cost-volume-profit (CVP) analysis relates to the way profit and costs change with a change in volume. CVP analysis examines the impact on earnings of changes in such factors as variable cost, fixed cost, selling price, volume, and product mix. CVP information helps you to predict the effect of any number of contemplated

actions and to make better planning decisions. More specifically, CVP analysis tries to answer the following questions:

1. What sales volume is required to break even? How long will it take to reach that sales volume?
2. What sales volume is necessary to earn a desired profit?
3. What profit can be expected on a given sales volume?
4. How would changes in selling price, variable costs, fixed costs, and output affect profits?
5. How would a change in the mix of products sold affect the break-even and target volume and profit potential?

What and Why of Break-Even Sales

Break-even analysis, which is part of CVP analysis, is the process of calculating the sales needed to cover your costs so that there is zero profit or loss. The break-even point that is arrived at by such analysis is important to the profit planning process. Such knowledge allows managers to maintain and improve operating results. It is also important when introducing a new product or service, modernizing facilities, starting a new business, or appraising production and administrative activities.

Break-even analysis can also be used as a screening device, such as the first attempt to determine the economic feasibility of an investment proposal.

Also, pricing may be aided by knowing the break-even point for a product. What other situations can you think of where break-even analysis is useful?

The assumptions of break-even analysis follow:

- Selling price is constant.
- There is only one product or a constant sales mix.
- Manufacturing efficiency is constant.
- Inventories do not significantly change from period to period.
- Variable cost per unit is constant.

The guidelines for breaking even are:

- An increase in selling price lowers break-even sales.
- An increase in variable cost increases break-even sales.
- An increase in fixed cost increases break-even sales.

Your objective of course is not just to break even, but to earn a profit. In deciding which products to push, continue, or discontinue, the break-even point is not the only important factor. Economic conditions, supply

and demand, and the long-term impact on customer relations must also be considered. You can extend break-even analysis to concentrate on a desired profit objective.

The break-even sales can be determined using the graphic and equation approaches. Using the graphic approach (see Figure 4-1), revenue, total cost, and fixed cost are plotted on a vertical axis and volume is plotted on a horizontal axis. The break-even point occurs at the intersection of the revenue line and the total cost line. Figure 4-1 also depicts profit potentials over a wide range of activity. It shows how profits increase with increases in volume.

The equation approach uses the following equation:

$$S = VC + FC$$

where S = sales, VC = variable cost, and FC = fixed cost. This approach allows you to solve for break-even sales or for other unknowns as well. An example is selling price.

If you want a desired before-tax profit, solve for P in the following equation:

$$S = VC + FC + P$$

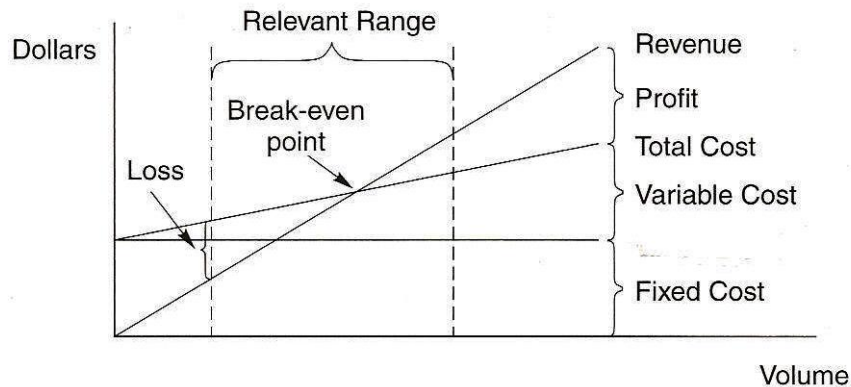
Example 4-1. A product has a fixed cost of \$270,000 and a variable cost of 70% of sales. The point of break-even sales can be calculated as follows:

$$\begin{aligned} S &= FC + VC \\ 1S &= \$270,000 + .7S \\ 0.3S &= \$270,000 \\ S &= \$900,000 \end{aligned}$$

If the selling price per unit is \$100, break-even units are 9,000 ($\$900,000/\100). If desired profit is \$40,000, the sales needed to obtain that profit (P) can be calculated as follows:

$$\begin{aligned} S &= FC + VC + P \\ 1S &= \$270,000 + 0.7S + \$40,000 \\ 0.3S &= \$310,000 \\ S &= \$1,033,333 \end{aligned}$$

Figure 4-1 Break-Even Chart



Example 4-2. If the selling price per unit is \$30, the variable cost per unit is \$20, and the fixed cost is \$400,000, the break-even units (U) can be calculated as follows:

$$\begin{aligned}
 S &= FC + VC \\
 \$30U &= \$400,000 + \$20U \\
 \$10U &= \$400,000 \\
 U &= 40,000
 \end{aligned}$$

Note:

Alternatively, the breakeven point in units equals fixed costs divided by the unit CM (selling price - variable costs).

Hence,

$$\$400,000 / (\$30 - \$20) = \$400,000 / \$10 = 40,000 \text{ units}$$

The break-even dollar amount is:

$$40,000 \text{ units} \times \$30 = \$1,200,000$$

Note:

Alternatively, the breakeven point in sales equals the fixed costs divided by the contribution margin ratio. The CM ratio is $\$(\$30 - \$20) / \$30 = \$10 / \$30 = 1/3 = 33.33\%$

Hence, $\$400,000 / .3333 = \$1,200,000$

Example 4-3. You sell 800,000 units of an item. The variable cost is \$2.50 per unit. Fixed cost totals \$750,000. The selling price (SP) per unit should be \$3.44 to break even:

$$\begin{aligned} S &= FC + VC \\ 800,000SP &= \$750,000 + (\$2.50 \times 800,000) \\ 800,000SP &= \$2,750,000 \\ SP &= \$3.44 \end{aligned}$$

Example 4-4. Assume your selling price is \$40, your sales volume is 20,000 units, your variable cost is \$15 per unit, your fixed cost is \$120,000, your after-tax profit is \$60,000, and your tax rate is 40%. To determine how much you have available to spend on research (R), consider this equation:

$$\begin{aligned} S &= VC + FC + P + R \\ (\$40 \times 20,000) &= (\$15 \times 20,000) + \$120,000 + \$100,000^* + R \\ \$280,000 &= R \end{aligned}$$

$$\begin{aligned} \text{After-tax profit: } \$60,000 &= 0.6 \times \text{Before-tax profit} \\ \frac{\$60,000}{0.6} &= \text{Before-tax profit} \\ \$100,000 &= \text{Before-tax profit} \end{aligned}$$

Example 4-5. Assume your selling price is \$40, your variable cost is \$24, your fixed cost is \$150,000, your after-tax profit is \$240,000, and your tax rate is 40%. To determine how many units you must sell to earn the after-tax profit, consider the following equation:

$$\begin{aligned} S &= FC + VC + P \\ \$40 U &= \$150,000 + \$24 U + \$400,000^* \\ \$16 U &= \$550,000 \\ U &= 34,375 \end{aligned}$$

$$\begin{aligned} \text{Before-tax profit} \times 0.6 &= \text{After-tax profit} \\ \text{Before-tax profit} \times 0.6 &= \$240,000 \\ \text{Before-tax profit} &= \frac{\$240,000}{0.6} = \$400,000 \end{aligned}$$

Note: Alternatively, the unit sales necessary in order to earn a desired profit can be calculated by using the formula: (fixed costs + desired profit)/unit CM. So $(\$150,000 + \$400,000)/(\$40 - \$24) = \$550,000/\$16 = 34,375$

Example 4-6. Assume your selling price is \$50 per unit, your variable cost is \$30 per unit, your sales volume is 60,000 units, your fixed cost is \$150,000, and your tax rate 30%. To determine the after-tax profit, use the following equation:

$$\begin{aligned} S &= FC + VC + P \\ (\$50 \times 60,000) &= 150,000 + (\$30 \times 60,000) + P \\ 1,050,000 &= P \\ \$1,050,000 \times 0.70 &= \$735,000 \end{aligned}$$

Example 4-7. You are considering making a product presently purchased outside for \$0.12 per unit. The fixed cost is \$10,000, and the variable cost per unit is \$0.08. Use the following equation to determine the number of units you must sell so that the annual cost of your machine equals the outside purchase cost.

$$\begin{aligned} \$0.12 U &= \$10,000 + \$0.08 U \\ \$0.04 U &= \$10,000 \\ U &= 250,000 \end{aligned}$$

What is Margin of Safety?

The *margin of safety* is a risk indicator that stipulates the amount by which sales may decline before losses are experienced.

$$\text{Margin of safety} = \frac{\text{Budget sales} - \text{Break-even sales}}{\text{Budget sales}}$$

The lower the ratio, the greater the risk of reaching the break-even point.

Example 4-8. If budget sales are \$40,000 and break-even sales are \$34,000, what is your margin of safety?

$$\text{Margin of safety} = \frac{\$40,000 - \$34,000}{\$40,000} = 15\%$$

Cash Break-Even Point

If you have a minimum of available cash, or if the opportunity cost of holding excess cash is high, you may want to know the volume of sales that will cover all cash expenses during a period. This is known as the *cash break-even point*.

Not all fixed costs involve cash payments. For example, depreciation expense is a noncash charge. To find the cash break-even point, the noncash charges must be subtracted from total fixed costs. Therefore, the cash break-even point is lower than the usual break-even point. The cash break-even point equation is as follows:

$$S = VC + FC \text{ (after deducting depreciation)}$$

Example 4-9. If the selling price is \$25 per unit, the variable cost is \$15 per unit, and total fixed cost is \$50,000, which includes depreciation of \$2,000, the cash break-even point is:

$$\begin{aligned} \$25 U &= \$15 U + \$48,000 \\ \$10U &= \$48,000 \\ U &= 4,800 \end{aligned}$$

You must sell 4,800 units at \$25 each to meet your break-even point.

What is Operating Leverage?

Operating Leverage measures the percentage change in profits resulting from a percentage change in sales. It is the degree to which fixed costs exist in your cost structure. It is the extent to which you commit yourself to high levels of fixed costs other than interest payments in order to leverage profits during good times. However, high operating leverage means risk because fixed costs cannot be decreased when revenue drops in the short run.

A high ratio of fixed cost to total cost over time may cause variability in profit. But a high ratio of variable cost to total cost indicates stability. It is easier to adjust variable cost than fixed cost when demand for your products decline.

Example 4-10. Assume that fixed costs were \$40,000 in 2X11 and \$55,000 in 2X12, and that variable costs were \$25,000 in 2X11 and \$27,000 in 2X12.

The operating leverage in 2X12 compared to 2X11 was higher, as indicated by the increase in the ratio of fixed costs to total costs. Hence, there is greater earnings instability.

$$\frac{\$55,000}{\$82,000} = 67.1 \% \text{ for 2X12}$$

$$\frac{\$40,000}{\$65,000} = 61.5\% \text{ for 2X11}$$

Example 4-11. Assume that your selling price is \$30 per unit, your variable cost is \$18 per unit, your fixed cost is \$40,000, and your sales volume is 8,000 units. You can determine the extent of operating leverage as follows:

$$\frac{\text{(Selling price - Variable cost) (Units)}}{\text{(Selling price - Variable Cost) (Units) - Fixed cost}} = \frac{(\$30 - \$18)(8,000)}{(\$30 - \$18)(8,000) - \$40,000} = \frac{\$96,000}{\$56,000} = 1.71$$

This means that for every 1% increase in sales above the 8,000-unit volume, income will increase by 1.71%. If sales increase by 10%, net income will rise by 17.10%.

Example 4-12. You are evaluating operating leverage. Your selling price is \$2 per unit, your fixed cost is \$50,000, and your variable cost is \$1.10 per unit, The first example assumes a sales volume of 100,000 units; the second assumes a sales volume of 130,000 units.

Sales Volume (in dollars)	-	Fixed Cost	-	Variable Cost	=	Net Income
(100,000 x \$2)	-	\$50,000	-	\$110,000	=	\$40,000
(130,000 x \$2)	-	\$50,000	-	\$143,000	=	\$67,000

The ratio of the percentage change in net income to the percentage change in sales volume is as follows:

$$\frac{\frac{\text{Change in net income}}{\text{Net Income}}}{\frac{\text{Change in quantity}}{\text{Quantity}}} = \frac{\frac{\$67,000 - \$40,000}{\$40,000}}{\frac{\$130,000 - \$100,000}{\$100,000}} = \frac{\frac{\$27,000}{\$40,000}}{\frac{\$30,000}{\$100,000}} = \frac{67.5\%}{30.0\%} = 2.25$$

If fixed cost remains the same, the 2.25 figure tells you that for every 1% increase in sales above the 100,000-unit volume there will be a 2.25% increase in net income. Thus, a 10% jump in sales will boost net income

22.5%. The same proportionate operating leverage develops regardless of the size of the sales increase above the 100,000-unit level.

The opportunity to magnify the increase in earnings that arises from any increase in sales suggests that you should use a high degree of operating leverage. Presumably, fixed operating costs should constitute a larger proportion of the total cost at a particular sales level so as to enhance the gains realized from any subsequent rise in sales. While a high degree of operating leverage is sometimes a desirable objective, there is the risk of financial damage caused by a drop in sales. It should also be noted that the more unpredictable sales volume is, the more desirable it is to have a high degree of operating leverage. *Remember:* Fixed costs magnify the gain or loss from any fluctuation in sales.

If you have a high degree of operating leverage, you should not simultaneously use a high degree of financial leverage (debt) because the combination makes the risk associated with your operations too severe for a volatile economic environment. Alternatively, if you have a low degree of operating leverage you can often take on a higher level of financial leverage. The lower risk of operating leverage balances the higher risk of financial leverage (debt position). The tradeoffs determine how much financial and operating leverage to use.

One example of an operating leverage question you may face is whether to buy buildings and equipment or rent them. If you buy them, you incur fixed costs even if volume declines. If there is a rental with a *short-term lease*, the annual cost is likely to be more, but it is easier to terminate the fixed cost in a business downturn. Another operating leverage decision involves whether to purchase plant and facilities and manufacture all components of the product or to subcontract the manufacturing and just do assembly. With subcontracting, contracts can be terminated when demand declines. If plant and equipment is bought, the fixed cost remains even if demand declines.

Operating leverage is an issue that directly impacts line managers. The level of operating leverage selected should not be made without input from the production managers. In general, newer technology has a higher fixed cost and lower variable cost than older technology. Managers must determine whether the risks associated with higher fixed costs are worth the potential returns.

Sales Mix Analysis

Break-even analysis requires some additional considerations when your department produces and sells more than one product. Different selling prices and different variable costs result in different unit contribution margins. As a result, break-even points vary with the relative proportions of the products sold, called the *sales mix*. In break-even analysis, it is necessary to predetermine the sales mix and then compute a weighted average contribution margin. It is also necessary to assume that the sales mix does not change for a specified period.

Example 4-13. Your department has fixed costs of \$76,000 and two products with the following contribution margin data:

	Product A	Product B
Selling price	\$15	\$10
Less: Variable cost	<u>12</u>	<u>5</u>
Unit contribution margin	<u>\$ 3</u>	<u>\$ 5</u>
Sales mix	60%	40%

The weighted average unit contribution margin is:

$$\$3(.6) + \$5(.4) = \$3.80$$

Your department's break-even point in units is:

$$\$76,000/\$3.80 = 20,000 \text{ units}$$

which is divided as follows:

$$\text{Product A: } 20,000 \text{ units} \times 60\% = 12,000 \text{ units}$$

$$\text{Product B: } 20,000 \text{ units} \times 40\% = 8,000 \text{ units}$$

Example 4-14. Your department has total fixed costs of \$18,600 and produces and sells three products:

	Product A	Product B	Product C	Total
Sales	\$30,000	\$60,000	\$10,000	\$100,000
Less: Variable cost	<u>24,000</u>	<u>40,000</u>	<u>5,000</u>	<u>69,000</u>
Contribution margin	<u>\$6,000</u>	<u>\$20,000</u>	<u>\$ 5,000</u>	<u>\$ 31,000</u>
Contribution margin ratio	20%	33 ¹ / ₃ %	50%	31%
Sales Mix	30%	60%	10%	100%

Since the contribution margin ratio for your department is 31%, the break-even point in dollars is:

$$\$18,600/.31 = \$60,000$$

which will be split in the mix ratio of 3:6:1 to give us the following break-even points for the individual products A, B, and C:

Product A:	\$60,000 x 30%	=	\$18,000
Product B:	\$60,000 x 60%	=	\$36,000
Product C:	\$60,000 x 10%	=	<u>\$ 6,000</u>
			<u>\$60,000</u>

One important assumption in a multiproduct department is that the sales mix will not change during the planning period. If the sales mix does change, however, the break-even point will also change.

Conclusion

If your sales volume consistently exceeds the break-even point, you may improve departmental profitability by reducing your variable cost of manual labor through a fixed cost investment in plant. However, you must consider the risk that sales may decline below the break-even point, which will decrease your profitability. Generally, you should aim to convert fixed cost to variable cost, rather than converting variable cost to fixed. But this must be done carefully, because it will reduce your contribution margin.

Chapter 4 Review Questions

1. The degree or amount that revenues may decline before losses are incurred is the
 - A. Residual income rate.
 - B. Marginal rate of return.
 - C. Margin of safety.
 - D. Target (hurdle) rate of return.

2. The breakeven point in units increases when
 - A. Selling price decreases.
 - B. Unit variable costs decrease and sales price remains unchanged.
 - C. Fixed costs remain unchanged and sales price increases.
 - D. Unit costs increase and sales price increases.

3. In calculating the breakeven point for a multiproduct (multiservice) company, which of the following assumptions is not commonly made when the contribution income statement is used?
 - A. Selling price is constant
 - B. Sales volume equals production volume.
 - C. Variable costs are changing per unit.
 - D. A given sales mix is maintained for all volume changes.

4. A company increased the selling price of its product from \$1.00 to \$1.10 a unit when total fixed costs increased from \$400,000 to \$480,000 and variable cost per unit remained unchanged. The breakeven point in units will be decreased. True or False?

5. The most likely strategy to reduce the breakeven point would be to
 - A. Increase both the fixed costs and the contribution margin.
 - B. Decrease both the fixed costs and the contribution margin.
 - C. Decrease the fixed costs and increase the contribution margin.
 - D. Increase the fixed costs and decrease the contribution margin.

Chapter 4 Review Answers

1. The degree or amount that revenues may decline before losses are incurred is the
 - A. Incorrect. Residual income is the excess of earnings over a minimum required return for the given investment base.
 - B. Incorrect. A marginal rate of return is the return on the next investment.
 - C. **Correct.** The margin of safety is the excess of expected sales over breakeven sales.
 - D. Incorrect. A target or hurdle rate of return is the required rate of return. It is also known as the discount rate or the opportunity cost of capital.

2. The breakeven point in units increases when
 - A. **Correct.** The guidelines for breaking even are: an increase in selling price lowers break-even sales; an increase in variable cost increases break-even sales; an increase in fixed cost increases break-even sales.
 - B. Incorrect. A decrease in unit variable costs will lower the breakeven point. The unit CM will increase.
 - C. Incorrect. An increase in the selling price will also increase the unit CM, resulting in a lower breakeven point.
 - D. Incorrect. The magnitude of the increases in variable and fixed costs and in sales price must be known to determine their overall effect on the unit CM.

3. In calculating the breakeven point for a multiproduct (multiservice) company, which of the following assumptions is not commonly made when the contribution income statement is used?
 - A. Incorrect. Break-even analysis assumes that selling price, revenues, and costs are linear over the relevant range
 - B. Incorrect. . CVP analysis assumes that no material change in inventory occurs which means that sales equals production.
 - C. **Correct.** Unit variable cost is assumed to be constant. Thus, total variable costs are directly proportional to volume. It further assumes that total fixed costs are constant.
 - D. Incorrect. CVP analysis also assumes that there is only one product or a constant sales mix. The revenue (sales) mix is deemed to be constant

4. A company increased the selling price of its product from \$1.00 to \$1.10 a unit when total fixed costs increased from \$400,000 to \$480,000 and variable cost per unit remained unchanged. The breakeven point in units will be decreased. True or False?

True is incorrect. The variable cost per unit needs to be provided in order to determine the effect of the changes.

False is correct. The breakeven point in units equals fixed costs divided by the unit CM (selling price - variable costs). To determine the new breakeven point, the variable cost per unit must be known as well as the total fixed costs and the new selling price per unit. Because the increase in selling price lowers the breakeven point and the increase in fixed costs raises it, the net effect of these changes cannot be determined when variable costs are not known.

5. The most likely strategy to reduce the breakeven point would be to
- A. Incorrect. Increasing the fixed costs increases the breakeven point. Note that the breakeven point in units equals fixed costs divided by the unit CM (selling price - variable costs). Fixed costs is in the numerator.
 - B. Incorrect. Decreasing the contribution margin increases the breakeven point. Note that the contribution margin is in the denominator in the formula: fixed costs divided by the unit CM (selling price - variable costs).
 - C. **Correct.** The breakeven point in units is equal to the fixed costs divided by the unit CM. The breakeven point in sales equals the fixed costs divided by the contribution margin ratio. Because fixed costs are in the numerator and the contribution margin is in the denominator, decreasing the fixed costs and increasing the contribution margin reduces the breakeven point.
 - D. Incorrect. Increasing fixed costs and decreasing the contribution margin increases the breakeven point. Note that the breakeven point in units equals fixed costs divided by the unit CM (selling price - variable costs).

Chapter 5:

Relevant Cost and Making Short-Term Decisions

Learning Objectives

After studying this chapter, you will be able to:

- Identify relevant costs in manufacturing process.
 - Recognize components for making financial decisions.
 - Understand costs used in future business directions.
-

When analyzing the manufacturing and/or selling functions of your department, you are faced with the problem of choosing between alternative courses of action. What should you produce? How should you manufacture it? Where should you sell the product? What price should you charge? In the short run, you may be confronted with the following non-routine, non-recurring situations:

- Whether to accept or reject a special order
- How to price standard products
- Whether to sell or process further
- Whether to make or buy
- Whether to add or drop a certain product line
- How to utilize scarce resources

What Costs Are Relevant to You?

In each of these situations, the ultimate management decision rests on cost data analysis. Cost data, which are classified by function, behavior patterns, and other criteria, are the basis for profit calculations. However, not all costs are of equal importance in decision making, and you must identify the costs that are relevant to a decision. The *relevant costs* are the future costs that differ between the decision alternatives. Therefore, the *sunk costs* are *not* relevant to these decisions because they are past costs. The *incremental or differential* costs are

relevant because they are the ones that differ between the alternatives. For example, in a decision on whether to sell an existing business for a new one, the cost to be paid for the new business is relevant. However, the initial cost of the old business is not relevant because it is a sunk cost.

Under the concept of relevant costs, which may be appropriately titled *the incremental, differential, or relevant cost approach*, decision making involves the following steps:

1. Gather all costs associated with each alternative.
2. Drop the sunk costs.
3. Drop those costs that do not differ between alternatives.
4. Select the best alternative based on the remaining cost data.

Example 5-1. You are planning to expand your department's productive capacity. The plan consists of purchasing a new machine for \$50,000 and disposing of the old without receiving anything. The new machine has a 5-year life. The old machine has a 5-year remaining life and a book value of \$17,500. The new machine will generate the same amount of revenue as the old one, but will substantially cut down on variable operating costs. Annual sales and operating costs of the present machine and the proposed replacement are based on normal sales volume of 20,000 units and are estimated as follows:

	Present Machine	New Machine
Sales	\$60,000	\$60,000
Less: Variable costs	35,000	20,000
Less: Fixed costs:		
Depreciation (straight-line)	2,500	10,000
Insurance, taxes, etc.	<u>4,000</u>	<u>4,000</u>
Net income	<u>\$18,500</u>	<u>\$26,000</u>

At first glance, it appears the new machine provides an increase in net income of \$7,500 per year. However, sales and fixed costs such as insurance and taxes are irrelevant because they do not differ between the two alternatives. Eliminating all the irrelevant costs leaves only the incremental costs:

Savings in variable costs	\$15,000
Less: Increase in fixed costs	\$10,000*
Net annual cash saving arising from the new machine	<u>\$5,000</u>
* Exclusive of \$2,500 sunk cost	

You must also consider that the \$50,000 cost of the new machine is relevant; however, the book value of the present machine is a sunk cost and is irrelevant in this decision.

Accepting or Rejecting a Special Order

You may receive a short-term, special order for your products at a lower price than usual. Normally, you may refuse such an order since it will not yield a satisfactory profit. However, if sales are slumping, such an order should be accepted if the incremental revenue obtained from it exceeds the incremental costs involved. The company should accept this price since it is better to receive some revenue than to receive nothing at all. A price that is lower than the regular price is called a *contribution price*. *This contribution approach to pricing* is most appropriate when: (1) there is a distressing operating situation where demand has fallen off, (2) there is idle capacity, or (3) there is sharp competition or a competitive bidding situation.

Example 5-2. Your department has a 100,000-unit capacity. You are producing and selling only 90,000 units of a product each year at a regular price of \$2. If the variable cost per unit is \$1 and the annual fixed cost is \$45,000, the income statement follows:

	Total	Per Unit
Sales (90,000 units)	\$180,000	\$2.00
Less: Variable costs (90,000 units)	<u>90,000</u>	<u>1.00</u>
Contribution margin	\$90,000	\$1.00
Less: Fixed cost	<u>45,000</u>	<u>0.50</u>
Net income	<u>\$45,000</u>	<u>\$0.50</u>

The company received an order calling for 10,000 units at \$1.20 per unit, for a total of \$12,000. The buyer will pay the shipping expenses. Although the acceptance of this order will not affect regular sales, you are reluctant to accept it because the \$1.20 price is below the \$1.50 factory unit cost ($\$1.50 = \$1.00 + \0.50). You must consider, however, that you can add to total profits by accepting this special order even though the price offered is below the unit factory cost. At a price of \$1.20, the order will contribute \$0.20 per unit (contribution margin per unit = $\$1.20 - \$1.00 = \$0.20$) toward fixed cost, and profit will increase by \$2,000 (10,000 units x \$0.20). Using the contribution approach to pricing, the variable cost of \$1 will be a better guide than the full unit cost of \$1.50. Note that the fixed costs will not increase.

	Per Unit	Without Special Order (90,000 Units)	With Special Order (100,000 Units)	Difference
Sales	\$2.00	\$180,000	\$192,000	\$12,000
Less: Variable costs	<u>1.00</u>	<u>90,000</u>	<u>100,000</u>	<u>10,000</u>
Contribution margin	\$1.00	\$ 90,000	\$ 92,000	\$ 2,000
Less-. Fixed cost	<u>0.50</u>	<u>45,000</u>	<u>45,000</u>	
Net income	<u>\$0.50</u>	<u>\$45,000</u>	<u>\$47,000</u>	<u>\$2,000</u>

Pricing Standard Products

Unlike pricing special orders, pricing standard products requires long-term considerations. The key concept is to recognize that the established unit selling price must be sufficient in the long run to cover all manufacturing, selling, and administrative costs, both fixed and variable, as well as to provide for an adequate return and for future expansion. There are two primary approaches to pricing standard products that are sold on the regular market, both of which use some kind of cost-plus pricing formula.

1. *The full-cost approach* defines the cost base as the full unit manufacturing cost. Selling and administrative costs are provided for through the markup that is added to the cost base.
2. *The contribution approach* defines the cost base as the unit variable cost. Fixed costs are provided for through the markup that is added to this base.

Example 5-3. You have prepared the following cost data on your company's regular product:

	Per Unit	Total
Direct material	\$6	
Direct Labor	4	
Variable overhead	4	
Fixed overhead (based on 20,000 units)	6	\$120,000
Variable selling and administrative expenses	1	
Fixed selling and administrative expenses (based on 20,000 units)	2	\$40,000

Assume that in order to obtain its desired selling price, the firm has a general policy of adding a markup equal to 50% of the full unit cost or 100% of the unit variable cost.

Under the full-cost approach, the desired unit selling price is:

Direct material	\$ 6
Direct Labor	4
Factory overhead	<u>10</u>
Full unit cost	\$20
Markup to cover selling and admin. expenses, and desired profit - 50% of full unit cost	<u>10</u>
Desired selling price	<u>\$30</u>

Under the contribution approach, the desired selling price is determined as follows:

Direct material	\$ 6
Direct Labor	4
Variable costs (overhead, selling and administrative expenses)	<u>5</u>
Unit variable cost	\$15
Markup to cover fixed costs, and desired profit- 100% of unit variable cost	<u>15</u>
Desired selling price	<u>\$30</u>

Example 5-4. Your company has determined that a \$500,000 investment is necessary to manufacture and market 20,000 units of its product every year. It will cost \$20 to manufacture each unit at a 20,000-unit level of activity, and total selling and administrative expenses are estimated to be \$100,000. If your company desires a 20% return on investment, what will be the markup using the full-cost approach?

Desired rate of return (20% x \$500,000)	\$100,000
Selling and administrative expenses	<u>100,000</u>
Total	\$200,000
Full unit cost (20,000 units x \$20)	\$400,000
Required markup (Total/Full unit cost)	<u>50%</u>

Analyzing the Make or Outsource Decision

Deciding whether to produce a component part internally or to buy it from supplier is called a *make-or-outsource (buy) decision*. This decision involves both qualitative factors (e.g., product quality and long-term business relationships with subcontractors) and quantitative factors (e.g., cost). The quantitative effects of the make-or-buy decision are best seen through incremental analysis.

Examples include:

- 1) Payroll processing in-house or outsource it to an outside service bureau
- 2) Developing a training program in-house or sending employees outside for training
- 3) Providing data processing and network services internally or buying them (Benefits: access to technology and cost savings)

Other strong candidates for outsourcing include: managing fleets of vehicles, sales and marketing, E-commerce, information technology, human resource, and custodial services. In recent years, companies have been outsourcing more and more business processes including payroll, employee benefits, customer support, invoicing, and IT management. Companies claim that outsourcing leads to substantial cost savings, allows them to focus on their core competencies, and ultimately increases shareholder value.

Example 5-5. You have prepared the following cost estimates for manufacture of a subassembly component based on an annual product of 8,000 units:

	Per Unit	Total
Direct material	\$ 5	\$40,000
Direct labor	4	32,000
variable factory overhead applied	4	32,000
Fixed factory overhead applied (150% of direct labor cost)	<u>6</u>	<u>\$48,000</u>
Total Cost	<u>\$19</u>	<u>\$152,000</u>

A supplier offers the subassembly at a price of \$16 each. Two-thirds of fixed factory overhead, which represent executive salaries, rent, depreciation, taxes, continue regardless of the decision. To determine whether to make or buy the product, you must evaluate the relevant costs that change between the alternatives. Assuming productive capacity will be idle if not used produce the subassembly, the analysis is as follows:

	Per Unit		Total of 8,000 Units	
	Make	Buy	Make	Buy
Purchase price		16		128,000
Direct material	\$ 5		\$ 40,000	
Direct Labor	4		\$ 32,000	
Variable overhead	4		\$ 32,000	
Fixed overhead that can be avoided by not making	<u>2</u>		<u>\$ 16,000</u>	
Total relevant costs	<u>\$15</u>	<u>\$16</u>	<u>\$120,000</u>	<u>\$128,000</u>
Difference in favor of making		<u>\$ 1</u>		<u>\$ 8,000</u>

The make-or-buy decision must be evaluated in the broader perspective of considering how best to utilize available facilities. The alternatives include:

1. Leaving facilities idle
2. Renting out idle facilities
3. Using idle facilities for other products

Determining Whether to Sell or Process Further

When two or more products are produced simultaneously from the same input by a joint process, these products are called *joint products*. The term *joint costs* is used to describe all the manufacturing costs incurred prior to the point at which the joint products are identified as individual products that is, the *split-off point*. At the split-off point some of the joint products are in final form and can be sold to the consumer, whereas others require additional processing. In many cases, however, you might have an option: you can sell the goods at the split-off point or process them further in the hope of obtaining additional revenue. Joint costs are considered irrelevant to this sell-or-process-further decision, since the joint costs have already been incurred at the time of the decision and, therefore, represent sunk costs. The decision will rely exclusively on additional revenue compared to the additional costs incurred due to further processing.

Example 5-6. Your company produces products A, B, and C from a joint process. Joint production costs for the year are \$120,000. Product A may be sold at the split-off point or processed further. The additional processing requires no special facilities, and all additional processing costs are variable. The sales value at the split-off point of 3,000 units is \$60,000. The sales value for 3,000 units after further processing is \$90,000 and the additional processing cost is \$25,000.

Incremental sales revenue	\$30,000
Incremental costs of additional processing	<u>25,000</u>
Incremental costs of gain	<u>5,000</u>

It is profitable for product A to be processed further. Keep in mind that the joint production cost of \$120,000 is not included in the analysis, since it is a sunk cost and, therefore, is irrelevant to the decision.

Adding or Dropping a Product Line

Deciding whether to drop an old product line or add a new one requires an evaluation of both qualitative and quantitative factors. However, any final decision should be based primarily on the impact on contribution margin or net income.

Example 5-7. Your department has three major product lines: A, B, and C. You are considering dropping product line B because it is being sold at a loss. The income statement for these product lines follows:

	<u>Product A</u>	<u>Product B</u>	<u>Product C</u>	<u>Total</u>
Sales	\$10,000	\$15,000	\$25,000	\$50,000
Less: Variable costs	<u>6,000</u>	<u>8,000</u>	<u>12,000</u>	<u>26,000</u>
Contribution margin	<u>\$ 4,000</u>	<u>\$ 7,000</u>	<u>\$13,000</u>	<u>\$24,000</u>
Less: Fixed costs				
Direct	\$ 2,000	\$ 6,500	\$ 4,000	\$12,500
Allocated	<u>1,000</u>	<u>1,500</u>	<u>2,500</u>	<u>5,000</u>
Total	<u>\$ 3,000</u>	<u>\$ 8,000</u>	<u>\$ 6,500</u>	<u>\$17,500</u>
Net Income	<u>\$ 1,000</u>	<u>\$(1,000)</u>	<u>\$ 6,500</u>	<u>\$ 6,500</u>

Direct fixed cost are identified directly with each of the product lines, whereas allocated fixed costs are common fixed costs allocated to the product lines using some base (e.g., space occupied). Common fixed costs typically continue regardless of the decision and thus cannot be saved by dropping the product line to which they are distributed.

The following calculations show the effects on your department with and without product line B.

	Keep Product B	Drop Product B	Difference
Sales	\$50,000	\$35,000	\$(15,000)
Less: Variable cost	26,000	18,000	(8,000)
Contribution margin	<u>24,000</u>	<u>17,000</u>	<u>(7,000)</u>
Less: Fixed costs			
Direct	\$12,500	\$ 6,000	\$ (6,500)
Allocated	<u>5,000</u>	<u>5,000</u>	
Total	<u>\$17,500</u>	<u>\$11,000</u>	<u>\$ (6,500)</u>
Net Income	<u>\$ 6,500</u>	<u>\$ 6,000</u>	<u>\$ 500</u>

Alternatively, if product line B were dropped, the incremental approach would show the following:

Sales revenue lost	\$15,000
Gains:	
Variable cost avoided	\$8,000
Directed fixed costs avoided	<u>6,500</u>
	<u>14,500</u>
Increase (decrease) in net income	<u>\$ (500)</u>

Both methods demonstrate that by dropping product line B your department will lose an additional \$500. Therefore, product line B should be kept. One of the great dangers in allocating common fixed costs is that such allocations can make a product line look less profitable than it really is. Because of such an allocation, product

line B showed a loss of \$1,000 but it actually contributes \$500 (\$7,000 - \$6,500) to the recovery of common fixed costs.

Utilizing Scarce Resources

In general, the emphasis on products with higher contribution margins maximizes your department's net income. This is not true, however, when there are constraining factors or scarce resources. A *constraining factor* is the factor that restricts or limits the production or sale of a given product. It may be machine hours, labor hours, or cubic feet of warehouse space. In the presence of these constraining factors, maximizing profit depends on getting the highest contribution margin per unit of the *factor* (rather than the highest contribution margin per unit of *product output*).

Example 5-8. Your department produces products A and B with the following contribution margins per unit and an annual fixed cost of \$42,000.

	Product A	Product B
Sales	\$8	\$24
Less: Variable costs	<u>6</u>	<u>20</u>
Contribution margin	<u>\$2</u>	<u>\$4</u>

As is indicated by the contribution margin, product B is more profitable than product A since it contributes more to your department's profits (\$4 versus \$2). But assume that your department has a limited capacity of 10,000 labor hours. Further, assume that product A requires 2 labor hours to produce and product B requires 5 labor hours. One way to express this limited capacity is to determine the contribution margin per labor hour.

	Product A	Product B
Contribution margin per unit	\$2.00	\$4.00
Labor hours required per unit	<u>2</u>	<u>5</u>
Contribution margin per labor hour	<u>\$1.00</u>	<u>\$0.80</u>

Since product A returns the higher contribution margin per labor, it should be produced and product B should be dropped.

Another way to look at the problem is to calculate the total contribution margin for each product.

	Product A	Product B
Maximum possible production	5,000 units*	2,000 units**
Contribution margin per unit	<u>x \$2</u>	<u>x \$4</u>
Total contribution margin	<u>\$10,000</u>	<u>\$8,000</u>

*(10,000 hours/2 hours)

** (10,000 hours/5 hours)

Again, product A should be produced since it contributes more than product B (\$10,000 versus \$8,000)

Don't Forget the Qualitative Factors

In addition to the quantitative factors, qualitative factors must also be considered in the decision making. Qualitative factors, which are difficult to measure in terms of money, include:

1. Effect on employee morale and schedules
2. Relationships with and commitments to suppliers
3. Effect on present and future customers
4. Long-term future effect on profitability

In some decision-making situations, qualitative factors are more important than immediate financial benefit.

Conclusion

Not all costs are of equal importance in decision making. The relevant costs are the expected future costs that differ between the decision alternatives. Therefore, the sunk costs are irrelevant since they are past costs. The costs that continue regardless of the decision are also irrelevant. The relevant cost approach assists you in making short-term, non-routine decisions such as whether to accept a below-normal selling price, which products to emphasize, whether to make or buy, whether to sell or process further, and how to optimize utilization of capacity. In addition to these quantitative aspects, remember qualitative factors must also be considered in many decision-making situations.

Chapter 5 Review Questions

1. Relevant costs are

- A. All fixed and variable costs.
- B. Expected future costs that will differ among various alternatives.
- C. Costs that would be incurred within the relevant range of production.
- D. Past or historical costs that are expected to be different in the future.

2. There is a market for both product X and product Y. Which of the following costs and revenues would be most relevant in deciding whether to sell product X or process it further to make product Y?

- A. Total cost of making X and the revenue from sale of X and Y.
- B. Total cost of making Y and the revenue from sale of Y.
- C. Additional cost of making Y, given the cost of making X, and additional revenue from Y.
- D. Additional cost of making X, given the cost of making Y, and additional revenue from Y.

Chapter 5 Review Answers

1. Relevant costs are

- A. Incorrect. Both fixed and variable costs can be either relevant or irrelevant depending upon the circumstances. Fixed costs are usually irrelevant to a future decision.
- B. **Correct.** The relevant costs are the future costs that differ between the decision alternatives. Therefore, the sunk costs are not relevant to these decisions because they are past costs. The incremental or differential costs are relevant because they are the ones that differ between the alternatives.
- C. Incorrect. Relevant costs are expected future costs that differ among decision choices.
- D. Incorrect. Past costs are sunk costs. Because they cannot be changed by management action, they are not relevant.

2. There is a market for both product X and product Y. Which of the following costs and revenues would be most relevant in deciding whether to sell product X or process it further to make product Y?

- A. Incorrect. The cost of making X is a sunk cost (irrelevant). In addition, only X or Y, not both, can be sold.
- B. Incorrect. Only the relevant, incremental costs are considered.
- C. **Correct.** Incremental costs are the additional costs incurred for accepting one alternative rather than another. Questions involving incremental costing (sometimes called differential costing) decisions are based upon a variable costing analysis. The typical problem for which incremental cost analysis can be used involves two or more alternatives, for example, selling or processing further. The decision will rely exclusively on additional revenue compared to the additional costs incurred due to further processing.
- D. Incorrect. Y is made only after X is completed.

Chapter 6:

Forecasting Cash Needs and Budgeting

Learning Objectives

After studying this chapter, you will be able to:

- Identify importance and value of sales forecasts.
 - Recognize how sales forecasts and budgets affect other operational budgets.
-

To accomplish your department's goals you must be familiar with financial forecasting and budget planning. Without these instruments you have no plan on which to base future financial decisions, and without a plan you cannot make things happen. As a non-financial manager, you may have to forecast sales, production, and costs under varying assumptions. Learning to prepare and use financial forecasts and budgets will help you to accurately plan and control your department's future.

Forecasts

Despite the uncertainties in life, it is important to attempt to forecast what will happen. In fact, forecasting tries to minimize uncertainty about the future. A forecast is a starting point for planning. It may simply be a projection that what happened last year will happen this year, or it may be quite complex using statistical techniques and seasonal patterns. Although you can base your projection on historical patterns, you must also take into account any important changes taking place in the current environment, as these changes will make the future different from the past. Examples of relevant changes are better technology, changes in laws and regulations, and increased competition.

Forecasts are the basis for capacity planning, inventory planning, planning for sales and market share, and budgeting. Sales forecasts are particularly important in many financial activities including budgets, profit planning, capital expenditure analysis (whether to buy long-term assets), and acquisition and merger analysis (when two companies combine into one).

You must realize that forecasts are guesses regarding the future. The guesses principally arise from hard data rather than from subjective judgment, therefore, certain variables may not be accounted for in this process.

Hence, you should question forecasted figures that seem unreasonable and illogical based on your experience. After all, you are most familiar with the financial factors that relate to your job.

Using Forecasts

Forecasts are needed for marketing, production, manpower, and financial planning and are used for planning and implementing long-term objectives.

If you are a marketing manager, for instance, you can use sales forecasts to determine optimal sales force allocations, establish sales goals and plan promotions and advertising. If you are a production planner, you need forecasts to schedule production activities, order materials, and plan shipments. If you are a purchaser, you need forecasts to aid you in determining what quantity of merchandise is needed and when to satisfy projected sales.

Figure 6-1 illustrates the relationship between forecasting and managerial functions. For example, as soon as your company is sure that it has sufficient capacity, the production plan is developed. If the company does not have enough capacity, planning and budgeting decisions will be required for capital spending to expand capacity.

In planning for capital investments, predictions of economic activity are required so that the returns, or cash inflows, accruing from the investment may be estimated. Borrowing needs for future operations should also be estimated through forecasts. Financial managers must make forecasts of money and credit conditions and interest rates so that the cash needs of the firm may be met at the lowest possible cost (e.g., should the company issue stock or debt to maintain its desired financial structure?). Long-term forecasts are needed to plan changes in the company's capital structure.

Figure 6-1. Sales Forecasts and Managerial Functions

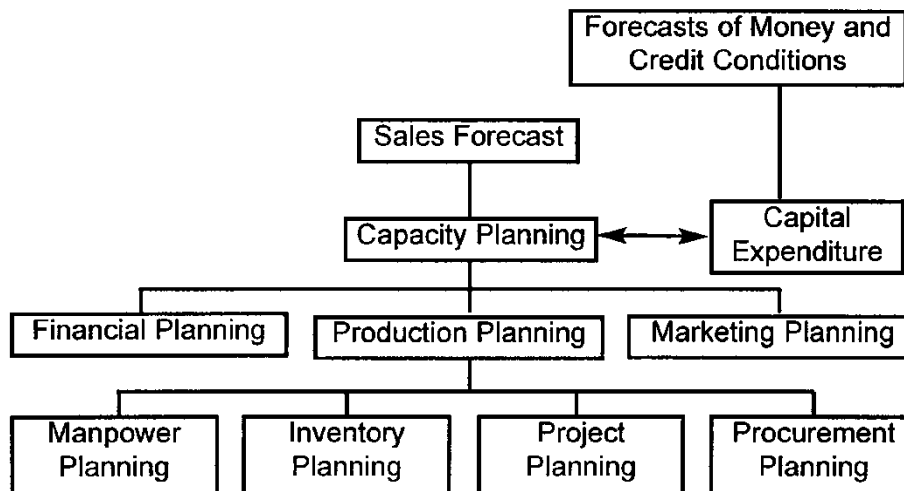
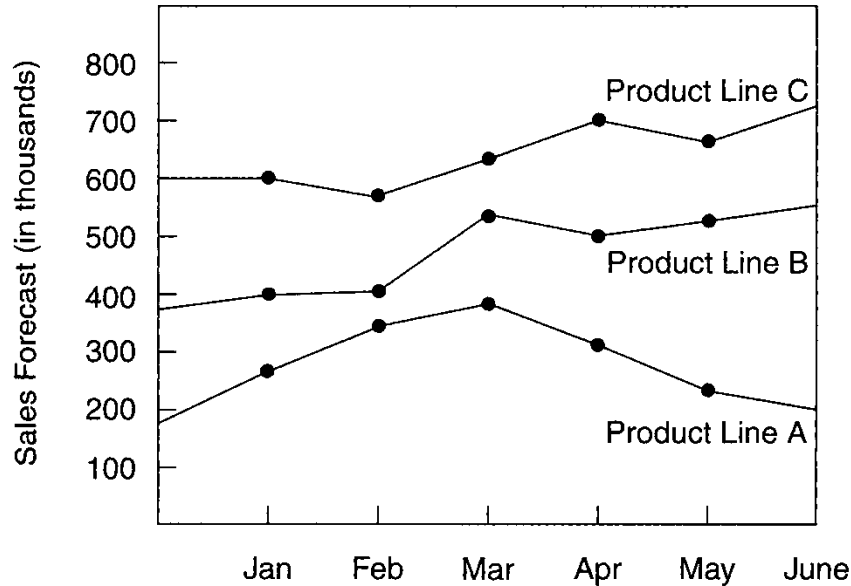


Figure 6-2. Sales Forecasts by Product Line



Preparing Financial Forecasts

To prepare a financial forecast you must begin by forecasting sales. Production and related cost forecasting will follow. Forecasting is easiest when there exists stability in relationships that can be captured in mathematical terms (e.g., $\text{sales} = a + b (\text{advertising expenses}) + c (\text{price})$).

The sequence for forecasting financing needs is:

1. Project your sales.
2. Project variables such as cost of sales and operating expenses.
3. Estimate the level of investment in assets required to support the projected sales.
4. Calculate financing needs.
5. Consider external factors affecting the forecast. Political concerns, economic environment, tax law, technological developments, and demographic factors may be applicable in certain cases.

Most other forecasts (budgets) follow the sales forecast. Sales estimates may be based on several factors including your instincts, past experiences, feedback from the sales force, and consumer surveys. If any changes are expected in your product mix (lines added or deleted), the projected change in volume is a consideration in

projecting sales. If competition or cost reductions necessitate price changes, these must also be considered in making your sales forecast. A sales forecast of major product lines for a 6-month period is shown in Figure 6-2.

Percent-of-Sales Method of Financial Forecasting

When constructing a financial forecast, the sales forecast is used to estimate various expenses, assets, and liabilities. Often, sales forecasting is done by product line. The most widely practiced method for formulating projections is the *percent-of-sales method*, in which the various expenses, assets, and liabilities for a future period are estimated as a percentage of sales for the present period. These percentages, together with the projected sales for the upcoming year, are then used to construct pro forma (planned or projected) balance sheets.

The computations for a pro forma balance sheet follow:

1. Express balance sheet items that *vary directly with sales* as a percentage of sales. Any item that does not vary directly with sales (e.g., long-term debt) is considered not applicable (NA).
2. Multiply the percentages determined in step 1 by the projected sales figure to obtain the amounts for the future period.
3. Where no percentage applies (e.g., for long-term debt, common stock, and paid-in-capital), simply insert the figures from the present balance sheet in the column for the future period.
4. Compute the projected retained earnings as follows:

$$\begin{array}{rcl} \text{Projected retained earnings} & = & \text{present retained earnings} \\ & & + \text{projected net income} - \text{cash dividends} \end{array}$$

(You'll need to know the percentage of sales that represents net income and the dividend payout ratio.)

5. Sum the asset accounts to obtain a total projected assets figure. Then add the projected liabilities and equity accounts to determine the total financing provided. Since liabilities plus equity must balance the assets when totaled, any difference is a *short fall*, which is the amount of external financing required.

Let us numerically work one out.

Example 6-1. For the pro forma balance sheet shown in Table 6-1 net income is assumed to be 5% of sales and the dividend payout ratio is 40%.

One important limitation of the percent-of-sales method is that your company is assumed to be operating at full capacity. Based on this assumption, the firm does not have adequate productive capacity to absorb projected increases in sales and may require an additional investment in assets.

The prime advantage of the percent-of-sales method of financial forecasting is that it is simple and inexpensive. To obtain a more precise projection of future financing needs, however, the preparation of a cash budget is required.

Budgets

In a personal interview with the author, a non-financial manager discussed the budgeting process as follows:

Budgeting at the firm follows the traditional top-down planning strategy. Sales budgets are set up for the firm as a whole, then broken out into the four sales regions - eastern, central, western, and southern states. At the Eastern Region we then receive our share of the corporate budget, which we must then subdivide among the territories in the region. The two key budgets that must be given considerable thought in their divisions are the sales quotas themselves and the promotional local funding dollars. Travel and expense dollars for the field representatives must be allocated. On a less formal, periodic basis, we receive allocations of promotional items that are charged to a national budget or charged in whole to our region and also must be allocated to the territories in the region.

Table 6-1. Pro Forma Balance Sheet in Millions of Dollars

	Present (20x8)	% of Sales (20x8 Sales=\$20)	Projected (20x9 Sales=\$24)	
Assets				
Current assets	2	10	2.4	
Fixed assets	<u>4</u>	20	<u>4.8</u>	
Total assets	<u>6</u>		<u>7.2</u>	
Liabilities and Stockholders' Equity				
Current liabilities	2	10	2.4	
Long-term debt	<u>2.5</u>	N.A.	<u>2.5</u>	
Total liabilities	<u>4.5</u>		<u>4.9</u>	
Common stock	0.1	N.A.	0.1	
Paid-in-capital	0.2	N.A.	0.2	
Retained earnings	<u>1.2</u>		<u>1.92</u>	*
Total equity	<u>1.5</u>		<u>2.22</u>	
Total liabilities and stockholders' equity	<u>6</u>		<u>7.12</u>	Total financing provided
			<u>0.08</u>	**External financing needed
			<u>7.2</u>	Total

*20x9 retained earnings = 20x8 retained earnings + projected net income – cash dividends paid

$$= \$1.2 + 5\%(\$24) - 40\%[5\%(\$24)]$$

$$= \$1.2 + \$1.2 - \$0.48 = \$2.4 - \$0.48 = \$1.92$$

**External financing needed projected total assets - (projected total liabilities + projected equity)

$$= \$7.2 - (\$4.9 + \$2.22) = \$7.2 - \$7.12 = \$0.08$$

In a personal interview with the author, another non-financial manager commented:

We use our projected sales forecasts for determining our increase in [insurance] policies in force. I am directly involved in our direct labor budget as we plan out our total people needs. I also must budget what each of my people will cost the company in terms of salary expense. I must budget for a certain percentage of promotions and also budget for the dollar amount and frequency of merit increases. This along with other aspects combine to formulate our yearly plan. After that is established we have everything in terms of variances to plan. Our management staff is then evaluated on our results in terms of variances. I am responsible for overtime dollars, additions to staff, and our in-house efficiencies in terms of production plans.

Budgets are very important to non-financial managers. They are useful for planning your goals, evaluating your progress, motivating your people, and communicating your results. Often your attainment of budget goals is measured in terms of variances. Budgeting is also very useful on a personal level, as you always want to know where you are in relation to your goals.

A *budget* is an annual projection of what you expect to achieve financially and operationally. It is a plan that commits resources to activities or projects and make formal (written) statements of your expectations of sales, expenses, production, volume, and various financial transactions for the coming period. A budget places guidelines and limitations on spending. The most common budget types that a non-financial manager might have to deal with are fixed budgets and flexible budgets. A fixed budget allocates a specific amount of resources that can be used to complete a specific task - this amount cannot be exceeded. A flexible *budget* allows the amount of allocated resources to vary along with the various levels of activity on a specific project.

Almost all non-financial managers are responsible for either planning and submitting a budget for a specific period of time or for conforming to one that has already been laid out.

In a personal interview, a non-financial manager employed by a computer company commented:

Although the company's attitude toward the budgeting process is a bottom-up approach, the calculation of the budget is almost entirely a top-down method. My immediate superior hands me the annual budget and discusses it with me for any discrepancies.

Our basic strategy to budgeting can be viewed as follows: first, strategic aspects are analyzed for both the short and long term; next, specific plans are developed; and last, the actual budgets are formulated.

The budget coordinates the activities of all the departments in your company. It communicates companywide goals to non-financial managers in different departments so they know what direction to take. You have no choice but to be familiar with your departmental budget and determines way to keep within it. Many non-financial managers also believe that they must use all the money allocated to them in the budget, so as not to lose funding next year; however, this does not mean that funds should be spent foolishly just to meet the budget.

A budget should be realistic (e.g., feasible in marketing and production capabilities) and consistent with company policy. It should take into consideration what your department's or company's *mission* is. For instance, does your company want to hold the line against the competition or does it want to grow? Should your company take an aggressive or a conservative approach in achieving these goals? The budget should be constantly evaluated since external or internal conditions may warrant changes. A budget is only an estimate, and deviation from that estimate should be expected. The budget must be adaptable to changing circumstances in your department. What will happen to sales if conditions change? What problems will be caused if initial sales expectations prove wrong? It is best to develop cost figures for different sales levels (e.g., high, low, expected) to assure flexibility.

The budget is a blueprint for planning and control. It enables you to see your role and set goals accordingly. At the beginning of the period, the budget is a standard. If you have no initial plan, you have no idea of what you want to accomplish. At the end of the period, the budget is a control device to measure your department's performance against the plan so that future performance may be improved. If you do not know where you are going, it is hard to tell whether or not you have arrived. The budgetary time period depends on many factors including how crucial the budget is to control costs. The period for a budget can be any appropriate time frame such as yearly, quarterly, monthly, weekly, and daily.

The major steps in preparing the budget are: (1) completing a sales forecast, (2) determining expected production volume, (3) estimating manufacturing costs and operating expenses, (4) determining cash flow and other financial effects, and (5) preparing projected financial statements. The budgetary process involves establishing goals, developing strategies, noting changes in the customer base, formulating plans of action, evaluating the market, looking at economic and political conditions, reviewing suppliers, analyzing competition, appraising industry trends, identifying the life cycle of the product, reviewing technological changes, appraising financial strength, and taking corrective action. However, without competent management, budgeting is a waste of time and money. A manager with a poor understanding of budgets may fail to correctly anticipate the future and commit to objectives for which his or her budget is inadequate, which may result in a budget overrun.

Assumptions

Prior to the budget being developed, certain questions must be asked and certain assumptions must be made. What will the inflation rate be? Where is competition headed? Will suppliers increase prices? Will customer tastes change? You also must explore the financial alternatives available to you. For instance, what will occur if you raise your selling price? What will be the effect if one variable (e.g., advertising) is changed?

The Structure of the Budget

The master (comprehensive) budget contains a projection of each of the key financial statements. Supporting schedules are also prepared for each of the major components in the financial statements. The master budget is classified broadly into two categories—the *operational budget* and the *financial budget*. The operational budget reflects the results of operating decisions and provides data needed to prepare a budgeted income statement.

The financial budget shows the financial decisions of your company and includes the cash budget and financial statement projections other than the income statement. A simplified diagram of the various components of the comprehensive budget is shown in Figure 6-3.

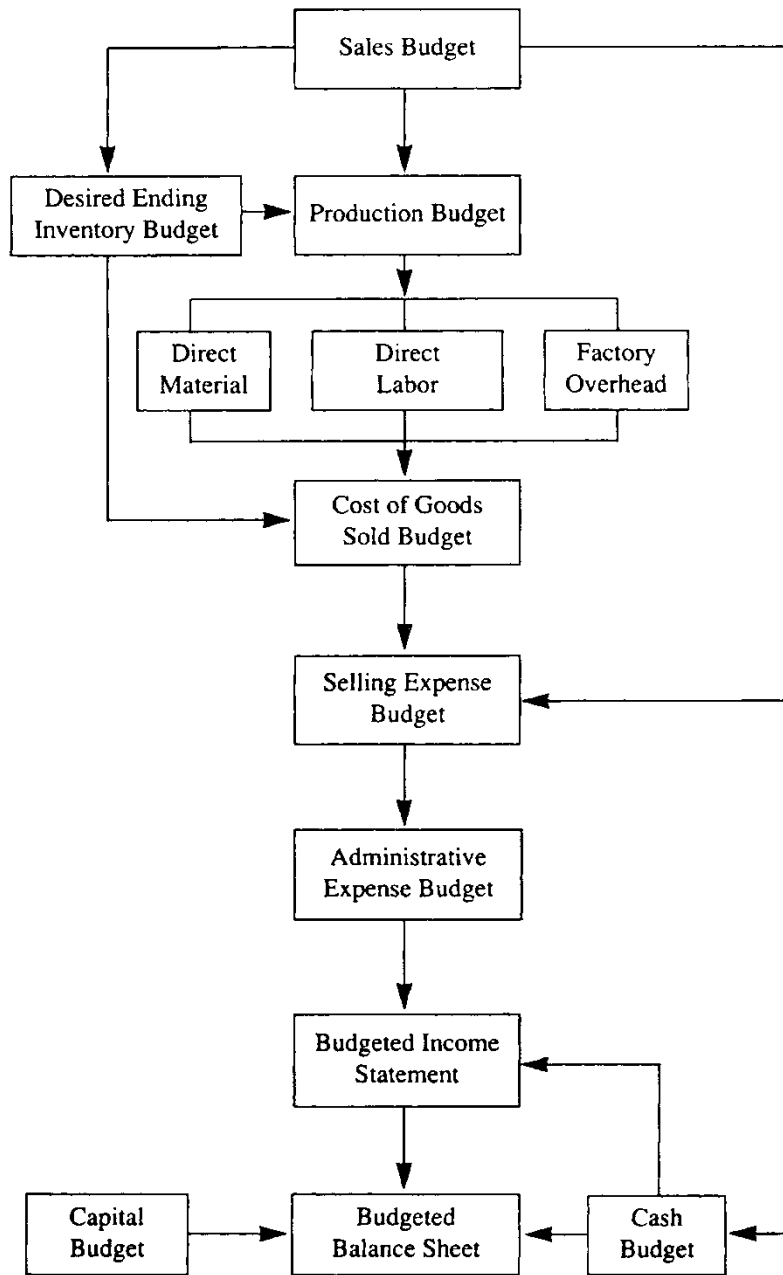
The operational budget includes the following:

- The sales budget
- The direct materials budget
- The direct labor budget
- The factory overhead budget
- The selling and administrative expense budget
- The *pro forma* income statement

The financial budget includes the following:

- The cash budget
- The *pro forma* balance sheet

Figure 6-3. A Master (Comprehensive) Budget



The Sales Budget

The sales budget is the starting point in preparing the master budget, since estimated sales volume influences nearly all other items appearing in the master budget. The sales budget, which ordinarily indicates the quantity of each product expected to be sold, allows all departments to plan their needs. Further, sales forecast figures determine staffing needs to reach targeted goals.

Accurate sales forecasting is important since an exaggerated sales forecast may result in your company hiring too many staff members or acquiring excessive facilities, which translates into unneeded costs. On the other hand, a very pessimistic forecast may cause a shortage in staff and facilities so that consumer demand cannot be met; this translates into lost business. Non-financial managers must also carefully appraise the sales estimates of other departments. For instance, the marketing department may give rosy sales estimates because it may try to stimulate the sales effort. As a result, it may not realistically appraise consumer demand.

After sales volume has been estimated, the sales budget is constructed by multiplying the expected sales in units by the expected unit sales price. Generally, the sales budget includes a computation of expected cash collections from credit sales, which will be used later for cash budgeting.

To illustrate how all these budgets are put together, we will focus on a manufacturing company called the Johnson Company, which produces and markets a single product. We will assume that the company develops the master budget in contribution format for 2X12 on a quarterly basis. We will highlight the variable cost-fixed cost breakdown throughout this example.

Example 6-2. The Johnson Company's sales budget for the year ending December 31, 2X12 is as follows:

	Quarter				Total
	1	2	3	4	
Expected sales in units	800	700	900	800	3,200
Units sales price	x \$80	x \$80	x \$80	x \$80	x \$80
Total sales	<u>\$64,000</u>	<u>\$56,000</u>	<u>\$72,000</u>	<u>\$64,000</u>	<u>\$256,000</u>

The schedule of expected cash collections for the Johnson Company is as follows :

	Quarter				Total
	1	2	3	4	
Accounts receivable (12/31/2X11)	\$ 9,500 ^a				\$ 9,500
First quarter sales (\$64,000)	44,800 ^b	\$17,920 ^c			62,720
Second quarter sales (\$56,000)		39,200 ^b	\$15,680 ^c		54,880
Third quarter sales (\$72,000)			50,400 ^b	\$20,160 ^c	70,560
Fourth quarter sales (\$64,000)				44,800 ^b	44,800
Total cash collections	<u>\$54,300</u>	<u>\$57,120</u>	<u>\$66,080</u>	<u>\$64,960</u>	<u>\$242,460</u>

- ^a All of the \$9,500 accounts receivable balance is assumed to be collected in the first quarter.
- ^b Of the total quarter's sales, 70% are collected in the quarter of sale.
- ^c Of the total quarter's sales, 28% are collected in the quarter following; the remaining 2% are uncollectible.

The Production Budget

After sales are budgeted, the production budget can be determined. The number of units expected to be manufactured is:

Budgeted sales plus desired ending inventory minus beginning inventory

Good managers constantly evaluate whether production is on schedule with proposed budgets and make adjustments accordingly. For example, if a computer on an assembly line is down for an extended period of time, the manager knows that production and output will probably be low for that time period.

Example 6-3. The Johnson Company's production budget for the year ending December 31, 2X12 is as follows:

	Quarter				
	1	2	3	4	Total
Planned sales (see Example 6-2)	800	700	900	800	3,200
Desired ending inventory ^a	<u>70</u>	<u>90</u>	<u>80</u>	<u>100^b</u>	<u>100^c</u>
Total needs	870	790	980	900	3,300
Less : Beginning inventory ^d	<u>80</u>	<u>70</u>	<u>90</u>	<u>80</u>	<u>80</u>
Units to be produced	<u>790</u>	<u>720</u>	<u>890</u>	<u>820</u>	<u>3,220</u>

- ^a This figure is calculated as 10% of the next quarter's sales
- ^b Estimated.
- ^c The ending inventory for the year is the same as the one for the fourth quarter.
- ^d The same as the previous quarter's ending inventory.

The Direct Material Budget

When the level of production has been computed, a direct material budget should be constructed to show how much material will be required for production and how much material must be purchased to meet this

production requirement. The purchase will depend on both expected usage of material and inventory levels. The formula for computation of the purchase is as follows:

$$\text{Purchase in units} = \text{Usage} + \text{Desired ending material inventory units} - \text{Beginning inventory units}$$

The direct material budget is usually accomplished by a computation of expected cash payments for materials.

Example 6-4. The Johnson Company's direct material budget for the year ending December 31, 2X12 is as follows:

	Quarter				Total
	1	2	3	4	
Units to be produced (see Example 6-3)	790	720	890	820	3,220
Material needs per unit (in lbs.)	<u>x3</u>	<u>x3</u>	<u>x3</u>	<u>x3</u>	<u>x3</u>
Material needs for production (in lbs.)	2,370	2,160	2,670	2,460	9,660
Desired ending inventory of materials (in lbs.) ^a	<u>216</u>	<u>267</u>	<u>246</u>	<u>250^b</u>	<u>250</u>
Total material needs (in lbs.)	2,586	2,427	2,916	2,710	9,910
Less : Beginning inventory of materials (in lbs.) ^c	<u>237</u>	<u>216</u>	<u>627</u>	<u>246</u>	<u>237</u>
Materials to be purchased	2,349	2,211	2,649	2,464	9,673
Unit price	<u>x \$2</u>	<u>x \$2</u>	<u>x \$2</u>	<u>x \$2</u>	<u>x \$2</u>
Purchase cost	<u>\$4,698</u>	<u>\$4,422</u>	<u>\$5,298</u>	<u>\$4,928</u>	<u>\$19,346</u>

^a 10 percent of the next quarter's units needed for production multiplied by 3 (material needs per unit).

^b Estimated.

^c The same as the prior quarter's ending inventory.

The schedule of expected cash disbursements for the Johnson Company is as follows:

	Quarter				Total
	1	2	3	4	
Accounts payable (12/31/2X11)	\$2,200				\$2,200
First quarter purchases (\$4,698)	2,349 ^a	\$2,349 ^b			4,698
Second quarter purchases (\$4,422)		2,211 ^a	\$2,211 ^b		4,422
Third quarter purchases (\$5,298)			2,649 ^a	\$2,649 ^b	5,298
Fourth quarter purchases (\$4,928)				<u>2,464^a</u>	<u>2,464</u>
Total disbursements	<u>\$4,549</u>	<u>\$4,560</u>	<u>\$4,860</u>	<u>\$5,113</u>	<u>\$19,082</u>

^a Of the total quarter's purchases, 50% are paid for in the quarter of purchases.

^b The remaining 50% of a quarter's purchases are paid for in the following quarter.

The Direct Labor Budget

The production requirements provide the starting point for the direct labor budget. To compute direct labor requirements, expected production volume for each period is multiplied by the number of direct labor hours to produce a single unit. The direct labor hours required to meet production needs are then multiplied by the direct labor cost per hour to obtain budgeted total direct labor costs.

Example 6-5. The Johnson Company's direct labor budget for the year ending December 31, 2X12 is as follows:

	Quarter				Total
	1	2	3	4	
Units to be produced (see Example 6-3)	790	720	890	820	3,220
Direct labor hours per unit	x5	x5	x5	x5	x5
Total hours	3,950	3,600	4,450	4,100	16,100
Direct labor cost per hour	x \$5	x \$5	x \$5	x \$5	x \$5
Total direct labor cost	<u>\$19,750</u>	<u>\$18,000</u>	<u>\$22,250</u>	<u>\$20,500</u>	<u>\$80,500</u>

The Factory Overhead Budget

The factory overhead budget provides a schedule of manufacturing costs other than direct materials and direct labor. These costs include factory rent, factory insurance, factory property taxes, and factory utilities. Using the contribution approach to budgeting requires the development of a predetermined overhead rate for the variable portion of the factory overhead. In developing the cash budget, remember that depreciation is not a cash outlay; therefore, it must be deducted from the total factory overhead in computing cash disbursement for factory overhead.

Example 6-6. To illustrate the factory overhead budget, we will assume the following:

- Total factory overhead budgeted = \$6,000 fixed (per quarter) plus \$2 per hour of direct labor.
- Depreciation expenses are \$3,250 each quarter.
- All overhead costs involving cash outlays are paid for in the quarter incurred.

The Johnson Company's factory overhead budget for the year ending December 31, 2X12 is as follows:

	Quarter				Total
	1	2	3	4	
Budgeted direct labor hours (see Example 6-5)	3,950	3,600	4,450	4,100	16,100
Variable overhead rate	<u>x \$2</u>	<u>x \$2</u>	<u>x \$2</u>	<u>x \$2</u>	<u>x \$2</u>
Variable overhead budgeted	7,900	7,200	8,900	8,200	32,200
Fixed overhead budgeted	<u>6,000</u>	<u>6,000</u>	<u>6,000</u>	<u>6,000</u>	<u>24,000</u>
Total budgeted overhead	13,900	13,200	14,900	14,200	56,200
Less: Depreciation	<u>3,250</u>	<u>3,250</u>	<u>3,250</u>	<u>3,250</u>	<u>13,000</u>
Cash disbursement for overhead	<u>10,650</u>	<u>9,950</u>	<u>11,650</u>	<u>10,950</u>	<u>43,200</u>

The Ending Inventory

The desired ending inventory budget provides information for the construction of budgeted financial statements. Specifically, it will help compute the cost of goods sold on the budgeted income statement. It will also give the dollar value of the ending materials and finished goods inventory to appear on the budgeted balance sheet.

Example 6-7. The Johnson Company's ending inventory budget for the year ending December 31, 2X12 is as follows:

	Ending Inventory Units	Unit Cost	Total
Direct materials	250 pounds (see Example 6-4)	\$ 2	\$ 500
Finished goods	100 units (see Example 6-3)	\$ 41	<u>\$ 4,100</u>
Total			<u>\$4,600</u>

The unit variable cost of \$41 is computed as follows:

	Unit Cost	Units	Total
Direct materials	\$2	3 pounds	6
Direct labor	5	5 hours	25
Variable overhead	2	5 hours ^a	<u>10</u>
Total variable manufacturing cost			<u>\$41</u>

^a Variable overhead is applied on the same basis as direct labor hours

The Selling and Administrative Expense Budget

The selling and administrative expense budget lists the operating expenses incurred when selling the products and managing the business. In order to complete the budgeted income statement in contribution format, the variable selling and administrative expense per unit must be computed.

Example 6-8. The Johnson Company's selling and administrative expense budget for the year ending December 31, 2X12 is shown below.

	Quarter				Total
	1	2	3	4	
Expected sales in units	800	700	900	800	3,200
Variable selling and administrative expense per units ^a	x \$4	x \$4	x \$4	x \$4	x \$4
Budgeted variable expense	\$3,200	\$2,800	\$3,600	\$3,200	\$12,800
Fixed selling and admin. expenses					
Advertising	1,100	1,100	1,100	1,100	4,400
Insurance	2,800				2,800
Office salaries	8,500	8,500	8,500	8,500	34,000
Rent	350	350	350	350	1,400
Taxes	<u>1,200</u>				<u>1,200</u>
Total budgeted selling and administrative expenses ^b	<u>\$15,950</u>	<u>\$12,750</u>	<u>\$14,750</u>	<u>\$13,150</u>	<u>\$56,600</u>

^a Includes sales agents' commissions, shipping, and supplies.

^b Paid for in the quarter incurred.

The Cash Budget

The cash budget is prepared to forecast financial needs. It is a tool for cash planning and control and for formulating investment strategies. Because the cash budget details the expected cash receipts and disbursements for a designated time period, it helps avoid the problem of either having idle cash on hand or suffering a cash shortage. If a cash shortage is experienced, the cash budget indicates whether the shortage is temporary or permanent and whether short-term or long-term borrowing is needed. Is a line of credit necessary? Should capital expenditures be cut back? If the cash position is very poor, the company may even go out of business because it cannot pay its bills. On the other hand, if the cash position is excessive, the company may be missing opportunities to use its cash for the greatest profit possibilities. Just as forecasts must be continuously evaluated for changing internal and external circumstances, the cash budget must also be periodically updated for changing conditions.

A cash budget for your department is similar to a cash budget you would prepare for yourself. To the beginning cash balance, you add the period's cash receipts, which gives you the total amount available to spend. You then subtract cash payments, leaving the ending cash balance. Just as you pay cash for living costs (e.g., food and shelter), a company also pays cash to operate and generate revenue (e.g., advertising). Unlike your personal cash budget, however, the company's cash budget cannot count on receiving a paycheck each period; you instead must estimate when credit sales will be collected. However, a company has more alternative sources of cash than you do. For example, a company may issue stock but a person doesn't.

The cash budget usually is comprised of four major sections:

1. The *receipts section* gives the beginning cash balance, cash collections from customers, and other receipts (e.g., borrowing money, selling assets). Note that cash receipts are not necessarily the same as revenue (e.g. credit sales).
2. The *disbursements section* shows all cash payments listed by purpose. Examples include cash expenses, purchase of assets, and payment of debt. Note that not all expenses are cash payments (e.g., depreciation).
3. The *cash surplus or deficit section* simply shows the difference between the cash receipts section and the cash disbursements section.
4. The *financing section* provides a detailed account of the borrowings and repayments expected during the budget period.

Example 6-9. To illustrate the cash budget we will make the following assumptions:

- The company desires to maintain a \$5,000 minimum cash balance at the end of each quarter.
- All borrowing and repayment must be in multiples of \$500 at an interest rate of 10% per annum. Interest is computed and paid as the principal is repaid. Borrowing takes place at the beginning of each quarter, and repayment is made at the end of each quarter.

The Johnson Company's cash budget for the year ending December 31, 2X12 is shown as follows:

	<i>Example</i>	<u>Quarter</u>				<u>Total</u>
		<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	
Cash balance, beginning	Given	\$10,000	\$9,401	\$5,461	\$9,106	\$10,000
Receipts:						
Collection from customers	6-2	<u>54,300</u>	<u>57,120</u>	<u>66,080</u>	<u>64,960</u>	<u>242,460</u>
Total cash available		<u>64,300</u>	<u>66,521</u>	<u>71,541</u>	<u>74,066</u>	<u>252,460</u>
Less: Disbursements:						
Direct materials	6-4	4,549	4,560	4,860	5,113	19,082
Direct labor	6-5	19,750	18,000	22,250	20,500	80,500
Factory overhead	6-6	10,650	9,950	11,650	10,950	43,200
Selling and Administrative	6-8	15,950	12,750	14,750	13,150	56,600
Machinery purchase	Given		24,300			24,300

Income Tax	Given	<u>4,000</u>	<u> </u>	<u> </u>	<u> </u>	<u>4,000</u>
Total disbursements		<u>54,899</u>	<u>69,560</u>	<u>53,510</u>	<u>49,713</u>	<u>227,682</u>
Cash surplus (deficit)		<u>9,401</u>	<u>(3,039)</u>	<u>18,031</u>	<u>24,353</u>	<u>24,778</u>
Financing:						
Borrowing			8,500			8,500
Repayment				(8,500)		(8,500)
Interest		<u> </u>	<u> </u>	<u>(425)</u>	<u> </u>	<u>(425)</u>
Total financing		<u> </u>	<u>8,500</u>	<u>(8,925)</u>	<u> </u>	<u>(425)</u>
Cash balance, ending		<u>\$9,401</u>	<u>\$5,461</u>	<u>\$9,106</u>	<u>\$24,353</u>	<u>\$24,353</u>

The Budgeted Income Statement

The budgeted income statement summarizes the various component projections of revenue and expenses for the budgeting period (for control purposes the budget can be divided into quarters or even months depending on need).

Example 6-10. The Johnson Company's budgeted income statement for the year ending December 31, 2X12 is as follows:

	Example No.		
Sales (3,200 units @ \$80)	6-2		\$256,000
Less: Variable expenses			
Variable cost of goods sold			
(3,200 units @ \$41)	6-7		\$131,200
Variable selling & administrative	6-8	<u>12,800</u>	<u>144,000</u>
Contribution margin			112,000
Less: Fixed expenses			
Factory overhead	6-6	24,000	
Selling and Administrative	6-8	<u>43,800</u>	<u>67,800</u>
Net operating income			44,200
Less: Interest expense	6-9		<u>425</u>
Net income before taxes			43,775
Less: Income taxes	20%		<u>8,755</u>
Net income			<u>35,020</u>

The Budgeted Balance Sheet

The budgeted balance sheet alerts you to unfavorable financial conditions that you might want to avoid. It also serves as a final check on the mathematical accuracy of all the other schedules, helps you perform a variety of ratio calculations, and highlights future resources and obligations. The budgeted balance sheet is prepared by adjusting the previous year's balance sheet bas on expectations for the budgeting period.

Example 6-11. To illustrate, we will use the Johnson Company's balance sheet as of December 31 2X11.

Assets		Liabilities and Stockholders' Equity	
Current assets:		Current liabilities:	
Cash	\$10,000	Accounts payable	\$2,200
Accounts receivable	9,500	Income tax payable	<u>4,000</u>
Material inventory	474	Total current liabilities	6,200
Finished goods inventory	<u>3,280</u>	Stockholders' equity:	
Total current assets	<u>23,254</u>	Common stock, no-par	70,000
Fixed assets:		Retained earnings	37,054
Land	50,000		
Buildings and equipment	100,000		
Accumulated depreciation	<u>(60,000)</u>		
Total fixed asset	<u>90,000</u>		
		Total liabilities and	_____
Total assets	<u>113,254</u>	stockholders' equity	<u>113,254</u>

The Johnson Company's budgeted balance sheet as of December 31, 2X12 is shown as follows:

Assets		Liabilities and Stockholders' Equity	
Current assets:		Current liabilities:	
Cash	\$24,353 ^a	Accounts payable	\$2,464 ^h
Accounts receivable	23,040 ^b	Income tax payable	<u>8,755ⁱ</u>
Material inventory	500 ^c	Total current liabilities	<u>11,219</u>
Finished goods inventory	<u>4,100^d</u>	Stockholders' equity:	
Total current assets	<u>\$ 51,993</u>	Common stock, no-par	70,000 ^j
Fixed assets:		Retained earnings	72,074 ^k
Land	50,000 ^e		
Buildings and equipment	124,300 ^f		
Accumulated depreciation	<u>(73,000)^g</u>		
Total fixed assets	101,300		
	_____		_____
Total assets	<u>\$153,293</u>	Total liabilities and stockholders' equity	<u>\$153,293</u>

^a From Example 6-9 (cash budget).

^b $\$9,500 + \$256,000 \text{ sales (from Example 6-2)} - \$242,460 \text{ receipts (from Example 6-9)} = \$23,040.$

^c From Example 6-7 (ending inventory budget).

^d From Example 6-7 (ending inventory)

^e No change.

^f $\$100,000 + \$24,300 \text{ (from Example 6-9)} = \$124,300.$

^g $\$60,000 + \$13,000 \text{ (from Example 6-6)} = \$73,000:$

^h $\$2,200 + \$19,346 \text{ (from example 6-4)} - \$19,082 \text{ (from Example 6-4)} = \$2,464$ (all accounts payable relate to material purchases), or 50% of fourth quarter purchase = $50\% (\$4,928) = 2,464.$

ⁱ From Example 6-10 (budgeted income statement).

^j No change.

^k $\$37,054 + \$35,020 \text{ (from Example 6-10) net income} = \$72,074.$

A Shortcut Approach to Formulating the Budget

There is a shortcut approach that is widely used in formulating a budget. In the first step of this approach, a *pro forma* income statement is developed using past percentage relationships between relevant expense and cost items and sales. These percentages are then applied to forecasted sales. This is a version of the percent-of-sales method previously discussed. Second, a *pro forma* balance sheet is estimated by determining the desired level of certain balance sheet items and by making additional financing conform to those desired figures. Thus, the remaining items are estimated to make the balance sheet balance.

There are two basic assumptions underlying this approach:

1. Previous financial condition is a reliable predictor of future condition.
2. The value of certain variables (e.g., cash, inventory, and accounts receivable) can be forced to take on specified *desired* values.

Computer-Based Models for Financial Planning and Budgeting

For smaller companies, an electronic spreadsheet may be used to efficiently and quickly develop a budget (such as Excel). Such software helps carry out tedious calculations. More importantly, if a budgetary figure is changed (e.g., sales), the electronic spreadsheet will change all other budgetary amounts related to it (e.g., cost of sales, selling expenses). Hence, it is easy to make different sales projections and see what the resulting costs and profitability will be.

A computer-based quantitative model may be used to construct a profit planning budget and to help answer a variety of “what-if” questions. Its calculations provide a basis for choice among alternatives under conditions of uncertainty. There are primarily two approaches to modeling the corporate budgeting process: *simulation and optimization* (see an advanced finance text for more information on these models). There are many user-oriented modeling languages and packages on the market specifically designed for budgeting.

Conclusion

Budgets should be participative not authoritative, and the budget process should be decentralized to departmental cost centers with responsible managers. If the people operating under the budget have helped prepare it, they will be more receptive to meeting the objectives. Budgets must also be realistic if they are to be accepted by the staff and if the company's objectives are to be met. If you feel a budget is fair and you have participated in the budgetary process, you can better understand the impact of your decisions on your department, on other departments, and on the company. You can also determine how best to use allocated funds to strengthen your departments' position.

A budget helps you direct attention from the present to the future. It assists you in anticipating problems in time to deal with them effectively, and it reveals whether you can expand. Further, the budget helps you achieve departmental goals. You have a reference point for control reporting. The budgetary process also assists you in searching for weaknesses, which you can strengthen before they become a major problem.

Chapter 6 Review Questions

1. The master budget

- A. Shows forecasted and actual results.
- B. Contains the operating budget.
- C. Reflects controllable costs only.
- D. Can be used to determine manufacturing cost variances.

2. The master budget process usually begins with the

- A. Sales budget.
- B. Production budget.
- C. Overhead budget.
- D. Cash budget.

3. A company had sales last year of \$10 million, with net income equal to 6% of sales. This year the sales are expected to be \$11.2 million. The accounts receivable balance was \$1.5 million at the end of last year. Using the percentage-of-sales method, the accounts receivable balance at the end of this year is forecasted to be

- A. \$1.572 million.
- B. \$1.68 million.
- C. \$2.172 million.
- D. \$2.7 million.

4. Identify the statement below that represents a required underlying assumption for using the percentage-of-sales technique to develop pro forma financial statements.

- A. Economies of scale exist in the use of assets.
- B. Your company is assumed to be operating at full capacity.
- C. Technological considerations dictate that fixed assets be added in large, discrete amounts.
- D. Actual sales-to-asset ratios for the firm in any given period vary with different stages of the economic cycle.

Chapter 6 Review Answers

1. The master budget

- A. Incorrect. The master budget does not contain actual results.
- B. **Correct.** The master budget is classified broadly into two categories—the operational budget and the financial budget. The operational budget reflects the results of operating decisions and provides data needed to prepare a budgeted income statement.
- C. Incorrect. The master budget reflects all applicable expected costs, whether or not controllable by individual managers.
- D. Incorrect. The master budget is not structured to allow determination of manufacturing cost variances, which requires using the flexible budget and actual results.

2. The master budget process usually begins with the

- A. **Correct.** The sales budget is the starting point in preparing the master budget, since estimated sales volume influences nearly all other items appearing in the master budget. The sales budget, which ordinarily indicates the quantity of each product expected to be sold, allows all departments to plan their needs. Once a firm can estimate sales, the next step is to decide how much to produce or purchase.
- B. Incorrect. The production budget normally cannot be prepared until the expected sales are known. The number of units expected to be manufactured to meet budgeted sales and inventory requirements is set forth in the production budget.
- C. Incorrect. The overhead budget is another term for the budget reflecting the results of operating decisions. It cannot be prepared until after the sales and production budgets are prepared.
- D. Incorrect. Preparation of the cash budget is the last step in the overall budgeting process. The cash budget is determined after the operating budgets such as the sales and production budgets are prepared.

3. A company had sales last year of \$10 million, with net income equal to 6% of sales. This year the sales are expected to be \$11.2 million. The accounts receivable balance was \$1.5 million at the end of last year. Using the percentage-of-sales method, the accounts receivable balance at the end of this year is forecasted to be

- A. Incorrect. \$1,572,000 is based on adding the percentage increase in net income to the previous amount of receivables $\{[6\% \times (\$11,200,000 - \$10,000,000)] + \$1,500,000\}$.
- B. **Correct.** Percentage of sales is the most widely used method for projecting the company's financing needs. This method involves estimating the various expenses, assets, and liabilities for a future period as a percent of the sales forecast and then using these percentages, together with the projected sales, to construct pro forma balance sheets. This method is based on the assumptions that most balance sheet

amounts directly correlate with sales and that the current levels of all assets are optimal for the current sales level. Thus, given that last year's receivables equaled 15% of sales ($\$1,500,000 \div \$10,000,000$), this year's ending receivables balance is expected to be $\$1,680,000$ ($15\% \times \$11,200,000$).

- C. Incorrect. $\$2,172,000$ is based on adding profit as a percentage of sales to last year's receivables [$\$1,500,000 + (6\% \times \$11,200,000)$].
- D. Incorrect. $\$2,700,000$ equals past receivables plus the additional sales.

4. Identify the statement below that represents a required underlying assumption for using the percentage-of-sales technique to develop pro forma financial statements.

- A. Incorrect. If economies of scale exist in the use of assets, the ratios of assets to sales are not constant.
- B. **Correct.** This method states balance sheet amounts as percentages of sales and then multiplies future sales by these percentages to develop pro forma financial statements. Your company is assumed to be operating at full capacity. Based on this assumption, the firm does not have adequate productive capacity to absorb projected increases in sales and may require an additional investment in assets. Thus, a greater amount of assets will be required for a greater amount of sales (e.g., receivables and cash requirements will increase). The asset-to-sales ratios must be constant when applying the percentage-of-sales forecasting method. If the current levels of assets are considered to be optimal for the current sales level, that is, if assets are efficiently used, the asset-to-sales ratios are constant.
- C. Incorrect. If fixed assets must be added in large, discrete amounts, the ratios are not constant.
- D. Incorrect. If ratios vary with economic cycles, the percentage-of-sales method is inappropriate.

Chapter 7:

Cost Control and Variance Analysis

Learning Objectives

After studying this chapter, you will be able to:

- Define variance analysis and its usefulness to financial analysis.
 - Determine when variance analysis should be applied.
 - Recognize the use of flexible budgets in performance reports.
 - Identify and list cost variances.
 - Clarify and classify variances in marketing, manufacturing and labor
-

Variance analysis is a tool managers use to evaluate financial performance. You can carry out variance analysis for such areas of the company as sales, purchasing, and distribution. Variance analysis can also help you appraise the productivity of your employees, including sales personnel, factory workers, and delivery personnel, among others. By using variance analysis, you can spot and correct problems, as well as identify areas of success.

Locating deviations between expected and actual figures through variance analysis helps you not only to identify problems but also to determine how large the problem is, who is responsible, and whether it is controllable or not. For example, if the cost of manufacturing a product or rendering a service is higher than expected, you would want to know the reasons for the discrepancy and the severity of the situation. With the aid of variance analysis, you can then decide whether the problem lies with buying or planning or general productivity. Or perhaps you find that actual sales fall short of expectations. You would want to know whether the sales manager can control the problem (e.g., poor salesperson effort) or not (e.g., an economic depression).

Variance analysis also spotlights positive performances. If the actual cost of a product is less than expected, for instance, you would want to know what you and your employees are doing correctly so as to capitalize on the situation. In this event, you would want to reward superior performances by employees or to know that the company is using new technological processes that successfully keep costs down.

Typically, only significant variances warrant investigation. Further, variances should be investigated when they fall out of the accepted range or the control limit. To help you interpret variance analysis reports, understand which variances are important for your position, and remedy any problems. This chapter will cover the following topics: (1) the standards of revenue and cost, (2) the use of variance analysis to monitor performance, (3) the evaluation of sales and cost variances, (4) the use of flexible budgeting, and (5) analysis of warehouse problems and sales performance. You will learn to calculate and appraise variances so as to answer these questions:

1. Do your actual sales and expenses match your estimates? Why or Why not?
2. Is the variance favorable or unfavorable? If it is favorable, who should get credit for it? If it is unfavorable, is it controllable?
3. Is the variance uncontrollable because of external factors such as a strike?
4. Are your standards too tight?
5. What trends do the variances reveal?
6. If the variance is significant (or controllable), what are the reasons and who is responsible? What corrective actions should be taken?

In an interview, a non-financial manager neatly summarized the virtues of variance analysis, which you are about to learn:

Let's say production has dropped and I am below plan. I must take appropriate action to get back on course. We have a weekly production meeting where we must report on our variances to plan in a number of areas. We do this in order to maintain tight management control and also to be responsive to our changing environment. Also this is a very important tool for planning as each week determine the best use for our resources, budgeting our people if you will.

Defining a Standard

At the beginning of the period, you set standards such as sales quotas, standard costs (e.g., material price, wage rate), and standard volume. Let us focus on standard cost, which is the predetermined cost of manufacturing, servicing, or marketing an item during a given future period. It is based on current and projected conditions. This norm is also dependent upon quantitative and qualitative measurements (e.g., working conditions). A non-financial manager commented in an interview that his facilities department uses standard costs for equipment installation and relocation to determine the cost to charge to the ordering unit. For determining the projected cost of a job, you should understand the concept of and calculations for standard costs.

Variance analysis compares standard to actual costs or performances. Contingent on the cost-benefit relationship, these analyses may be as detailed as necessary. Evaluation of variances may be done yearly,

quarterly, monthly, daily, or hourly, depending on how quickly you need to identify a problem. But since you do not know actual figures (e.g., hours spent) until the end of the period, variances can only be arrived at then.

There are two types of variances: material and immaterial. For material variances, you must identify the responsible departments or persons and take corrective action. Insignificant, or immaterial, variances need not be looked into further unless they recur and/or reflect potential difficulty.

One way to measure if a variance is significant is to divide the variance by the standard cost. Generally, a variance of more than 5 percent may be deemed material. In some cases, materiality is measured by dollar amount or by volume level. For example, the company may set a policy looking into any variance that exceeds \$10,000 or 20,000 units, whichever is less. Guidelines for materiality should be set to reflect the importance of an element to the corporation's performance and decision making. For example, when a product or activity is critical to the proper functioning of the business (e.g., critical part, promotion, repairs), limits for materiality should be such that early reporting of variances is encouraged. Further, statistical techniques can be used to ascertain the significance of cost and revenue variances.

The Usefulness of Variance Analysis

Setting standards and analyzing variances are essential in financial analysis and decision making. Both activities tell you how you are doing and what is going wrong or right. Some specific advantages of standards and variances are as follows:

- If properly used, standards can help motivate employees.
- Assist in decision making because areas of inefficiency are identified.
- Help formulate sales price because you can determine what the item should cost.
- Set and evaluate objectives by comparing budgeted to actual figures.
- Establish cost control since cost inefficiencies and overruns are pinpointed.
- Highlight problem areas through the "management by exception" principle.
- Pinpoint responsibility for undesirable performance so that corrective action may be taken. Variances in product activity (cost, quantity, quality) are typically the foreman's responsibility. Variances in sales are often the responsibility of the marketing manager. Variances in profit usually relate to overall operations. Note that variances indicating strengths should be further taken advantage of.
- Facilitate communication within the organization, such as between management and supervisors, because everyone knows the standard to accomplish.
- Assist in planning by forecasting needs (e.g., cash requirements).
- Establish bid prices on contracts because desired profit goals can be determined.
- Simplify bookkeeping procedures by keeping the records at standard cost.

Although standard costing and variance analysis are exceptionally important tools, they can have their drawbacks. For example, biases in deriving standards can exist. Further, material variances can sometimes be

due to out-of-date standards or poor budgetary processes rather than actual performances. Therefore, you should use these tools with caution.

Setting Standards

There are four types of standards:

- **Basic.** These are not changed from period to period. They form the basis with which later period performance is compared. No consideration, however, is given to a change in the environment, which is an unrealistic basis.
- **Maximum efficiency.** These are perfect standards, which assume ideal, optimal conditions. Realistically, certain inefficiencies will occur.
- **Currently attainable.** These are based on efficient activity. They are possible goals but difficult to achieve. Normal occurrences, such as anticipated machinery failure, are considered in the calculation of currently attainable standards.
- **Expected.** These are expected figures, which should come very close to actual figures.

You should base standards on the situation being appraised. Here are some examples of how to match standards with particular situations:

<u>Situation</u>	<u>Standard</u>
Cost reduction	Tight
Pricing policy	Realistic
High-quality	Perfection

Determining and Evaluating Sales Variances

Actual and budgeted sales figures should be compared by territory, salesperson, and product to see if expectations are being realized.

To evaluate sales performance, you should focus on *profitable* sales volume. Don't be misled by *high* sales volume; high sales volume does not automatically mean high profits because the high costs associated with products need to be subtracted. Thus, reports by salespersons should show not only revenue derived but also gross profit earned. Although gross profit may not necessarily translate into net profit because of high selling

and advertising expenses, it is a legitimate measure of performance. Overall, the report will reveal where to put sales effort.

When you appraise changes in gross profit, you have to recognize that these changes may be caused by changes in sales mix, selling price, volume, or returns. Also, a complete analysis of sales volume should include consideration of budgets, standards, sales plans, industry comparisons, and manufacturing costs.

Sales variances are computed to gauge the performance of the marketing function.

Example 7-1. Western Corporation's budgeted sales for 20X1 were

Product A: 10,000 units at \$6.00 per unit	\$ 60,000
Product B: 30,000 units at \$8.00 per unit	<u>240,000</u>
Expected sales revenue	<u>\$300,000</u>

Actual sales for the year were	
Product A: 8,000 units at \$6.20 per unit	\$ 49,600
Product B: 33,000 units at \$7.70 per unit	<u>254,100</u>
Actual sales revenue	<u>\$303,700</u>

There is a favorable sales variance of \$3,700, consisting of the sales price variance .

The sales price variance equals: (Actual selling price - Budgeted selling price) x Actual units sold

Product A (\$6.20 - \$6.00) x 8,000	\$1,600	Favorable
Product B (\$7.70 - \$8.00) x 33,000	<u>9,900</u>	Unfavorable
Sales price variance	<u>\$8,300</u>	Unfavorable

The sales volume variance equals: (Actual quantity - Budgeted quantity) x Budgeted selling price

Product A (8,000 - 10,000) x \$6.00	\$12,000	Unfavorable
Product B (33,000 - 30,000) x \$8.00	<u>24,000</u>	Favorable
Sales volume variance	<u>\$12,000</u>	Favorable

By looking at the trend in sales, you may identify unfavorable trends requiring a reduction of the sales effort or a change in product.

You have to evaluate the meaning of sales variances to your department. For example, an unfavorable sales volume variance may arise from poor marketing procedures. An unfavorable total sales variance may signal a problem with the marketing manager because he or she has control over sales, advertising, and often pricing. Unfavorable sales situations may also be caused by a lack in quality control, substitution of poorer quality components because of deficient purchasing, or deficient product design based on poor engineering.

You should also compare your divisional sales figures with the sales figures of competing companies' divisions and with industry averages. Sometimes an unfavorable sales volume variance is caused by the price cuts of competing companies. And, if unfavorable volume variance is coupled with favorable price variance, you may have lost sales by raising your prices.

Cost Variances

When a product is made or a service is performed, you have to determine these three cost measures:

- Actual cost equals actual price times actual quantity, where actual quantity equals actual quantity per unit of work times actual units of work produced
- Standard cost equals standard price times standard quantity, where standard quantity equals standard quantity per unit of work times actual units of work produced.
- Total cost variance equals actual cost less standard cost.

Total cost variance has the two elements: price variance and quantity variance. Price (rate, spending) variance is calculated as follows:

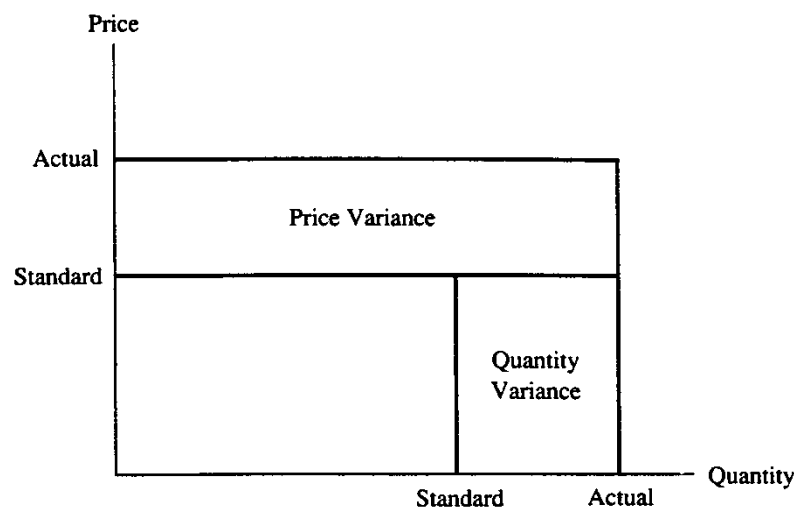
$$(\text{Standard price} - \text{Actual price}) \times \text{Actual quantity}$$

Quantity (usage, efficiency) variance is formulated in the following manner:

$$(\text{Standard quantity} - \text{Actual quantity}) \times \text{Standard price}$$

These figures are computed for both material and labor. Figure 7-1 depicts the variance analysis for total cost.

Figure 7-1. Variance Analysis of Total Cost



Material's Variances

The materials price variance allows you to evaluate the activity of the purchasing department and to see the impact of raw materials cost changes on profitability, while the materials quantity variance helps you to judge the performance of the production supervisor. Example 7-2 calculates the three types of materials variances you need to know.

Example 7-2. The standard cost of one unit of output (product or service) was \$15, or three pieces at \$5 per piece. During the period, 8,000 units were made. The actual cost was \$14 per unit, or two pieces at \$7 per piece,

Total Materials Variance

Standard quantity x Standard price (24,000 x \$5)	\$120,000
Actual quantity x Actual price (16,000 x \$7)	<u>112,000</u>
	<u>\$ 8,000 F</u>

Materials Price Variance

(Standard price - Actual price) x Actual quantity	
(\$5 - \$7) x 16,000	<u>\$ 32,000 U</u>

Materials Quantity Variance

(Standard quantity - Actual quantity) x Standard price	
(24,000 - 16,000) x \$5	<u>\$ 40,000 F</u>

Unfavorable materials price variances may be caused by one or more of the following factors: inaccurate standard prices, failure to take a discount on quantity purchases, failure to shop for bargains, inflationary cost increases, scarcity in raw material supplies resulting in higher prices, and purchasing department inefficiencies.

Unfavorable material quantity variances result from poorly trained workers, improperly adjusted machines, use of an improper production method, outright waste on the production line, and/or use of a lower grade material, purchased to save money.

Once the reasons for unfavorable materials variances have been determined, you can then locate the responsible departments or key personnel:

<u>Reason</u>	<u>Responsible Party</u>
Overstated price paid	Purchasing
Failure to detect defective goods	Receiving
Inefficient labor or poor supervision	Foreman
Poor mix in material	Production manager
Rush delivery of materials	Traffic
Unfavorable quantity variance	Foreman
Unexpected change in production volume	Sales manager

To correct an unfavorable material price variance, you can increase selling price, substitute cheaper materials, change a production method or specification, or engage in a cost reduction program. To achieve some of these ends, you should examine the variability in raw material costs, look at price instability in trade publications, and emphasize vertical integration to reduce the price and supply risk of raw materials.

Lastly, remember that you cannot control materials price variances when higher prices are caused by inflation or shortage situations or when rush orders are required by the customer, who will bear the ultimate cost increase.

Labor Variances

The standard labor rate is based on the contracted hourly wage rate. Where salary rates are set by union contract, the labor rate variance will usually be minimal. Otherwise, it should be responsibility of the human resource department. Labor efficiency standards are typically estimated by engineers based on an analysis of the production operation.

Labor variances are determined in a manner similar to that of material variances, as illustrated in Example 7-3.

Example 7-3. The standard cost of labor is four hours times \$9 per hour, or \$36 per unit. During the period, 7,000 units were produced. The actual cost is six hours times \$8 per hour, or \$48 per unit.

Total Labor Variance

Standard quantity x Standard price (28,000 x \$9)	\$252,000
Actual quantity x Actual price (42,000 x \$8)	<u>336,000</u>
	<u>\$ 84,000 U</u>

Labor Rate Variance

(Standard price - Actual price) x Actual quantity	
(\$9 - \$8) x 42,000	<u>\$ 42,000 F</u>

Labor Efficiency Variance

(Standard quantity - Actual quantity) x Standard price	
(28,000 - 42,000) x \$9	<u>\$126,000 U</u>

Possible causes of *unfavorable* labor rate variance include the following:

1. an increase in wages,
2. poor scheduling or production resulting in overtime work, and
3. use of workers commanding higher hourly rates than expected.

Possible reasons for labor rate variances can be matched with responsible parties, as follows:

<u>Reason</u>	<u>Responsible Party</u>
Use of overpaid or an excessive number of workers	Human resource manager or union contract
Poor job descriptions	Human resource
Overtime	Production planning

In the case of a shortage of skilled workers, it may be impossible to avoid an unfavorable labor price variance.

Labor efficiency (quantity) variances can be attributed to one or more of the following:

- Poor supervision
- Use of unskilled workers, who are paid lower rates, or the wrong mixture of labor for a given job
- Use of poor quality machinery
- Improperly trained workers
- Poor quality of materials requiring more labor time in processing
- Machine breakdowns
- Employee unrest
- Production delays due to power failure

The reasons and responsible parties for unfavorable labor efficiency variances can then be matched in these ways:

<u>Reason</u>	<u>Responsible Party</u>
Inadequate supervision	Foreman
Improper functioning of equipment	Maintenance
Insufficient material supply or poor quality	Purchasing

Overhead Variances

The overhead variance is comprised of the controllable and volume variances.

Relevant computations follow.

Total overhead variance = Actual overhead vs. Standard overhead
(standard hours x standard overhead rate).

Controllable variance = Actual overhead vs. Budget
adjusted to standard hours.

Note: Budget adjusted to standard hours equals fixed overhead plus variable overhead (standard hours times standard variable overhead rate).

Volume variance = Standard overhead vs. Budget adjusted to standard hours.

Example 7-4 uses the equations to illustrate a hypothetical situation.

Example 7-4. The following data are provided:

Budgeted overhead (includes fixed overhead of \$7,500 and variable overhead of \$10,000)	\$ 17,500
Budgeted hours	10,000
Actual overhead	\$8,000
Actual units produced	800
Standard hours per unit of production	5

Preliminary calculations are as follows:

Budgeted fixed overhead (\$7,500/10,000 hr)	0.75
Budgeted variable overhead (\$10,000/10,000 hr)	<u>1.00</u>
Total budgeted overhead (\$17,500/10,000 hr)	<u>\$1.75</u>
Standard hours (800 units x 5 hr per unit)	4,000 hr

Total Overhead Variance

Actual overhead	\$8,000
Standard overhead	
Standard hours	4,000 hr
Standard overhead rate	x <u>\$1.75</u>
	<u>7,000</u>
	<u>\$ 1,000U</u>

Controllable Variance

Actual overhead	\$8,000
Budget adjusted to standard hours:	
Fixed overhead	\$7,500
Variable overhead (Standard hours x Standard variable overhead rate - 4,000 x \$1)	<u>4,000</u>
	<u>11,500</u>
	<u>3,500F</u>

Volume Variance

Standard overhead	7,000
Budget adjusted to standard hours	<u>11,500</u>
	<u>4,500U</u>

Because unfavorable variances exist, you would want to locate the responsible parties. The controllable variance is the responsibility of the foreman, since he or she influences actual overhead incurred. The volume variance is the responsibility of management executives and production managers, since they are involved with plant utilization.

On the one hand, variable overhead variance information is helpful in arriving at output level and output mix decisions. It also assists in appraising decisions regarding variable inputs. On the other hand, fixed overhead variance data provide information regarding decision-making astuteness in relation to the purchase of some combination of fixed plant size and variable production inputs.

The possible reasons for recurring unfavorable overhead volume variances include the following:

- The purchase of the wrong size plant
- Improper scheduling
- Insufficient orders
- Shortages in material
- Machinery failure
- Long operating time
- Inadequately trained workers

When idle capacity exists, this may indicate long-term operations planning problems.

The Use of Flexible Budgets in Performance Reports

The static (fixed) budget is geared to only one level of activity and thus has problems in cost control because it does not distinguish between fixed costs and variable costs.

The flexible budget is geared toward a range of activities rather than a single level of activity. A flexible budget employs budgeted figures at different capacity levels. It allows you to choose the best expected (normal) capacity level (100%) and to assign pessimistic (80%), optimistic (110%), and full (150%) capacity levels. You can then see how your department is performing at varying capacity levels. Fixed costs remain constant as long as you operate below full capacity.

Flexible budgeting distinguishes between fixed and variable costs, thus allowing for a budget, which can be automatically adjusted (via changes in variable cost totals) to the particular level of activity actually attained. Thus, variances between actual costs and budgeted costs are adjusted for volume ups and downs before differences due to price and quantity factors are computed. Note that flexible budgets are primarily used to accurately measure performance because they compare actual costs for a given output with the budgeted costs for the *same level of output*.

Table 7-1 presents an example of a flexible budget. Example 7-5 illustrates the differences between static and flexible budgets.

Table 7-1. Flexible Budget

<i>Cost</i>	<i>Variable Cost</i>	<i>Fixed Cost</i>	<i>Budget (50,000 hrs.)</i>	<i>Actual (60,000 hrs.)</i>	<i>Budget (60,000 hrs.)</i>	<i>Spending Variance</i>
Indirect material	\$.80	\$6,000	\$46,000	\$56,000	\$54,000	\$2,000(U)
Indirect labor	4.20	24,000	234,000	270,000	276,000	6,000(F)
Supervision		70,000	70,000	74,000	70,000	4,000(U)
Depreciation		40,000	40,000	32,000	40,000	8,000(F)
Power and light	.30	2,000	17,000	21,000	20,000	1,000(U)
Maintenance	4.70	58,000	293,000	287,000	340,000	53,000(F)
Total	<u>\$10.00</u>	<u>\$200,000</u>	<u>\$700,000</u>	<u>\$740,000</u>	<u>\$820,000</u>	<u>\$60,000(F)</u>

Example 7-5. Assume that the Fabricating Department of Company X is budgeted to produce 6,000 units during June. Assume further that only 5,800 units were produced. The direct labor and variable overhead budget for the month of June follows:

Budgeted production	6,000 units
Actual production	5,800 units
Direct labor	\$39,000
Variable overhead costs:	
Indirect labor	6,000
Supplies	900
Repairs	<u>300</u>
	<u>\$46,200</u>

If a static budget is used, the performance report for Company X's Fabricating Department will appear as follows:

	<i>Budget</i>	<i>Actual</i>	<i>Variance (U or F)</i>
Production in units	<u>6,000</u>	<u>5,800</u>	<u>200U</u>
Direct labor	\$39,000	\$38,500	\$500F
Variable overhead costs:			
Indirect labor	6,000	5,950	50F
Supplies	900	870	30F
Repairs	<u>300</u>	<u>295</u>	<u>5F</u>
	<u>\$46,200</u>	<u>\$45,615</u>	<u>\$585F</u>

These cost variances are useless: They compare oranges with apples. That is, the budget costs are based on an activity level of 6,000 units, whereas the actual costs were incurred at an activity level below this figure (5,800 units). From a control standpoint, it makes no sense to compare costs at one activity level with costs at a different one. Such comparisons make a production manager look good as long as the actual production is less than the budgeted production. For our current examples, we should compare costs at the actual production of 5,800 units.

Budgeted production 6,000 units
 Actual production 5,800 units

		<i>Budget</i> <i>(5,800 units)</i>	<i>Actual</i> <i>(5,800 units)</i>	<i>Variance</i> <i>(U or F)</i>
Direct labor	\$6.50 per unit	\$37,700	\$38,500	\$800U
Variable overhead:				
Indirect labor	1.00	5,800	5,950	150U
Supplies	.15	870	870	0
Repairs	.05	290	295	5U
	<u>\$7.70</u>	<u>\$44,660</u>	<u>\$45,615</u>	<u>\$955U</u>

All cost variances are unfavorable, as compared to the favorable cost variance on the performance report using the static budget approach.

Standards and Variances in Marketing

Prior to setting a marketing standard in a given trade territory, you should examine prior, current, and forecasted conditions. You should also make adjustments for standards that vary with geographical location. In formulating standard costs for the transportation function, minimum cost traffic routes should be selected based on the distribution pattern.

Standards for advertising cost in particular territories will vary depending upon the types of advertising media needed, which are in turn based on the type of customers the advertising is intended to reach as well as the nature of the competition.

Some direct selling costs can be standardized, such as product presentations for which a standard time per sales call can be established. Direct selling expenses should be related to distance traveled, frequency of calls made, etc. If sales commissions are based on sales generated, standards can be based on a percentage of net sales.

Time and motion studies are usually a better way of establishing sales standards than prior performance, since past strategies may have been inefficient.

Of the numerous marketing standards and variances, we will focus on, for the purpose of illustration, those associated with sales.

Sales Standards

Sales standards may be set in terms of effort, accomplishments, or the relationship between effort and accomplishment. For example, a salesperson may be expected to make 100 calls per month. By making 100 calls, the salesperson meets a standard. He or she may be expected to obtain 60 orders or \$300,000 in business based on the 100 calls. By doing so, a different standard is accomplished. You need to set sales standards to control sales activities, to reward merit, and to encourage sales effort.

Analyzing Salesperson Variances

You should appraise sales force effectiveness within a territory, including time spent and expenses incurred. Examples 7-6 and 7-7 provide you with the data and computations for analyzing variances in two hypothetical situations.

Example 7-6. Sales data for your department follow.

Standard cost	\$240,000
Standard salesperson days	2,000
Standard rate per salesperson day	\$120
Actual cost	\$238,000
Actual salesperson days	1,700
Actual rate per salesperson day	\$140

Total Cost Variance

Actual cost	\$238,000
Standard cost	<u>240,000</u>
	<u>\$ 2,000 F</u>

Note: Cost variances may be determined by territory, product, or personnel .
The control variance is broken down into salesperson days and salesperson costs.

Variance in Salesperson Days

(Actual days - Standard days) x Standard rate per day	
(1,700 - 2,000) x \$120	<u>\$36,000 F</u>

The variance is favorable because the territory was handled in fewer days than expected.

Variance in Salesperson Costs

(Actual rate - Standard rate) x Actual days	
(\$140 - \$120) x 1,700	<u>\$34,000 U</u>

An unfavorable variance results because the actual rate per day is greater than the expected rate per day.

Example 7-7. A salesperson called on 55 customers and sold each an average of \$2,800 of merchandise. The standard of calls is 50 and the standard sale is \$2,400. Variance analysis of calls and sales follows.

Total Variance

Actual calls x Actual sale (55 x \$2,800)	\$154,000
Standard calls x Standard sale (50 x \$2,400)	<u>120,000</u>
	<u>\$ 34,000 F</u>

The \$34,000 favorable variance can be broken down as follows.

Variance in Calls

Actual calls - Standard calls) x Standard sale (55 - 50) x \$2,400	<u>\$12,000 F</u>
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Variance in Sales

(Actual sale - Standard sale) x Standard calls (\$2,800 - \$2,400) x 50	<u>\$20,000 F</u>
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Joint Variance

(Actual calls - Standard calls) x (Actual sale - Standard sale) (55 - 50) x (\$2,800 - \$2,400)	<u>\$ 2,000F</u>
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You should encourage your sales staff to push products with the highest *profitability* rather than the highest selling price or least sales resistance. Additional performance measures of sales force effectiveness include meeting sales quotas, the number of orders from current and new customers, profitability per order, and the relationship between salesperson costs and revenue obtained.

Avoid paying your salespeople commissions on gross sales because you may encourage them to sell to anyone, resulting in huge sales returns and allowances. Instead, the commission should be tied to net sales.

Variations in Warehousing Costs

Variance in warehousing costs can be calculated by looking at the cost per unit to store the merchandise and the number of orders anticipated. Example 7-8 provides the data and calculations of the warehousing cost variance for a hypothetical situation.

Example 7-8. The following information applies to a product:

Standard cost	\$12,100
Standard orders	5,500
Standard unit cost	\$ 2.20
Actual cost	\$14,030
Actual orders	6,100
Actual unit cost	\$ 2.30
Total Warehousing Cost Variance	
Actual cost	\$14,030
Standard cost	<u>12,100</u>
	<u>\$ 1,930 U</u>

The total variance is segregated into the variance in orders and variance in cost, as follows.

Variance in Orders

(Actual orders vs. Standard orders) x Standard unit cost
(6,100 vs. 5,500) x \$2.20 \$1,320 U

Variance in Cost

(Actual cost per unit vs. Standard cost per unit) x
Actual orders (\$2.30 vs. \$2.20) x 6,100 \$ 610 U

Conclusion

Variance analysis is essential for the appraisal of all aspects of the business, including manufacturing, marketing, and service. Variances are red (or green) flags to watch for and become monitoring and control devices. Unfavorable variances must be examined to ascertain whether they are controllable by you or uncontrollable because they solely relate to external factors. When a variance is controllable, immediate corrective action must be taken to handle the problem. If a variance is favorable, an examination should still be made so that corporate policy may include the positive aspects. Further, the party responsible for a favorable variance should be recognized and rewarded.

By looking at variances, you make your department more efficient and less costly to run, with the quality of service or product at a constant level. You should also determine an acceptable range of variances. Even a small variance can mean a large savings, if favorable, or a large loss, if unfavorable. By analyzing variances, you are using a tool to protect savings and to cut inefficiencies and losses.

Chapter 7 Review Questions

1. When preparing a performance report for a cost center using flexible budgeting techniques, the budget cost column should be based on the
 - A. Budgeted amount in the original budget prepared before the beginning of the year.
 - B. Actual amount for the same period in the preceding year.
 - C. Budget adjusted to the actual level of activity for the period being reported.
 - D. Budget adjusted to the planned level of activity for the period being reported.

2. A flexible budget is appropriate for
 - A. Control of direct materials and direct labor but not selling and administrative expenses.
 - B. Any level of activity.
 - C. Control of direct labor and direct materials but not fixed factory overhead.
 - D. Control of selling and administrative expenses but not factory overhead.

3. Which one of the following is true concerning standard costs?
 - A. Standard costs are estimates of costs attainable only under the most ideal conditions, but rarely practicable.
 - B. Standard costs are difficult to use with a costing system.
 - C. If properly used, standards can help motivate employees.
 - D. Unfavorable variances, material in amount, should be investigated, but large favorable variances need not be investigated.

4. The standard unit cost is used in the calculation of materials price and materials quantity (usage) variances. True or False?

5. Under a standard cost system, the materials price variances are usually the responsibility of the
 - A. Production manager.
 - B. Cost accounting manager.
 - C. Sales manager.
 - D. Purchasing manager.

6. Under a standard cost system, the materials usage (quantity) variances are the responsibility of
- A. Production supervisor.
 - B. Purchasing and industrial engineering.
 - C. Purchasing and sales.
 - D. Sales and industrial engineering.
7. An unfavorable direct labor efficiency variance could be caused by a(n)
- A. Unfavorable variable overhead spending variance.
 - B. Favorable variable overhead spending variance.
 - C. Unfavorable fixed overhead volume variance.
 - D. Unfavorable materials quantity (usage) variance.
8. How is labor rate variance computed?
- A. The difference between standard and actual rates, times standard hours.
 - B. The difference between standard and actual hours, times actual rate.
 - C. The difference between standard and actual rates, times actual hours.
 - D. The difference between standard and actual hours, times the difference between standard and actual rates.

Chapter 7 Review Answers

1. When preparing a performance report for a cost center using flexible budgeting techniques, the budget cost column should be based on the

- A. Incorrect. The static (or fixed) budget amount is not useful for comparison purposes. The budget for the actual activity level achieved is more important. You do not want to compare apples with oranges.
- B. Incorrect. Prior-year figures are not useful if activity levels are different.
- C. **Correct.** If a report is to be used for performance evaluation, the budget cost column should be based on the actual level of activity for the period. The ability to adjust amounts for varying activity levels is the primary advantage of flexible budgeting. Note that flexible budgets are primarily used to accurately measure performance because they compare actual costs for a given output with the budgeted costs for the same level of output.
- D. Incorrect. A budget based on planned activity level is not as meaningful as one based on actual activity level. Performance must be measured on an apple by apple basis.

2. A flexible budget is appropriate for

- A. Incorrect. Flexible budgets are useful for controlling variable costs, including selling and administrative costs.
- B. Incorrect. A flexible budget is prepared for a specific range of activity.
- C. **Correct.** The flexible budget is geared toward a range of activities rather than a single level of activity. A flexible budget employs budgeted figures at different capacity levels. This flexibility is important if costs vary with the activity level. Thus, a flexible budget is particularly appropriate for control of direct labor and direct materials (both variable costs), but it is not necessary for control of fixed factory overhead. By definition, fixed overhead costs do not change as activity levels change.
- D. Incorrect. Flexible budgets are useful for controlling variable costs, including variable factory overhead and variable selling and administrative costs.

3. Which one of the following is true concerning standard costs?

- A. Incorrect. Standard costs should be attainable under conditions of efficient operation.
- B. Incorrect. A standard cost system is ideally suited to a costing system.
- C. **Correct.** Standards are used as a norm against which actual results may be compared. One of the benefits of a standard cost system is that it can be used to motivate employees to achieve specified goals.
- D. Incorrect. All material variances should be investigated, whether favorable or unfavorable.

4. The standard unit cost is used in the calculation of materials price and materials quantity (usage) variances. True or False?

True is correct. The materials price variance is calculated by multiplying the difference between actual price and standard price by the actual units purchased. The materials usage variance is calculated by multiplying the difference between the actual usage and the standard usage by the standard price. Thus, the standard unit cost is used to compute both the materials price variance and the materials usage variance.

False is incorrect. Standard price is used in the calculation of both materials price variances and materials usage variances: **Materials Price Variance** = (Standard price - Actual price) x Actual quantity; **Materials Quantity Variance** = (Standard quantity - Actual quantity) x Standard price.

5. Under a standard cost system, the materials price variances are usually the responsibility of the

- A. Incorrect. The production manager has no control over the price paid for materials.
- B. Incorrect. The cost accounting manager has no control over the price paid for materials.
- C. Incorrect. The sales manager has no control over the price paid for materials.
- D. **Correct.** The materials price variance is the difference between the standard price and the actual price paid for materials. This variance is usually the responsibility of the purchasing department. Thus, the purchasing manager has an incentive to obtain the best price possible.

6. Under a standard cost system, the materials usage (quantity) variances are the responsibility of

- A. **Correct.** The materials quantity variance is the difference between actual and standard quantities used in production, times the standard price. An unfavorable materials quantity variance is usually caused by waste, shrinkage, or theft. Thus, it may be the responsibility of the production department because excess usage occurs while the materials are in that department. Industrial engineering may also play a role because it is responsible for design of the production process.
- B. Incorrect. Purchasing is less likely to affect the materials quantity variance.
- C. Incorrect. Sales have no effect on the materials quantity variance.
- D. Incorrect. The materials quantity variance = (Standard quantity - Actual quantity) x Standard price does not use sales data.

7. An unfavorable direct labor efficiency variance could be caused by a(n)

- A. Incorrect. A variable overhead spending variance may be affected by, but does not affect, the direct labor efficiency variance. Variable overhead includes indirect, not direct labor.

- B. Incorrect. Variable overhead includes indirect, not direct, labor. A variable overhead spending variance does not influence the direct labor efficiency variance.
- C. Incorrect. The volume variance is unrelated to the direct labor efficiency variance.
- D. **Correct.** An unfavorable direct labor efficiency variance results when production requires more labor hours than expected, for example, because employees take longer work breaks than anticipated when the standards were established. The variance can also be the result of production delays, such as those caused by poor quality materials or materials shortages. Thus, an unfavorable materials quantity variance could indicate that excessive materials were used.

8. How is labor rate variance computed?

- A. Incorrect. The actual hours must be used to determine the labor rate variance. . Price (rate, spending) variance is calculated as follows: $(\text{Standard price} - \text{Actual price}) \times \text{Actual quantity}$
- B. Incorrect. This formula gives no useful variances. Quantity (usage, efficiency) variance is formulated in the following manner: $(\text{Standard quantity} - \text{Actual quantity}) \times \text{Standard price}$
- C. **Correct.** The labor rate variance is computed by finding the difference between the standard and the actual rates and then multiplying by actual hours: $\text{AH}(\text{AR} - \text{SR})$.
- D. Incorrect. The difference between standard and actual hours, times the difference between standard and actual rates, is the rate/usage variance in three-way analysis of labor variances (not widely used).

Chapter 8:

Managing Financial Assets

Learning Objectives

After studying this chapter, you will be able to:

- Define working capital.
 - Describe how to finance an asset.
 - Identify ways to improve cash management.
 - Recognize ways to accelerate cash receipts or delay cash payments.
-

A company must maintain a level of working capital sufficient to pay bills as they come due. Failure to do so is technical insolvency and can result in involuntary bankruptcy. Unfortunately, holding current assets for purposes of paying bills is not profitable for a company because they usually offer a low return compared with longer-term investments. Thus, the skillful management of working capital requires a balancing of a firm's desire for profit with its need for adequate liquidity.

The ability to manage working capital will improve return and minimize the risk of running short of cash. There are various ways of managing working capital to achieve success. These methods will be discussed in this chapter.

Working Capital

Briefly, working capital equals total current assets - the most liquid assets of the company. Example 8-1 illustrates how to calculate working capital.

Example 8-1. The following assets exist: \$10,000 in cash, \$30,000 in accounts receivable, \$42,000 in inventory, \$90,000 in machinery, \$36,000 in long-term investments, and \$4,000 in patents.

The working capital consists of the total current assets:

Cash	\$10,000
Accounts receivable	30,000
Inventory	<u>42,000</u>
Total working capital	<u>\$82,000</u>

The liquidity of the current assets will influence the terms and availability of short-term credit. The more liquid your business is, generally the easier it is for you to obtain short-term credit at favorable terms. Short-term credit, in turn, affects the amount of cash held.

Your working capital needs will partly depend on how long it takes your company to turn raw materials into sold products. The longer it takes to acquire or produce goods, the greater the working capital needed.

Financing Assets

When you need funds to buy seasonal inventory, you should finance with short-term debt because the sale of the inventory will generate funds in the near term to pay off the obligation. The short-term debt provides flexibility to meet seasonal needs within your ability to repay the loan. Long-term assets should be financed with long-term debt because the assets last longer and the financing can be spread over a longer time period. These two strategies are called *hedging*; that is, you are financing assets with liabilities of similar maturity so the proceeds and return from the assets may be used to pay off the debt, resulting in less financing risk.

Managing Cash Properly

Sound cash management requires you to know how much cash is needed, how much cash you have, and where that cash is. This knowledge is particularly crucial during inflationary periods.

Before you plan a cash management strategy, you need to take care of some basic cash-handling needs. For example, make certain that cash receipts are deposited promptly. Also, make sure that cash isn't unnecessarily tied up in other accounts such as advances or loans to employees and insurance deposits.

Next, you need to determine your cash management objective. You want to invest excess cash for a return but have adequate liquidity to meet your needs. Thus, you have to plan when to have excess funds available for investment and when money needs to be borrowed. But some available cash is needed for unexpected demands or for customer collection problems.

What determines how much cash you should hold? The key factors are cash management policies, current liquidity position, liquidity risk preferences, maturity dates of debt, ability to borrow, forecasted short- and long-term cash flow, and the probabilities of different cash flows under varying circumstances.

You do not want an excessive cash balance because no return can be earned on it. The minimum cash to hold is the greater of (1) compensating balances (a deposit held by a bank to compensate for providing services) or (2) precautionary balances (money held for emergency purposes) plus transaction balances (money to cover checks outstanding).

You can get away with a smaller cash balance when cash receipts and cash disbursements are highly synchronized and predictable. You have to accurately forecast the amount of cash needed, its source, and its destination. These data are needed on both a short- and a long-term basis. Forecasting assists in properly timing financing, debt repayment, and the amount to be transferred between accounts.

If you have many bank accounts, you may be able to guard against accumulating excessive balances. You need less cash on hand if you can borrow quickly from a bank, such as under a *line of credit agreement*, which allows you to borrow instantly up to a specified maximum amount. A line of credit is an arrangement between a bank and a borrower in which the bank commits itself to lend up to a certain maximum amount to the borrower in a given period.

Warning: Cash in some bank accounts may not be available for investment. For example, when a bank lends you money, it may require you to retain funds on hand as collateral. This deposit is referred to as a *compensating balance*, which in effect represents *restricted cash*.

Cash management also requires knowing the amount of funds available for investment and the length of time they can be invested. You can invest funds in the following ways:

- Time deposits, including savings accounts earning daily interest, long-term savings accounts, and certificates of deposit (short-term, negotiable time deposits with banks, issued at face value and providing for interest at maturity).
- Money market funds, which are managed portfolios of short-term, high-grade debt instruments such as Treasury bills and commercial paper.
- Demand deposits that pay interest.
- Bankers' acceptances, which are short-term (up to six months), noninterest-bearing notes up to \$1 million issued at a discount. Acceptances are mostly traded internationally and enjoy their preferred credit status because of their "acceptance" (guarantee) for future payment by commercial banks. Bankers' acceptances are time drafts drawn on and accepted by a banking institution, which in effect substitutes its credit for that of the importer or holder of merchandise.
- Commercial paper, which is a short-term, unsecured debt instrument issued by financially strong companies (see Chapter 16 for a more detailed discussion).
- Short-term tax exempts issued by states and local government agencies in denominations up to \$1 million. The maturity typically ranges from 6 to 12 months. A good secondary market exists for resale. Interest is paid at maturity.
- Repurchase agreements issued by dealers in U.S. government securities.
- The maturity ranges from one day to three months. They come in typical amounts of \$500,000 or more. No secondary market exists. They are legal contracts between a borrower (security seller) and lender (security buyer). The borrower will repurchase at the contract price plus an interest charge.

- Treasury bills, which are backed by the U.S. government. Treasury bills are issued for terms of 4, 13, 26, and 52 weeks. They trade in minimum units of \$100. Treasury bills are issued at a discount, which means that interest represents the difference between the price paid and the face value of the instrument at the maturity date. Treasury bills are exempt from state and local income tax. A treasury bill is highly liquid and nearly risk-free, and it is often held as a substitute for cash.

Example 8-2 demonstrates how to calculate the annual return of a Treasury bill.

Example 8-2. A \$10,000, three-month Treasury bill is purchased for \$9,800. The return for three months is

$$\frac{\text{Return}}{\text{Investment}} = \frac{\$10,000 - \$9,800}{\$9,800} = \frac{\$200}{\$9,800} = 2\%$$

On an annual basis, the return is: $2\% \times 12/3 = 8\%$ (annual return)

By holding marketable securities, you can protect against cash shortages. If your business is seasonal, you may buy marketable securities when excess funds exist and then sell the securities when there is a cash deficit. You may also invest in marketable securities when funds are being held temporarily in anticipation of short-term capital expansion. In deciding on an investment portfolio, you should consider return rate, default risk, marketability, and maturity date.

In deciding on a cash management system, you should consider its associated costs compared to the return earned from implementing the system. The costs include bank charges, your time, and office employee salaries. You can make use of your personal computer in making transactions with the computers of banks and money market funds. Computer systems are also useful for buying and selling securities in the money market.

The *thrust* of cash management is to accelerate cash receipts and delay cash payments. Analyze each bank account as to its type, balance, and cost so that return is maximized.

Getting Money Faster

To accelerate cash inflow, you must (1) know the bank's policy regarding fund availability, (2) know the source and location of cash receipts, and (3) devise procedures for quick deposit of checks received and for quick transfer of receipts in outlying accounts into the main corporate account.

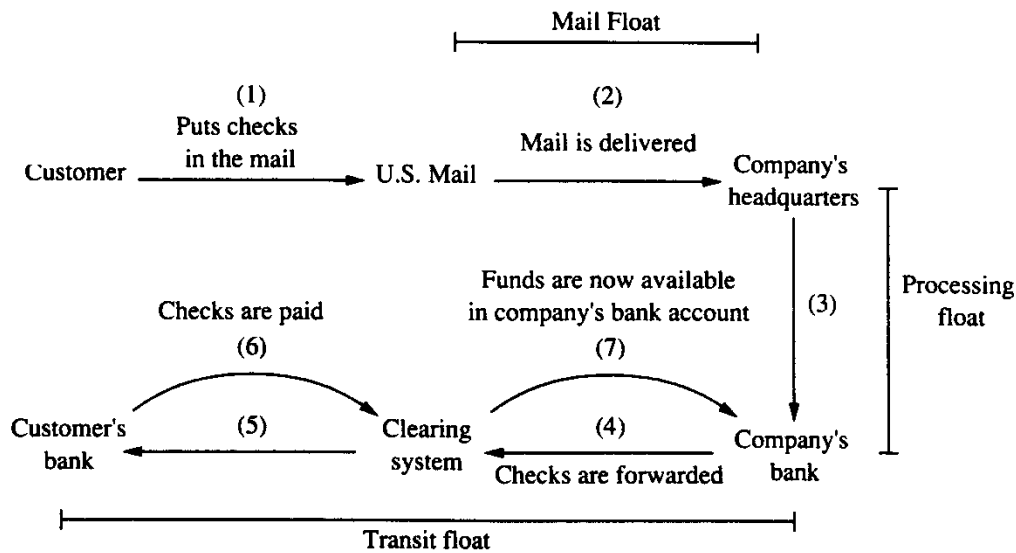
Note: Electronic data exchange (EDI) or financial EDI (FEDI) significantly reduces or eliminates a float. EDI refers to the growing practice of direct, electronic information exchange between all types of businesses, thereby shortening the length of time required to initiate and complete a business transaction. Electronic payments are the fastest way to reduce float by completing eliminating any physical handling of payments, and the cost

savings from reducing handling expenses, along with faster payments, can greatly outweigh any cost of implementation.

Before you draw up plans for quick deposits and transfers, you need to understand the check processing delays. Delays include (1) mail float—the time a check moves from a debtor to a creditor, (2) processing float—the time it takes for a creditor to deposit the check after receipt, and (3) deposit collection (transit) float—the time for a check to clear.

Figure 8-1 illustrates a cash or check collection system for a hypothetical business not using electronic data exchange.

Figure 8-1. Cash Collection System



You can minimize mail float by making sure that the collection center is close to the customer. Local banks should be selected to hasten the receipt of funds for subsequent transfer to the central corporate account. Alternatively, strategic post office lockboxes may be used for customer remissions. The local bank collects from these boxes periodically during the day and deposits the funds in the corporate account. The bank also provides a computer listing of payments received by account and a daily total. Because the lockbox system has a significant per-item cost, it is most effective with low-volume, high-dollar collections. But the system is becoming increasingly more available to firms with high-volume, low dollar receipts because technological advances (such as machine-readable documents) are lowering the per-item cost of lockboxes.

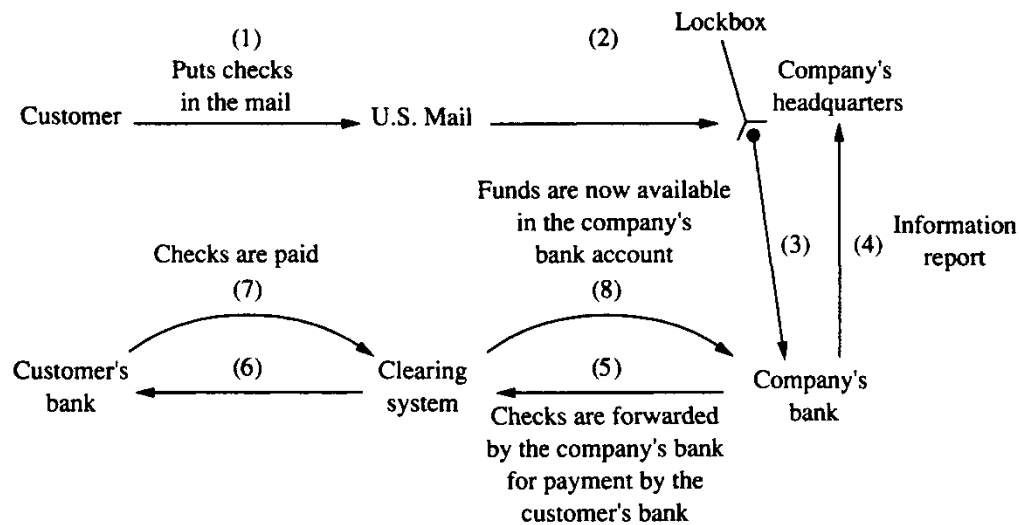
Example 8-3 calculates, for a hypothetical situation, the amount of money that can be tied up by mailing delays.

Example 8-3. You obtain average cash receipts of \$300,000 per day. It typically takes 6 days from the time a check is mailed to its availability for use. The amount tied up by the delay is

$$6 \text{ days} \times \$300,000 = \$1,800,000$$

Before implementing a lockbox system, you need to undertake a cost-benefit analysis considering the average dollar amount of checks received, the costs saved by having lockboxes, the decline in mailing time per check, and the processing cost. Figure 8-2 depicts a simple lockbox system.

Figure 8-2. Lockbox System



Example 8-4 shows you how to calculate the maximum monthly payment for a lockbox.

Example 8-4. It takes about eight days to receive and deposit payments from customers. Thus, a lockbox system is being considered. It is anticipated that the system will reduce the float time to five days. Average daily collections are \$400,000. The return rate is 11%.

The reduction in outstanding cash balances occurring if the lockbox system is initiated is

$$3 \text{ days} \times \$400,000 = \$1,200,000$$

The return that could be earned on these funds is

$$\$1,200,000 \times .11 = \$132,000$$

The maximum monthly charge that should be paid for the lockbox arrangement is therefore

$$\$132,000 / 12 = \$11,000$$

Example 8-5 illustrates the financial advantage of a lockbox system.

Example 8-5. You are considering the use of a lockbox system costing \$130,000 per year. Daily collections average \$360,000. The lockbox arrangement will reduce the float period by three days. The rate of return is 14%.

The cost-benefit analysis is shown below:

Return on early collection of cash (.14 x 3 x \$360,000)	\$ 151,200
Less: Cost	<u>(130,000)</u>
Advantage of lockbox	<u>\$ 21,200</u>

You may also have to determine whether or not it would be financially beneficial to split a geographic collection region into a number of parts. Example 8-6 demonstrates how geographical splitting can be advantageous.

Example 8-6. You have an agreement with Harris Bank, which handles \$4 million in collections a day and requires a compensating balance of \$600,000. You are contemplating canceling the agreement and dividing the eastern region so that two other banks will handle the business instead. Bank X will handle \$1 million a day in collections, requiring a compensating balance of \$300,000, and Bank Y will handle the other \$3 million a day, requiring a compensating balance of \$500,000. It is expected that collections will be hastened by 1 day if the eastern region is divided. The rate of return is 12%.

The new arrangement is financially beneficial, as indicated below.

Acceleration in cash receipts (\$4 million x 1/4)	\$1,000,000
Less: Additional compensating balance (\$800,000 - \$600,000)	<u>(200,000)</u>
Increased cash flow	\$ 800,000
Times: Rate of return	<u>x .12</u>
Net annual savings	<u>\$96,000</u>

Concentration banking should also be considered where funds are collected by several local banks and transferred to a main *concentration* account in another bank. The transfer of funds may be accomplished through the use of depository transfer checks (DTCs) or wire transfers. In the DTC arrangement, you make a resolution statement with the bank, whereby signature-less checks are deposited. As the initial banks collect the funds, information is immediately transferred to the concentration bank, which then issues a DTC to collect the outlying funds. The funds may be available the same day. With wire transfers (e.g., bank wire, federal reserve wire), funds are moved immediately between banks. This eliminates transit float in that only "good funds" are transferred.

Other ways to accelerate cash receipt deposits include the following:

- Arrange for preauthorized checks where the company writes the checks for its customers to be charged against their demand deposit accounts.
- Send customers preaddressed, stamped envelopes.
- Require deposits on large or custom orders or progress billings as the work progresses.
- Charge interest on accounts receivable after a certain amount of time.
- Encourage post-dated checks from customers.
- Have cash-on-delivery terms.

In accelerating cash receipts, we may want to determine the return on the cash balance.

Example 8-7. Your company's weekly average cash balances follow:

<u>Week</u>	<u>Average Cash Balance</u>
1	\$14,000
2	16,000
3	11,000
4	<u>15,000</u>
Total	<u>\$56,000</u>

The weekly average cash balance is

$$\$56,000 / 4 = \$14,000$$

Assuming an annual interest rate of 12%, the monthly return on the average cash balance is

$$\$14,000 \times 1\% = \$140$$

By accelerating remissions, freed cash can be invested in marketable securities for a return or used to pay off short-term debt.

Delaying Cash Payments

You should try to keep money longer to earn greater interest, or to engage the funds in higher priority projects or activities with greater returns. Never pay bills, for example, before their due dates. Other ways to delay cash payments include the following:

1. Make partial payments.
2. Use drafts to pay bills because drafts are not due on demand. When a bank receives a draft it must return the draft to you for acceptance before payment. When you accept the draft, you then deposit the funds with the bank; therefore, you can maintain a smaller average checking balance.

3. Mail checks from post offices with limited service or from locations where the mail must go through several handling points, lengthening the payment period.
4. Draw checks on remote banks or establish cash disbursement centers in remote locations so that the payment period is lengthened. For example, you can pay someone in New York with a check drawn on a California bank.
5. Use credit cards and charge accounts to lengthen the time between your purchase of goods and the payment date.
6. Delay the frequency of payments to employees (e.g., expense account reimbursements, payrolls).
7. Disburse sales commissions when the receivables are collected rather than when the sales are made.
8. Maintain zero balance accounts where zero balances are established for all of the company's disbursing units. These accounts are in the same concentration bank. Checks are drawn against these accounts, with the balance in each account never exceeding \$0. Divisional disbursing authority is thus maintained at the local level of management. The advantages of zero balance accounts are better control over cash payments, reduction in excess cash balances held in regional banks, and a possible increase in disbursing float.
9. Using a controlled disbursement account. With this system, almost all payments that must be made are known in the morning. The bank informs the firm of the total, and the firm transfers (usually by wire) the amount needed.

You can control cash payments by centralizing the payment operation so that obligations are satisfied at optimum times. Centralization will also aid in predicting the disbursement float.

You can minimize cash balances by using probabilities of the expected time checks will clear. Deposits, for example, may be made to a payroll checking account based on the anticipated time of check clearance. Examples 8-8 and 8-9 illustrate this principle.

Example 8-8. You write checks averaging \$50,000 per day; each check takes three days to clear. You will have a checkbook balance of \$150,000 less than the bank's records.

Example 8-9. Every two weeks, you make out checks that average \$600,000 and take three days to clear. How much money can you save annually if you delay transfer of funds from an interest-bearing account that pays 0.00384% per day (annual rate of 1.4%) for those three days?

The interest for three days is: $\$600,000 \times (.0000384 \times 3) = \69.10

The number of two-week periods in a year is: $52 \text{ weeks} / 2 \text{ weeks} = 26$

The savings per year is: $\$69.10 \times 26 = \$1,796.60$

Although not a delay of cash payment, you may reduce cash outflow by the early repayment of a loan, thus avoiding some interest.

Finally, in planning cash flows, make sure to consider that some types are more uncertain than others. For example, a major uncertain cash flow is cash sales. A major known cash flow is payroll payments. Make adjustments accordingly.

A cash management system that incorporates the suggestions in the last two sections is shown in Figure 8-4.

Figure 8-4. Cash Management System

Acceleration of Cash Receipts

- Encourage electronic payments
- Lock box System
- Concentration Banking
- Preauthorized Checks
- Obtain Deposits on Large Orders
- Charge Interest on Overdue Receivables

Delay of Cash Payments

- Pay by Draft
 - Requisition More Frequently
 - Disbursing Float
 - Make Partial Payments
 - Use Charge Accounts
 - Delay Frequency of Paying Employees
 - Pay electronically near due date
-

Opportunity Cost of Foregoing a Cash Discount

Many companies establish credit terms that authorize cash discounts in exchange for early payment of the amount purchased. If you take advantage of the cash discount, you will reduce the purchase cost.

An opportunity cost is the net revenue you lose by rejecting an alternative action. You should typically take advantage of a discount offered by a creditor because of the high opportunity cost. If you are short of funds to pay the supplier early, you should borrow the money when the interest rate on the loan is below the annual rate of the discount. For example, if the terms of sale are 2/10, net/30, you have 30 days to pay the bill but will get a 2% discount if you pay in 10 days.

You can use the following formula to compute the opportunity cost percentage on an annual basis:

$$\text{Opportunity cost} = \frac{\text{Discount percent}}{100 - \text{Discount percent}} \times \frac{360}{N}$$

where N = the number of days payment can be delayed by forgoing the cash discount. This equals the number of days credit is outstanding less the discount period.

The numerator of the first term (discount percent) is the cost per dollar of credit, whereas the denominator (100 - discount percent) represents the money available by forgoing the cash discount. The second term represents the number of times this cost is incurred in a year.

If you elect not to pay within the discount period, you should hold on to the money as long as possible. For example, if the terms are 2 / 10, net/60, you should not pay for 60 days.

Example 8-10. The opportunity cost of not taking a discount when the terms are 3/15, net/60 is computed as follows:

$$\text{Opportunity Cost} = (3/(100-3)) \times (360/(60-15)) = (3/97) \times (360/45) = 24.7\%$$

Table 8-1 presents possible credit terms and the associated opportunity cost of not paying within the discount period.

Table 8-1. Opportunity Cost of Not Taking a Discount

<u>Credit Terms</u>	<u>Opportunity Cost</u>
1/10, net/45	10.3%
2/10, net/30	36.7%
3/30, net/90	18.6%

Volume Discounts

A volume discount is a reduction *in the price* you pay if a large quantity *of* goods is ordered. A larger order usually provides a higher trade discount.

Although a trade discount reduces the cost of buying goods, it can increase the carrying cost of holding a greater amount of merchandise.

Example 8-11. If you buy 10,000 units instead of 5,000 units, you will receive a 2% discount off the purchase of \$2 per unit. However, holding the higher level of merchandise will increase carrying costs by \$300. The larger order is warranted as indicated below.

Savings due to trade discount:	
10,000 x S.04, or (\$2 x .02)	\$400
Less: Increase in carrying costs	<u>(300)</u>
Net advantage of higher value order	<u>\$100</u>

Conclusion

By properly managing your cash, you can increase your rate of return. You should attempt to accelerate cash receipts and delay cash payments as much as feasible.

Chapter 8 Review Questions

1. Determining the appropriate level of working capital for a firm requires
 - A. Evaluating the risks associated with various levels of fixed assets and the types of debt used to finance these assets.
 - B. Changing the capital structure and dividend policy for the firm.
 - C. Maintaining short-term debt at the lowest possible level because it is ordinarily more expensive than long-term debt.
 - D. Offsetting the profitability of current assets and current liabilities against the risk of running short of cash.

2. Crystal is a retail mail order firm that currently uses a central collection system that requires all checks to be sent to its Boston headquarters. An average of 5 days is required for mailed checks to be received, 4 days for Crystal to process them and 1½ days for the checks to clear through its bank. A proposed lockbox system would reduce the mail and process time to 3 days and the check clearing time to 1 day. Crystal has an average daily collection of \$100,000. If Crystal should adopt the lockbox system, its average cash balance would increase by
 - A. \$650,000.
 - B. \$250,000.
 - C. \$800,000.
 - D. \$400,000.

3. A compensating balance
 - A. Compensates a financial institution for services rendered by providing it with deposits of funds.
 - B. Is used to compensate for possible losses on a marketable securities portfolio.
 - C. Is a level of inventory held to compensate for variations in usage rate and lead time.
 - D. Is the amount of prepaid interest on a loan.

4. Methods of accelerating cash collections include compensating balances. True or False?

5. Treasury bills are most often held as a substitute for cash. True or False

6. Using a 360-day year, what is the opportunity cost to a buyer of NOT accepting terms 3/10, net 45?

- A. 55.67%
- B. 31.81%
- C. 22.27%
- D. 101.73%

7. When a company offers credit terms of 2/10, net 30, the annual interest cost, based on a 360-day year, is 10.3%. True or False?

Chapter 8 Review Answers

1. Determining the appropriate level of working capital for a firm requires

- A. Incorrect. Management of fixed assets is not a factor in working capital management.
- B. Incorrect. Capital structure and dividend policy are factors involved in capital structure finance, not in working capital financial management.
- C. Incorrect. Short-term debt is usually less expensive than long-term debt.
- D. **Correct.** A company must maintain a level of working capital sufficient to pay bills as they come due. Failure to do so is technical insolvency and can result in involuntary bankruptcy. Unfortunately, holding current assets for purposes of paying bills is not profitable for a company because they usually offer a low return compared with longer-term investments. Thus, the skillful management of working capital requires a balancing of a firm's desire for profit with its need for adequate liquidity.

2. Crystal is a retail mail order firm that currently uses a central collection system that requires all checks to be sent to its Boston headquarters. An average of 5 days is required for mailed checks to be received, 4 days for Crystal to process them and 1½ days for the checks to clear through its bank. A proposed lockbox system would reduce the mail and process time to 3 days and the check clearing time to 1 day. Crystal has an average daily collection of \$100,000. If Crystal should adopt the lockbox system, its average cash balance would increase by

- A. **Correct.** Checks are currently tied up for 10½ days (5 for mailing, 4 for processing, and 1½ for clearing). If that were reduced to 4 days, YHY's cash balance would increase by \$650,000 (6.5 days x \$100,000 per day).
- B. Incorrect. \$250,000 is calculated by assuming the collection process would be shortened by 2½ days.
- C. Incorrect. \$800,000 is calculated by assuming the collection process would be shortened by 8 days.
- D. Incorrect. \$400,000 is calculated by assuming the collection process would be shortened by 4 days.

3. A compensating balance

- A. **Correct.** Banks sometimes require a borrower to keep a certain percentage of the face amount of a loan in a noninterest-bearing checking account. This requirement raises the effective rate of interest paid by the borrower. Cash in some bank accounts may not be available for investment. For example, when a bank lends you money, it may require you to retain funds on hand as collateral. This deposit is referred to as a compensating balance, which in effect represents restricted cash.
- B. Incorrect. In financial accounting, a valuation allowance is used to reflect losses on marketable securities.
- C. Incorrect. Safety stock is held for such purposes.
- D. Incorrect. Interest deducted in advance is discount interest.

4. Methods of accelerating cash collections include compensating balances. True or False?

True is incorrect. A compensating balance is a minimum amount that must be maintained in a bank account. Therefore, this is not a method of accelerating cash collections.

False is correct. Various methods of accelerating cash collections include minimization of mail float, use of preauthorized checks, concentration banking, and lockbox systems. A compensating balance is a minimum average or absolute amount that must be maintained in a bank account. Hence, it is not a means of accelerating cash collections. This requirement means that less cash is available to the depositor.

5. Treasury bills are most often held as a substitute for cash. True or False

True is correct. A treasury bill is a short-term U.S. government obligation that is sold at a discount from its face value. A treasury bill is highly liquid and nearly risk-free, and it is often held as a substitute for cash.

False is incorrect. A Treasury bill is almost as safe and liquid as cash.

6. Using a 360-day year, what is the opportunity cost to a buyer of NOT accepting terms 3/10, net 45?

- A. Incorrect. 55.67% is based on terms of 3/10, net 30.
- B. **Correct.** Payments should be made within discount periods if the return is more than the firm's cost of capital. With terms of 3/10, net 45, the buyer is earning a 3% savings for paying on the tenth day, or 35 days earlier than would otherwise be required. For example, on a \$1,000 invoice, the payment would be only \$970. The \$30 savings is comparable to interest earned on a \$970 loan to the vendor (the payment is not due for another 35 days). The interest rate on this hypothetical loan is 3.09278% ($\$30/\970). That return is for a 35-day period. Annualizing the return requires determining the number of 35-day periods in a year. Multiplying the return for 35 days times the periods in a year results in an annual rate of return of about 31.81% [$3.09278\% \times (360 \text{ days}/35 \text{ days})$].
- C. Incorrect. 22.27% is based on an earning period of 50 days.
- D. Incorrect. 101.73% is based on a discount of 9%.

7. When a company offers credit terms of 2/10, net 30, the annual interest cost, based on a 360-day year, is 10.3%. True or False?

True is incorrect, 10.3% is the annual interest cost for credit terms of 1/10, net/45.

False is correct. Assume that the gross amount of an invoice is \$1,000. With a 2% discount, the buyer will pay only \$980 on the tenth day. Thus, the seller is forgoing \$20 to receive payment 20 days sooner than would otherwise be required. The 20-day interest rate is .0204 ($\$20/\980). The number of 20-day periods in a year is 18 ($360/20$). If the interest rate is 2.04% for each 20-day period, the annual interest rate (rounded to the nearest tenth) is 36.7% ($18 \times 2.04\%$).

Chapter 9:

Managing Accounts Receivable and Credit

Learning Objectives

After studying this chapter, you will be able to:

- Recognize ways to improve rate of return with accounts receivable and credit.
 - Understand and analyze accounts receivable values.
-

Most business transactions are carried out on a credit basis. As a manager, your decisions regarding accounts receivable must include whether to give credit, and, if so, you must determine eligibility, amounts, and terms. The type of credit terms extended to customers determines the length of time a *customer* has to *pay* for the purchase. This, in turn, affects sales volume. For example, a longer credit term will probably result in increased sales while a shorter credit term will likely result in fewer sales. Increasing the quality of the accounts rejected also means that fewer sales will be made. The company is therefore not trying to maximize its sales or increase its bad debt losses. The objective is to reduce bad debt losses and thereby maximize profits. Further, higher quality accounts will mean a shorter average collection period.

To be successful in managing accounts receivable, you must consider whether it is financially prudent to hold receivable balances. The opportunity cost of tying up money in accounts receivable is the loss of return that could have been earned if those funds had been invested in marketable securities. The management of these accounts receivable also involves having appropriate credit and collection policies.

The credit terms have a direct bearing on the associated costs and revenue to be generated from accounts receivable. For example, if credit terms are tight, there will be less investment in accounts receivable and less bad debt losses, but there will also be lower sales and reduced profits. On the other hand, if credit terms are lax, there will be higher sales and gross profit but greater bad debts and a higher opportunity cost of carrying the investment in accounts receivable because marginal customers take longer to pay.

In evaluating a potential customer's ability to pay, consider the customer's integrity, financial soundness, and collateral to be pledged. Bad debt losses can be estimated reliably when you sell to many customers and when credit policies have not changed for a long time.

You must also consider the costs of giving credit, including administrative costs of the credit department, computer services, fees to rating agencies, and periodic field investigations.

Credit References

Retail credit bureaus and professional credit reference services should be used to appraise a customer's ability to pay. One such service is Dun and Bradstreet (D&B) reports, which contain information about a company's nature of business, product line, management, financial statement information, number of employees, previous payment history as reported by suppliers, amounts currently owed and past due, terms of sale, audit opinion, lawsuits, insurance coverage, leases, criminal proceedings, banking relationships and account information (e.g., current bank loans), location of business, and seasonality aspects. This information is provided in several D&B publications such as the *D&B Reference Book*, the *D&B consolidated reports*, and *D&B business information reports*.

Credit Policy

A good credit system has the following characteristics:

1. It is straightforward, clear, consistent, and uniformly applied.
2. It is quick--otherwise, the customer may do business elsewhere.
3. It does not intrude into a customer's personal affairs.
4. It is inexpensive (e.g., there is centralization of credit decisions by experienced staff).
5. It is based upon past experience (e.g., examining the characteristics of good accounts, marginal accounts, delinquent accounts, and outright rejected applications). Careful attention is given to the reasons for previous uncollectibility. Table 9-1 shows an illustrative classification of customers by credit risk for a hypothetical company.

In managing accounts receivable, you should practice the following procedures. First, establish a *credit policy*.

1. A detailed review of a potential customer's soundness should be made prior to extending credit. The customer's financial statements and credit rating should be examined, and financial service reports should be reviewed. The customer's previous repayment record, the competitive factors of the customer's business, and the economy must also be considered. You want to know whether there is sufficient cash flow to repay the debt.
2. As customer financial health changes, credit limits should be revised.
3. Marketing factors must be noted since an excessively restricted credit policy will lead to lost sales.
4. If seasonal datings are used, you may offer liberal payments during slow periods to stimulate business by selling to customers who are unable to pay until later in the season. This policy is financially appropriate when the return on the additional sales plus the lowering in inventory costs is greater than the incremental cost of the additional investment in accounts receivable.

Table 9-1. Types of Customers and Expected Bad Debts

Risk Category	Description	Bad Debt Percent
A	Large, financially strong companies having minimal credit risk	None
B	Financially strong companies lacking a proven track record	2%
C	Companies with financial status of some risk and on which credit limit should be placed	3%
D	Marginal accounts needing reacted credit and careful monitoring	5%

5. If the credit standing of a customer is dubious, collateral equal to or greater than the balance of the account should be pledged.
6. Avoid high-risk receivables (e.g., customers in a financially troubled industry or region).
7. Note that consumer receivables have a greater risk of default than corporate receivables. Individuals have less money than companies. Further, consumers are more protected by fair trade laws,

Competition and economic conditions must be considered. In recession, you may relax the credit policy because you need the business. However, in times of short supply, credit policy may be tightened because the seller is in the "driver's seat."

Second, establish a *billing policy*.

1. Customer statements should be sent within one day subsequent to the close of the period.
2. Large sales should be billed immediately.
3. Customers should be invoiced for goods when the order is shipped.
4. Billing for services should be as soon as serviced are performed.

Finally, establish a *collection policy*.

1. Accounts receivable should be aged to identify delinquent and high-risk *customers*. *Aging* is determining the length of time an account is past due. The aging should be compared to industry norms. The longer receivables are outstanding, the higher the likelihood of uncollectibility. The purpose of an aging of receivables is to classify receivables by due date. Those that are current (not past due) are listed in one column, those less than 30 days past due in another column, etc. The amount in each

category can then be multiplied by an estimated bad debt percentage that is based on a company's credit experience and other factors. The theory is that the oldest receivables are the least likely to be collectible. Aging the receivables and estimating the uncollectible amounts is one method of arriving at the appropriate balance sheet valuation of the accounts receivable account.

2. Collection efforts should be undertaken at the very first sign of customer financial unsoundness. Use collection agencies when warranted.
3. Sell (factor) accounts receivable when net savings occur. Figure 9-1 shows the factoring procedure.
4. Credit insurance will protect against unusual bad debt losses.

Note: The average collection period measures the number of days between the date of sale and the date of collection. It should be related to a firm's credit terms. For example, a firm that allows terms of 2/15, net 30, should have an average collection period of somewhere between 15 and 30 days.

Analyzing Accounts Receivable

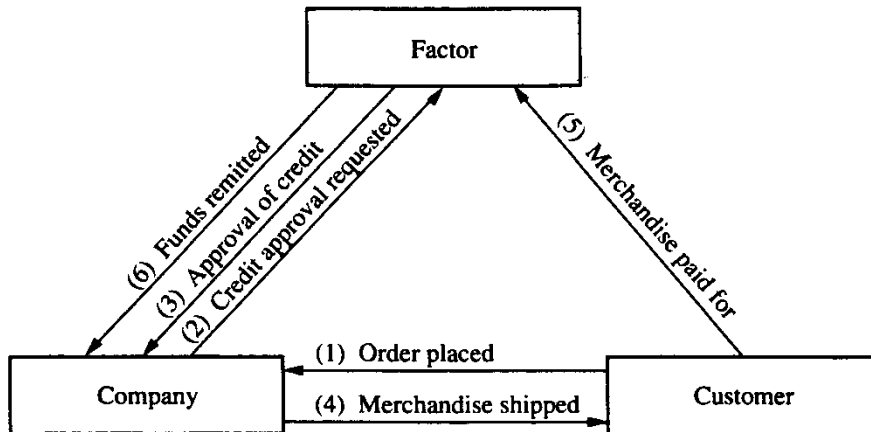
The average sales volume affects the size of the investment in accounts receivable. A larger quantity results in a larger investment. However, holding sales volume constant, the size of that investment becomes directly attributable to how long average receivables are outstanding. The calculation that defines this relationship follows:

$$\text{Annual credit sales} \times \text{Days to collect}/360 = \text{Investment in accounts receivable}$$

Example 9-1. You sell on terms of net/60. On the average, accounts are 30 days past due. Annual credit sales are \$400,000. The investment in accounts receivable is

$$\$400,000 \times 90/360 = \$100,000$$

Figure 9-1. Factoring Procedure



Example 9-2. The cost of a product is 40% of the selling price, and the carrying cost is 12% of the selling price. On the average, accounts are paid 90 days after the sale date. Sales average \$40,000 per month. Your accounts receivable for this product are calculated as follows:

$$3 \text{ months} \times \$40,000 \text{ sales} = \$120,000$$

The investment in accounts receivable is

$$\$120,000 \times (0.40 + 0.12) = \$62,400$$

Example 9-3. You have accounts receivable of \$700,000. The average manufacturing cost is 40% of the sales price. The before-tax profit margin is 10%. The carrying cost of inventory is 3% of the selling price. The sales commission is 8% of the sales. The investment in accounts receivable is

$$\$700,000 \times (0.40 + 0.03 + 0.08) = \$700,000 \times (0.51) = \$357,000$$

Example 9-4. Your credit sales are \$120,000, the collection period is 60 days, and the cost is 80% of sales price. The accounts receivable turnover is

$$360/60 = 6$$

The average accounts receivable balance is

$$\text{Credit sales/Turnover} = \$120,000/6 = \$20,000$$

The average investment in accounts receivable is

$$\$20,000 \times .80 = \$16,000$$

It is good business practice to give a discount for early payment by customers when the return on the funds received is greater than the cost of the discount.

Example 9-5. Your current annual credit sales are \$12,000,000. You sell on terms of net/30, and your collection period is 2 months. Therefore, the turnover of accounts receivable is 6 times (12/2). You could expect a 15% rate of return. You propose to offer a 3/10, net/30 discount. You anticipate 25% of your customers will take advantage of the discount. As a result of the discount policy, the collection period will be reduced to 11 months (turnover of 8 times). An analysis of this discount policy indicates that it would not be financially prudent.

Current average accounts receivable balance (\$12,000,000/6)	\$2,000,000
Average accounts receivable balance-after policy change (\$12,000,000/8)	<u>1,500,000</u>
Reduction in average accounts receivable	500,000
Rate of return	<u>x .15</u>
Dollar return earned	<u>75,000</u>
Cost of discount (0.25 x \$12,000,000 x 0.03)	<u>90,000</u>
Disadvantage of discount policy	<u>\$15,000</u>

Instead, you may consider offering credit to customers with a higher than-normal risk rating. Here, the profitability on additional sales must be compared with the amount of additional bad debts expected, higher investing and collection costs, and the opportunity cost of tying up funds in receivables for a longer period of time. Or you may consider other alternatives at slow business periods. When idle capacity exists, the additional profitability is represented by the incremental contribution margin (sales less variable costs) since fixed costs remain the same (see Chapter 3). The incremental investment in receivables is determined by multiplying the average accounts receivable by the ratio of per unit cost to selling price.

Example 9-6. Currently, you sell 300,000 units annually, and each unit has a selling price of \$80, a variable cost of \$50, and a fixed cost of \$10. The collection period is 2 months, and the rate of return is 16%. You are experiencing a period of idle capacity and are considering a change in policy that will relax credit standards. The following information applies to the proposal:

1. Sales will increase by 20%.
2. The collection period will increase to 3 months.

3. Bad debt losses are expected to be 3% of the increased sales.
4. Collection costs are expected to increase by \$20,000.

An analysis of the proposed credit policy shows incremental profitability to be calculated as follows:

Increased unit sales (300,000 x .20)	60,000	
Per-unit contribution margin (\$80 - \$50)		x \$30
Incremental profit		<u>\$1,800,000</u>

Additional bad debts are calculated as follows:

Incremental dollar sales (60,000 x \$80)	\$4,800,000
Bad debt percentage	x.03
Additional bad debts	<u>\$ 144,000</u>

The new average unit cost is determined by using the following information:

	<u>Units</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Current	300,000	\$60	\$18,000,000
Increment	<u>60,000</u>	50 ^a	<u>3,000,000</u>
Total	<u>360,000</u>		<u>\$21,000,000</u>

^a Since idle capacity exists, the per-unit cost on the incremental sales is solely the variable cost of \$50.

$$\text{New average unit cost} = \frac{\$21,000,000}{360,000} = \$58.33$$

The additional cost of higher investment in average accounts receivable is determined by calculating the investment in average accounts receivable after the change in policy:

$$\frac{\text{Credit sales}}{\text{Turnover}} \times \frac{\text{Unit cost}}{\text{Selling price}} = \$5,249,700$$

$$\frac{\$28,800,000}{4} \times \frac{\$58.33}{\$80.00} = \$5,249,700$$

From this amount, you must subtract the current investment in average accounts receivable:

$$\frac{\$24,000,000}{6} \times \frac{\$60}{\$80} = \$3,000,000$$

This results in the following information:

Incremental investment in average accounts receivable (\$5,249,700 - 3,000,000)	\$2,249,700
Rate of return	X.16
Additional cost	<u>\$ 359,952</u>

The net advantage/disadvantage is

Incremental profitability		\$1,800,000
Less: Additional bad debts	\$144,000	
Additional collection costs	20,000	
Opportunity cost	<u>359,952</u>	<u>523,952</u>
Net advantage/disadvantage		<u>\$1,276,048</u>

Since the net advantage is considerable, you should relax the credit policy.

Example 9-7. You are considering liberalizing the credit policy to encourage more customers to purchase on credit. Currently, 80% of your sales are made on credit, and there is a gross margin of 30%. Other relevant data are included here.

	<u>Current</u>	<u>Proposed</u>
Sales	\$300,000	\$450,000
Credit sales	\$240,000	\$360,000
Collection expenses	4% of credit sales	5% of credit sales
Accounts receivable turnover	4.5	3

An analysis of the proposal yields the following results for average accounts receivable balance (credit sales/accounts receivable turnover):

Expected average accounts receivable (\$360,000/3)	\$120,000
Current average accounts receivable (\$240,000/4.5)	<u>53,333</u>
Increase	<u>\$66,667</u>

For gross profit, the analysis yields the following results:

Expected increase in credit sales (\$360,000 - \$240,000)	\$120,000
Gross profit rate	<u>x 0.30</u>
Increase	<u>\$ 36,000</u>

Collection expenses are calculated as follows:

Expected collection expenses (0.05 x \$360,000)	\$18,000
Current collection expenses (0.04 x \$240,000)	<u>9,600</u>
Increase	<u>\$ 8,400</u>

You would benefit from a more liberal credit policy.

Conclusion

You should carefully evaluate the credit and collection policies of your department to be certain that your accounts receivable are being aggressively managed. For example, during times of idle capacity, it may be advantageous to alter credit policies to attract business. Similarly, it might be necessary to tighten policies at other times in order to make better use of investment opportunities. Decisions regarding when to extend credit to whom and for how much must be made in light of these changing circumstances.

Chapter 9 Review Questions

1. When a company analyzes credit applicants and increases the quality of the accounts rejected, the company is attempting to
 - A. Maximize sales.
 - B. Increase bad-debt losses.
 - C. Increase the average collection period.
 - D. Maximize profits.

2. An aging of accounts receivable measures the
 - A. Ability of the firm to meet short-term obligations.
 - B. Average length of time that receivables have been outstanding.
 - C. Percentage of sales that have been collected after a given time period.
 - D. Amount of receivables that have been outstanding for given lengths of time.

3. The average collection period for a firm measures the number of days
 - A. After a typical credit sale is made until the firm receives the payment.
 - B. For a typical check to "clear" through the banking system.
 - C. Beyond the end of the credit period before a typical customer payment is received.
 - D. Before a typical account becomes delinquent.

Chapter 9 Review Answers

1. When a company analyzes credit applicants and increases the quality of the accounts rejected, the company is attempting to

- A. Incorrect. Tightening credit will reduce sales.
- B. Incorrect. Tightening credit will reduce bad debt losses.
- C. Incorrect. Most likely, higher quality accounts will mean a shorter average collection period.
- D. **Correct.** Increasing the quality of the accounts rejected means that fewer sales will be made. The company is therefore not trying to maximize its sales or increase its bad debt losses. The objective is to reduce bad debt losses and thereby maximize profits.

2. An aging of accounts receivable measures the

- A. Incorrect. An aging schedule is used for receivables, not liabilities.
- B. Incorrect. An aging schedule concerns specific accounts, not averages.
- C. Incorrect. An aging schedule focuses on uncollected receivables.
- D. **Correct.** The purpose of an aging of receivables is to classify receivables by due date. Those that are current (not past due) are listed in one column, those less than 30 days past due in another column, etc. The amount in each category can then be multiplied by an estimated bad debt percentage that is based on a company's credit experience and other factors. The theory is that the oldest receivables are the least likely to be collectible. Aging the receivables and estimating the uncollectible amounts is one method of arriving at the appropriate balance sheet valuation of the accounts receivable account.

3. The average collection period for a firm measures the number of days

- A. **Correct.** The average collection period measures the number of days between the date of sale and the date of collection. It should be related to a firm's credit terms. For example, a firm that allows terms of 2/15, net 30, should have an average collection period of somewhere between 15 and 30 days.
- B. Incorrect. It describes the concept of float.
- C. Incorrect. The average collection period includes the total time before a payment is received, including the periods both before and after the end of the normal credit period.
- D. Incorrect. It describes the normal credit period.

Chapter 10:

Managing Inventory

Learning Objectives

After studying this chapter, you will be able to:

- List inventory management considerations.
 - Understand and apply inventory analysis.
 - Identify ways to optimize the economic order quantity.
-

When managing inventory, remember that you want to avoid placing too many funds in inventory because it will result in declining profitability and retarded cash inflow. But some inventory must be maintained to meet customer orders and ensure smooth production activity. A sales forecast is the starting point for effective inventory management since expected sales determines how much inventory is needed.

The two types of inventory systems are *perpetual* and *periodic*. For the former, inventory balances are updated daily. For the latter, there is a physical count of inventory each period. Table 10-1 illustrates the perpetual inventory method, whereas Table 10-2 presents the periodic inventory method.

The three types of inventories are (1) raw materials (materials acquired from a supplier that will be used in the manufacture of goods), (2) working-in-process (partially completed goods), and (3) finished goods (completed goods awaiting sale).

Table 10-1.

Perpetual Inventory (Product X, units)

Date	Receipts	Issuances	Balance
8/1			10,000
8/5		8,000	2,000
8/10	10,000		12,000
8/13		6,000	6,000
8/17		4,000	2,000
8/29	10,000		12,000
8/30		4,000	8,000

Table 10-2.

Periodic Inventory (Product X, Units)

August 1 Balance	10,000
Add: August purchases	<u>20,000</u>
Total stock available	30,000
Less: August 31 physical count	<u>(8,000)</u>
Sold or used during August	22,000

Inventory Management Considerations

In managing inventory, you should perform the following tasks:

1. Appraise the adequacy of the raw materials level, which depends on expected production, condition of equipment, and any seasonal considerations.
2. Forecast future movements in raw materials prices so that, if prices are expected to increase, additional materials are purchased at the lower price.
3. Discard slow-moving products to reduce inventory carrying costs and to improve cash flow.
4. Guard against inventory buildup, since it is associated with substantial carrying and opportunity costs.
5. Minimize inventory levels when liquidity and/or inventory financing problems exist.
6. Plan for a stock balance that will guard against and cushion the possible loss of business from a shortage in materials. The timing of an order also depends on seasonal factors.
7. Examine the quality of merchandise received. Monitoring the ratio of purchase returns to purchases should be enlightening: A sharp increase in the ratio indicates that a new supplier may be warranted.

8. Keep a careful record of back orders. A high back-order level indicates that fewer inventory balances are needed. The reason is that back orders may be used as indicators of the production required, resulting in improved production planning and procurement. The trend in the ratio of the dollar amount of back orders to the average per-day sales will prove useful.
9. Appraise the acquisition and inventory control functions. Any problems must be identified and rectified. In areas where control is weak, inventory balances should be restricted.
10. Closely supervise warehouse and materials handling staff to guard against theft and to maximize efficiency.
11. Minimize the lead time in the acquisition, manufacturing, and distribution functions. The lead time is how long it takes to receive merchandise from suppliers after an order is placed. Depending upon lead times, an increase in inventory stocking may be required or the purchasing pattern may have to be altered.
12. Examine the time between raw materials input and the completion of production to see if production and engineering techniques can be implemented to hasten the production operation.
13. Examine the degree of spoilage and take steps to reduce it.
14. Maintain proper inventory control such as through the application of computer techniques. For example, a point-of-sale computerized electronic register may be used by a retail business. The register continually updates inventory for sales and purchases. These data facilitate the computation of reorder points and quantity per order.
15. Scrutinize the trend in the unit cost of manufactured items. Reasons for variations should be analyzed to see if they are caused by factors within or beyond your control (i.e., to an increase in oil prices or to managerial inefficiencies).
16. Have economies in production run size to *reduce setup costs and idle* time.

Inventory Analysis

You must consider the obsolescence and spoilage risk of inventory. For example, technological, perishable, fashionable, flammable, and specialized goods usually have a high salability risk. The nature of the risk should be taken into account in computing the desired inventory level for the item.

Different inventory items vary in profitability and the amount of space they take up. Inventory management involves a trade-off between the costs of keeping inventory versus the benefits of holding it. Higher inventory levels result in increased costs from storage, casualty and theft insurance, spoilage, higher property taxes for larger facilities, increased manpower requirements, and interest on borrowed funds to finance inventory acquisition. However, an increase in inventory lowers the possibility of lost sales from stockouts and the incidence of production slowdowns from inadequate inventory. Additionally, large volume purchases will result in greater purchase discounts. Inventory levels are also affected by short-term interest rates. For instance, as short-term interest rates increase, the optimum level of holding inventory will be reduced.

You may have to decide whether it is more profitable to sell inventory as is or to sell it after further processing. Example 10-1 provides a hypothetical situation that involves making this decision.

Example 10-1. You can sell inventory for \$40,000 as is or sell it for \$80,000 if you put \$20,000 into further processing. The latter should be selected because further processing yields a \$60,000 profit relative to \$40,000 for the current sale.

You should check inventory on an ongoing basis in order to reconcile the book and physical amounts. Cyclic counting has the following advantages:

1. Permits the efficient use of a few, full-time experienced counters throughout the year.
2. Enables the timely detection and correction of the causes of inventory error.
3. Does not require a plant shutdown, as does a year-end count.
4. Facilitates the modification of computer inventory programs, if needed.

A quantity discount may be received when purchasing large orders. The discount reduces the acquisition cost of materials, as Example 10-2 shows.

Example 10-2. You purchase 2,000 units of an item with a list price of \$8 each. The quantity discount is 4%. The net cost of the item is calculated as follows:

Acquisition cost (2,000 x \$8)	\$16,000
Less: Discount (.04 x \$16,000)	<u>(640)</u>
Net cost	<u>\$15,360</u>

The average investment in inventory should be considered, as Example 10-3 illustrates.

Example 10-3. You place an order for 7,000 units at the beginning of the year. Each unit costs \$12. The average investment is

Average inventory ^a	3,500
Unit cost	<u>x \$12</u>
Average investment	<u>\$42,000</u>

$$^a \frac{\text{Quantity (Q)}}{2} = \frac{7,000}{2} = 3,500$$

The more frequently you place an order, the lower the average investment will be.

An additional item should be held as long as the increase in sales revenue from storing the item equals the cost of holding it. In inventory planning, you also have to consider your sales volume and cost estimates.

Determining the Carrying and Ordering Costs

Inventory carrying costs include storage costs, handling costs, insurance costs, and property taxes. A provisional cost for spoilage and obsolescence should also be included in an analysis of inventory. Further, the opportunity cost of holding inventory balances (i.e., interest on capital employed) should be taken into account. The more the inventory held, the greater the carrying cost is. Carrying cost is calculated as follows:

$$\text{Carrying cost} = \frac{Q}{2} \times C$$

where $Q/2$ represents average quantity and C is the carrying cost per unit.

Inventory ordering costs are the costs of placing an order and receiving the merchandise. They include freight and the clerical costs. If you want to minimize ordering costs, enter the fewest number of orders possible. In the case of produced items, ordering cost includes scheduling cost. Ordering cost is formulated as follows:

$$\text{Ordering cost} = \frac{S}{Q} \times P$$

where S = total usage

Q = quantity per order

P = cost of placing an order

Example 10-4 uses this equation in a hypothetical situation.

Example 10-4. You use 8,500 units per year. Each order is for 200 units. The cost per order is \$13. The total ordering cost for the year is

$$\frac{8,500}{200} \times \$13 = \$552.50$$

The total inventory cost is therefore

$$\frac{QC}{2} + \frac{SP}{C}$$

A trade-off exists between ordering and carrying costs. A greater order quantity will increase carrying costs but lower ordering costs.

The Economic Order Quantity (EOQ)

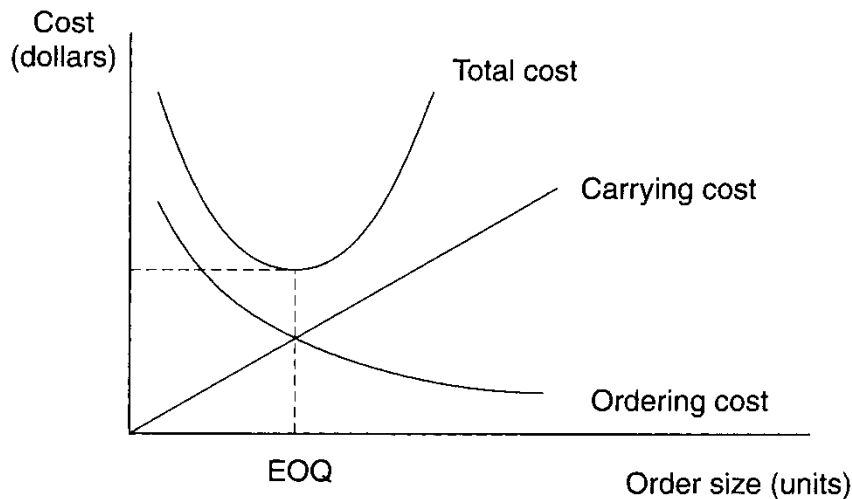
The economic order quantity (EOQ) is the optimum amount of goods to order each time so that total inventory costs are minimized. You should apply EOQ analysis to every product that represents a significant proportion of sales. EOQ is calculated as follows:

$$EOQ = \sqrt{\frac{2SP}{C}}$$

The number of orders for a period is the usage, S , divided by the EOQ.

Figure 10-1 graphs the EOQ point, while Examples 10-5 and 10-6 calculate the frequency of ordering for hypothetical situations.

Figure 10-1. EOQ Point



Example 10-5. You want to know how frequently to place orders. The following information is provided:

$S = 500$ units per month

$P = \$40$ per order

$C = \$4$ per unit

$$EOQ = \sqrt{\frac{2SP}{C}} = \sqrt{\frac{2(500)(40)}{4}} = \sqrt{10,000} = 100 \text{ units}$$

The number of orders each month is

$$S/EOQ = 500/100 = 5$$

Therefore, an order should be placed about every 6 days (31/5).

Example 10-6. A store is determining its frequency of orders for blenders. Each blender costs \$15. The annual carrying cost is \$200. The ordering cost is \$10. The store anticipates selling 50 blenders each month. Its desired average inventory level is 40.

$$S = 50 \times 12 = 600$$

$$P = \$10$$

$$C = \frac{\text{Purchase price} \times \text{Carrying cost}}{\text{Average investment}} = \frac{\$15 \times \$200}{40 \times \$15} = \$5$$

$$EOQ = \sqrt{\frac{2SP}{C}} = \sqrt{\frac{2(600)(10)}{5}} = \sqrt{\frac{12,000}{5}} = \sqrt{2,400} = 49 \text{ (rounded)}$$

The number of orders per year is

$$S / EOQ = 600 / 49 = 12 \text{ orders (rounded)}$$

The store should place an order about every 30 days (365/12).

During periods of inflation and tight credit, you should be flexible with your inventory management policies. For example, the EOQ computation will have to be adjusted for increasing costs.

Avoiding Stockouts

Stockouts of raw materials or work-in-process can cause a slowdown in production. To avoid a stockout situation, a safety stock should be kept. Safety stock is the minimum inventory for an item, based on expected usage and delivery time of materials. This cushion guards against unusual product demand or unexpected delivery problems. Safety stock helps to prevent the potential damage to customer relations and to future sales that can occur when you lack the inventory to fill an order immediately. The need for a safety stock increases the total inventory required.

Example 10-7 illustrates the safety stock principle.

Example 10-7. You place an order when the inventory level reaches 210 units rather than 180 units. The safety stock is 30 units. In other words, you expect to be stocked with 30 units when the new order is received.

The optimum safety stock is the point where the increased carrying cost equals the opportunity cost of a potential stockout. The increased carrying cost equals the carrying cost per unit multiplied by the safety stock:

$$\text{Stockout cost} = \text{Number of orders} \times \left(\frac{\text{usage}}{\text{order quantity}} \right) \times \text{Stockout units}$$

X Unit stockout cost x Probability of a stockout

Example 10-8 uses the safety stock equation in a hypothetical situation.

Example 10-8. You use 100,000 units annually. Each order calls for 10,000 units. Stockout is 1,000 units; this amount is the difference between the maximum daily usage during the lead time less the reorder point, ignoring a safety stock factor. You expect a stockout probability of 30%. The per-unit stockout cost is \$2.30. The carrying cost per unit is \$5. The stockout cost and the amount of safety stock are determined as follows:

$$\text{Stockout cost} = \frac{100,000}{10,000} \times 1,000 \times \$2.30 \times .3 = \$6,900$$

Let **X** represent the safety stock.

$$\begin{aligned} \text{Stockout cost} &= \text{Carrying cost of safety stock} \\ \$6,900 &= \$5X \\ 1,380 \text{ units} &= X \end{aligned}$$

Determining the Reorder Point or Economic Order Point (EOP)

The reorder point tells you when to place an order. However, calculating the reorder point requires you to know the lead time from placing to receiving an order. Thus, the reorder point is computed as follows:

$$\text{EOP} = \text{Lead time} \times \text{Average usage per unit of time}$$

This tells you the inventory level at which a new order should be placed. If you need a safety stock, then add this amount to the EOP.

Example 10-9. You need 6,400 units evenly throughout the year. There is a lead time of one week. There are 50 working weeks in the year. The reorder point is

$$1 \text{ week} \times \frac{6,400}{50 \text{ weeks}} = 1 \text{ week} \times 128 \text{ units/week} = 128 \text{ units}$$

Figure 10-2 shows the changes in level of inventory over time.

An inventory control model appears in Figure 10-3.

Figure 10-2. Changes in Level of Inventory over Time

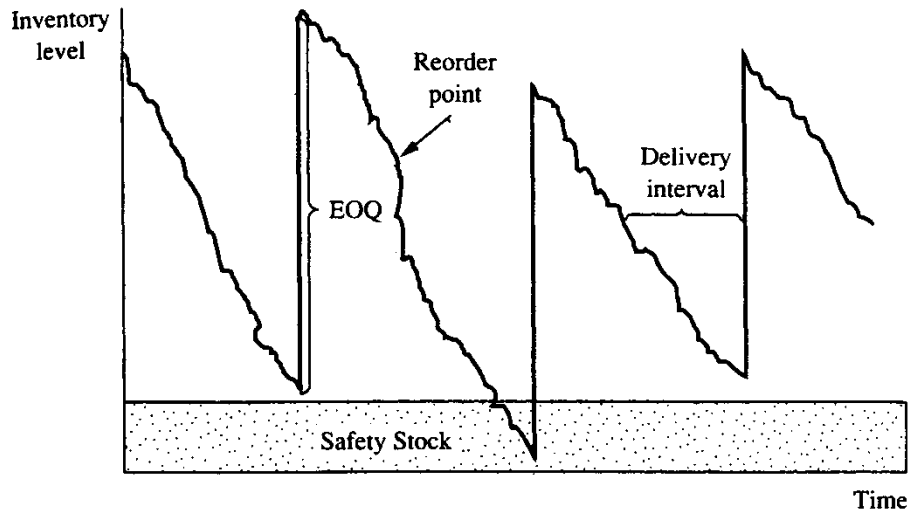
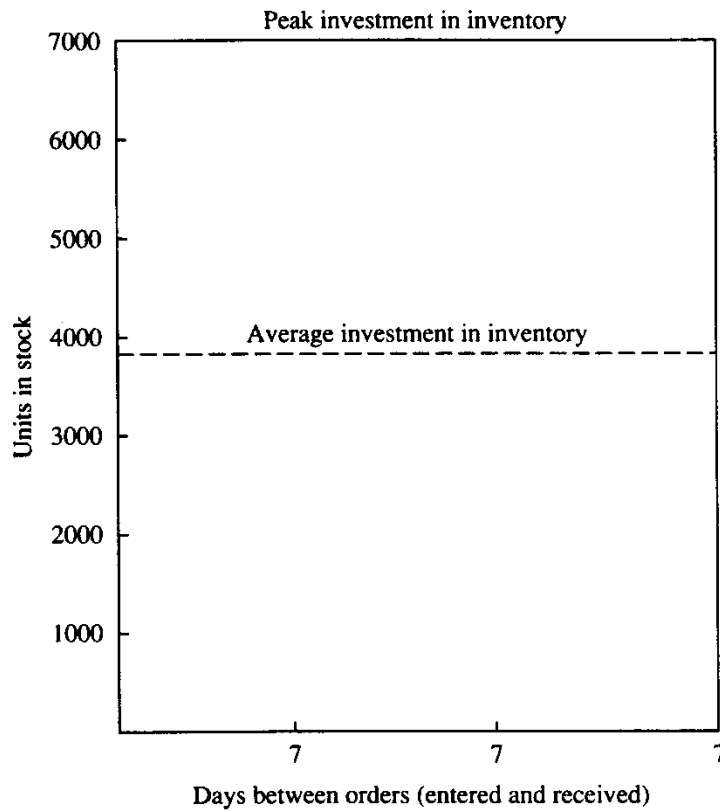


Figure 10-3. Inventory Control Model



We now turn to determining what inventory items should have priority in space. The product that results in the highest contribution margin per cubic foot should typically have the most priority in allocating space.

Example 10-10. For Product X:

Sales price	\$ 15
Variable cost per unit	<u>5</u>
Contribution margin per unit	<u>\$ 10</u>
Contribution margin per dozen	\$120
Storage space per dozen (cubic feet)	÷2
Contribution margin per cubic foot	\$ 60
<i>Number of units sold per period</i>	<u>x 4</u>
Expected contribution margin per cubic foot	<u>\$240</u>

The ABC Inventory Control Method

The ABC method of inventory control requires the classification of inventory into one of three groups-A, B, or C. Group A items are the most expensive, group B less expensive, and group C the least costly. The higher the value of the inventory items, the more control needed. See Figure 10-4 for an illustration of the ABC inventory control system. Table 10-3 illustrates an ABC distribution.

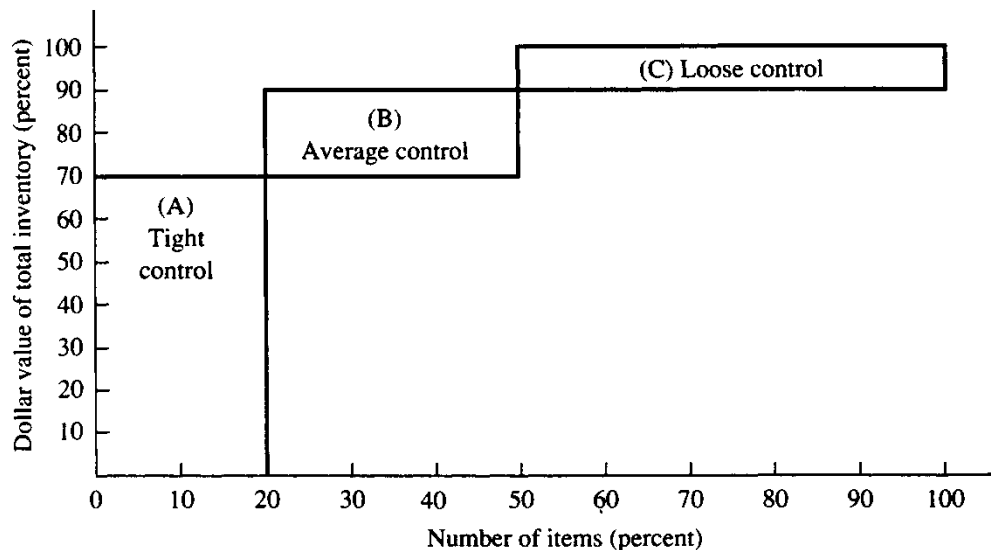


Figure 10-4. ABC Inventory Control System

Table 10-3

ABC Inventory Distribution

Inventory Classification	Population (Percent)	Dollar (Percent)	Usage
A	20	80	
B	30	15	
C	50	5	

Supply Chain Management

To remain competitive, companies are continually faced with challenges to reduce product development time, improve product quality, speed delivery time to customers, and reduce production and inventory costs and lead times. Increasingly, these challenges cannot be effectively met by isolated change to specific organizational units, but instead depend critically on the relationships and interdependencies among different firms (or subunits).

The combination of unlimited information, computing power and capacity makes it possible for managers to match supply with demand on a global scale. Innovative supply chain structures are rapidly emerging. These incorporate expanded access to "e-sources" of supply, which use web-based exchanges and hubs, interactive trading mechanisms and advanced optimization and matching algorithms to link customers with suppliers for individual transactions. Consequently, the dream of always providing the right product to the right customer at the right time and place and at the right price becomes a reality.

Conclusion

Deciding on the proper amount of investment in inventory is not an easy task. The amount you need may change daily and require close evaluation. However, improper inventory management can unnecessarily tie up funds in inventory-funds that can be used more productively elsewhere. A buildup of inventory may lead to obsolete inventory. On the other hand, an excessively low inventory may result in less profit because of lost sales.

Chapter 10 Review Questions

1. The carrying costs associated with inventory management include
 - A. Insurance costs, shipping costs, storage costs, and obsolescence.
 - B. Storage costs, handling costs, capital invested, and obsolescence.
 - C. Purchasing costs, shipping costs, set-up costs, and quantity discounts lost.
 - D. Obsolescence, set-up costs, capital invested, and purchasing costs.

2. The ordering costs associated with inventory management include
 - A. Insurance costs, purchasing costs, shipping costs, and spoilage.
 - B. Obsolescence, setup costs, quantity discounts lost, and storage costs.
 - C. Purchasing costs, shipping costs, setup costs, and quantity discounts lost.
 - D. Shipping costs, obsolescence, setup costs, and capital invested.

3. An example of a carrying cost is
 - A. Disruption of production schedules.
 - B. Quantity discounts lost.
 - C. Handling costs.
 - D. Spoilage.

4. In inventory management, the safety stock will tend to increase if the
 - A. Carrying cost increases.
 - B. Cost of running out of stock decreases.
 - C. Variability of the lead time increases.
 - D. Variability of the usage rate decreases.

5. The result of the economic order quantity formula indicates the
 - A. Annual quantity of inventory to be carried,
 - B. Annual usage of materials during the year.
 - C. Safety stock plus estimated inventory for the year.
 - D. Quantity of each individual order during the year.

Chapter 10 Review Answers

1. The carrying costs associated with inventory management include

- A. Incorrect. Shipping costs are ordering costs, not carrying costs.
- B. **Correct.** Carrying costs include storage costs, handling costs, insurance costs, interest on capital invested, and obsolescence.
- C. Incorrect. It states various ordering (or manufacturing) costs.
- D. Incorrect. The set-up costs for a production run are equivalent to ordering costs. Additionally, purchasing costs are considered costs of ordering.

2. The ordering costs associated with inventory management include

- A. Incorrect. Insurance costs and obsolescence are carrying costs.
- B. Incorrect. Obsolescence and storage costs are carrying costs.
- C. **Correct.** Ordering costs are costs incurred when placing and receiving orders. Ordering costs include purchasing costs, shipping costs, clerical costs, setup costs for a production run, and quantity discounts lost.
- D. Incorrect. Obsolescence and capital invested are carrying costs.

3. An example of a carrying cost is

- A. Incorrect. Disruption of production schedules may result from a stockout.
- B. Incorrect. Quantity discounts lost are related to ordering costs or inventory acquisition costs.
- C. Incorrect. Shipping and handling costs are included in acquisition costs.
- D. **Correct.** Inventory costs fall into three categories: order or setup costs, carrying (holding) costs, and stockout costs. Carrying costs include storage costs for inventory items plus opportunity cost (i.e., the cost incurred by investing in inventory rather than making an income-earning investment). Examples are insurance, spoilage, interest on invested capital, obsolescence, and warehousing costs.

4. In inventory management, the safety stock will tend to increase if the

- A. Incorrect. An increase in inventory carrying costs makes it less economical to carry safety stocks. Thus, safety stocks will be reduced.
- B. Incorrect. If the cost of stockouts declines, the incentive to carry large safety stocks is reduced.
- C. **Correct.** A company maintains safety stocks to protect itself against the losses caused by inventory stock-outs. These can take the form of lost sales or lost production time. Safety stock is necessary

because of the variability in lead time and usage rates. As the variability in lead time increases, a company will tend to carry larger safety stocks.

- D. Incorrect. A decline in the variability of usage makes it easier to plan orders, and safety stocks will be less necessary.

5. The result of the economic order quantity formula indicates the

- A. Incorrect. The annual quantity of inventory demanded is an input into the formula, not the result.
- B. Incorrect. Annual usage is a determinant of annual demand, which is an input into the formula.
- C. Incorrect. Safety stock is not reflected in the basic EOQ formula.
- D. **Correct.** The EOQ model is a deterministic model that calculates the ideal order (or production lot) quantity given specified demand, ordering or setup costs, and carrying costs. The model minimizes the sum of inventory carrying costs and either ordering or production setup costs.

Chapter 11:

The Time Value of Money

Learning Objectives

After studying this chapter, you will be able to:

- Recognize future values and different loan types.
 - Apply the concept of time value of money.
 - Understand and identify capital rationing decisions.
-

A dollar now is worth more than a dollar to be received later. This statement sums up an important principle: money has a time value. The truth of this principle is not that inflation might make the dollar received at a later time worth less in buying power. The reason is that you could invest the dollar now and have more than a dollar at the specified later date.

Time value of money is a critical consideration in financial and investment decisions. For example, compound interest calculations are needed to determine future sums of money resulting from an investment. Discounting, or the calculation of present value, which is inversely related to compounding, is used to evaluate the future cash flow associated with capital budgeting projects. There are plenty of applications of time value of money in finance. For example, how do you determine the periodic payout of an auto loan or a mortgage loan? The chapter discusses the concepts, calculations, and applications of future values and present values.

Future Values – How Money Grows

A dollar in hand today is worth more than a dollar to be received tomorrow because of the interest it could earn from putting it in a savings account or placing it in an investment account. Compounding interest means that interest earns interest. For the discussion of the concepts of compounding and time value, let us define the following:

- F_n = future value = the amount of money at the end of year n
- P = principal

- i = annual interest rate
- n = number of years

Then,

$$F_1 = \text{the amount of money at the end of year 1}$$

$$= \text{principal and interest} = P + iP = P(1+i)$$

$$F_2 = \text{the amount of money at the end of year 2}$$

$$= F_1(1+i) = P(1+i)(1+i) = P(1+i)^2$$

The future value of an investment compounded annually at rate i for n years is

$$F_n = P(1+i)^n = P \cdot T_1(i,n)$$

where $T_1(i,n)$ is the compound amount of \$1 and can be found in Table 11-1 at the end of the chapter.

EXAMPLE 11-1. You place \$1,000 in a savings account earning 8 percent interest compounded annually. How much money will you have in the account at the end of 4 years?

$$F_n = P(1+i)^n$$

$$F_4 = \$1,000 (1 + 0.08)^4 = \$1,000 T_1(8\%,4 \text{ years})$$

From Table 11-1, the T_1 for 4 years at 8 percent is 1.361. Therefore,

$$F_4 = \$1,000 (1.361) = \$1,361$$

EXAMPLE 11-2. You invested a large sum of money in the stock of TLC Corporation. The company paid a \$3 dividend per share. The dividend is expected to increase by 20 percent per year for the next 3 years. You wish to project the dividends for years 1 through 3.

$$F_n = P(1+i)^n$$

$$F_1 = \$3(1+0.2)^1 = \$3 T_1(20\%,1) = \$3 (1.200) = \$3.60$$

$$F_2 = \$3(1+0.2)^2 = \$3 T_1(20\%,2) = \$3 (1.440) = \$4.32$$

$$F_3 = \$3(1+0.2)^3 = \$3 T_1(20\%,3) = \$3 (1.728) = \$5.18$$

Intra-Year Compounding

Interest is often compounded more frequently than once a year. Banks, for example, compound interest quarterly, daily and even continuously. If interest is compounded m times a year, then the general formula for solving the future value becomes

$$F_n = P\left(1 + \frac{i}{m}\right)^{n \cdot m} = P \cdot T_1(i/m, n \cdot m)$$

The formula reflects more frequent compounding ($n \cdot m$) at a smaller interest rate per period (i/m). For example, in the case of semiannual compounding ($m = 2$), the above formula becomes

$$F_n = P(1+i/2)^{n \cdot 2} = P \cdot T_1(i/2, n \cdot 2)$$

EXAMPLE 11-3. You deposit \$10,000 in an account offering an annual interest rate of 20 percent. You will keep the money on deposit for five years. The interest rate is compounded quarterly. The accumulated amount at the end of the fifth year is calculated as follows:

$$F_n = P\left(1 + \frac{i}{m}\right)^{n \cdot m} = P \cdot T_1(i/m, n \cdot m)$$

where $P = \$10,000$
 $i/m = 20\%/4 = 5\%$
 $n \times m = 5 \times 4 = 20$

Therefore,

$$F_5 = \$10,000(1 + .05)^{20} = \$10,000 T_1(5\%, 20) = \$10,000 (2.653) = \$26,530$$

EXAMPLE 11-4. Assume that $P = \$1,000$, $i = 8\%$ and $n = 2$ years. Then for

Annual compounding ($m=1$):

$$F_2 = \$1,000(1+0.08)^2 = \$1,000 T_1(8\%, 2) = \$1,000(1.166) = \$1,166.00$$

Semiannual compounding ($m=2$):

$$\begin{aligned} F_2 &= \$1,000\left(1 + \frac{0.08}{2}\right)^{2 \cdot 2} \\ &= \$1,000(1+.04)^4 = \$1,000 T_1(4\%, 4) \\ &= \$1,000(1.170) \\ &= \$1,170.00 \end{aligned}$$

Quarterly compounding ($m=4$):

$$\begin{aligned} F_2 &= \$1,000 \left(1 + \frac{0.08}{4}\right)^{2 \cdot 4} \\ &= \$1,000(1+.02)^8 = \$1,000 T_1(2\%, 8) \\ &= \$1,000(1.172) \\ &= \$1,172.00 \end{aligned}$$

As the example shows, the more frequently interest is compounded, the greater the amount accumulated. This is true for any interest for any period of time.

Future Value of an Annuity

An annuity is defined as a series of payments (or receipts) of a fixed amount for a specified number of periods. Each payment is assumed to occur at the end of the period. The future value of an annuity is a compound annuity, which involves depositing or investing an equal sum of money at the end of each year for a certain number of years and allowing it to grow.

Let S_n = the future value on an n-year annuity

A = the amount of an annuity

Then we can write

$$\begin{aligned}
 S_n &= A(1+i)^{n-1} + A(1+i)^{n-2} + \dots + A(1+i)^0 \\
 &= A[(1+i)^{n-1} + (1+i)^{n-2} + \dots + (1+i)^0] \\
 &= A \cdot \sum_{t=0}^{n-1} (1+i)^t = A \left[\frac{(1+i)^n - 1}{i} \right] = A \cdot T_2(i, n)
 \end{aligned}$$

where $T_2(i, n)$ represents the future value of an annuity of \$1 for n years compounded at i percent and can be found in Table 11-2 at the end of the chapter.

EXAMPLE 11-5. You wish to determine the sum of money you will have in a savings account at the end of 6 years by depositing \$1,000 at the end of each year for the next 6 years. The annual interest rate is 8 percent. The $T_2(8\%, 6 \text{ years})$ is given in Table 11-2 as 7.336. Therefore,

$$S_6 = \$1,000 T_2(8\%, 6) = \$1,000 (7.336) = \$7,336$$

EXAMPLE 11-6. You deposit \$30,000 semiannually into a fund for ten years. The annual interest rate is 8 percent. The amount accumulated at the end of the tenth year is calculated as follows:

$$S_n = A \cdot T_2(i, n)$$

where

A	= \$30,000
i	= 8%/2 = 4%
n	= 10 x 2 = 20

Therefore,

$$\begin{aligned} S_n &= \$30,000 T_2(4\%, 20) \\ &= \$30,000 (29.778) = \$893,340 \end{aligned}$$

Present Value – How Much Money is Worth Now?

Present value is the present worth of future sums of money. The process of calculating present values, or discounting, is actually the opposite of finding the compounded future value. In connection with present value calculations, the interest rate i is called the *discount rate* (or *cost of capital*).

Recall that $F_n = P(1+i)^n$

Therefore,

$$P = \frac{F_n}{(1+i)^n} = F_n \left[\frac{1}{(1+i)^n} \right] = F_n \cdot T_3(i,n)$$

Where $T_3(i,n)$ represents the present value of \$1 and is given in Table 11-3 at the end of the chapter.

EXAMPLE 11-7. You have been given an opportunity to receive \$20,000 6 years from now. If you can earn 10 percent on your investments, what is the most you should pay for this opportunity? To answer this question, you must compute the present value of \$20,000 to be received 6 years from now at a 10 percent rate of discount. F_6 is \$20,000, i is 10 percent, and n is 6 years. $T_3(10\%,6)$ from Table 11-3 is 0.565.

$$P = \$20,000 \left[\frac{1}{(1+0.1)^6} \right] = \$20,000 T_3(10\%,6) = \$20,000(0.565) = \$11,300$$

This means that you can earn 10 percent on your investment, and you would be indifferent to receiving \$11,300 now or \$20,000 6 years from today since the amounts are time equivalent. In other words, you could invest \$11,300 today at 10 percent and have \$20,000 in 6 years.

Present Value of Mixed Streams of Cash Flows

The present value of a series of mixed payments (or receipts) is the sum of the present value of each individual payment. We know that the present value of each individual payment is the payment times the appropriate T_3 value.

EXAMPLE 11-8. You are thinking of starting a new product line that initially costs \$32,000. Your annual projected cash inflows are:

Year 1	\$10,000
Year 2	\$20,000
Year 3	\$5,000

If you must earn a minimum of 10 percent on your investment, should you undertake this new product line?

The present value of this series of mixed streams of cash inflows is calculated as follows:

<u>Year</u>	<u>Cash inflows</u>	<u>$T_3(10\%, n)$</u>	<u>Present Value</u>
1	\$10,000	0.909	\$9,090
2	\$20,000	0.826	\$16,520
3	\$5,000	0.75	\$3,755
			<u>\$29,365</u>

Since the present value of your projected cash inflows is less than the initial investment, you should not undertake this project.

Present Value of an Annuity

Interest received from bonds, pension funds, and insurance obligations all involve annuities. To compare these financial instruments, we need to know the present value of each. The present value of an annuity (P_n) can be found by using the following equation:

$$\begin{aligned}
 P_n &= A \cdot \left[\frac{1}{(1+i)^1} \right] + A \cdot \left[\frac{1}{(1+i)^2} \right] + \dots + A \cdot \left[\frac{1}{(1+i)^n} \right] \\
 &= A \cdot \left[\frac{1}{(1+i)} + \frac{1}{(1+i)^2} + \dots + \frac{1}{(1+i)^n} \right] \\
 &= A \cdot \sum_{t=1}^n \frac{1}{(1+i)^t} = \sum A \cdot \frac{1}{i} \left[1 - \frac{1}{(1+i)^n} \right]
 \end{aligned}$$

$$= A \cdot T_4(i,n)$$

where $T_4(i,n)$ represents the present value of an annuity of \$1 discounted at i percent for n years and is found in Table 11-4 at the end of the chapter.

EXAMPLE 11-9. Assume that the cash inflows in Example 11-8 form an annuity of \$10,000 for 3 years. Then the present value is

$$P_n = A \cdot T_4(i,n)$$

$$P_3 = \$10,000 T_4(10\%, 3 \text{ years}) = \$10,000 (2.487) = \$24,870$$

EXAMPLE 11-10. Suppose that you have just won the state lottery in the amount of \$1 million (or \$800,000 after taxes). Instead of paying you the lump sum of \$800,000, the state pays you \$40,000 each year for the next 20 years. If the discount rate is 10%, how much is the lottery amount worth to you ?

Then the present worth is

$$P_n = A \cdot T_4(i,n)$$

$$P_{20} = \$40,000 \cdot T_4(10\%, 20 \text{ years}) = \$40,000 (8.514) = \$340,560$$

This means that if the state can make a 10% return on its lottery sales receipts, it is actually paying you only \$340,560 rather than \$800,000.

Perpetuities

Some annuities go on forever, called perpetuities. An example of a perpetuity is preferred stock that yields a constant dollar dividend indefinitely. The present value of a perpetuity is found as follows:

$$\text{Present value of a perpetuity} = \frac{\text{receipt}}{\text{discount rate}} = \frac{A}{i}$$

EXAMPLE 11-11. Assume that a perpetual bond has an \$80-per-year interest payment and that the discount rate is 10 percent. The present value of this perpetuity is:

$$P = \frac{A}{i} = \frac{\$80}{.10} = \$800$$

Applications of Future Values and Present Values

Future and present values have numerous applications in financial and investment decisions. Six of these applications are presented below.

Deposits to Accumulate a Future Sum (or Sinking Fund)

An individual might wish to find the annual deposit (or payment) that is necessary to accumulate a future sum. To find this future amount (or sinking fund) we can use the formula for finding the future value of an annuity.

$$S_n = A \cdot T_2(i, n)$$

Solving for A, we obtain:

$$\text{Annual deposit amount} = A = \frac{S_n}{T_2(i, n)}$$

EXAMPLE 11-12. You wish to determine the equal annual end-of-year deposits required to accumulate \$5,000 at the end of 5 years in a fund. The interest rate is 10 percent. The annual deposit is:

$$S_5 = \$5,000$$

$$T_2(10\%, 5 \text{ years}) = 6.105 \text{ (from Table 11-2)}$$

$$A = \frac{\$5,000}{6.105} = \$819$$

In other words, if you deposit \$819 at the end of each year for 5 years at 10 percent interest, you will have accumulated \$5,000 at the end of the fifth year.

EXAMPLE 11-13. You need a sinking fund for the retirement of a bond 30 years from now. The interest rate is 10 percent. The annual year-end contribution needed to accumulate \$1,000,000 is

$$S_{30} = \$1,000,000$$

$$T_2(10\%, 30 \text{ years}) = 164.49$$

$$A = \frac{\$1,000,000}{164.49} = 6,079.40$$

Amortized Loans

If a loan is to be repaid in equal periodic amounts, it is said to be an amortized loan. Examples include auto loans, mortgage loans, and most commercial loans. The periodic payment can easily be computed as follows:

$$P_n = A \cdot T_4(i, n)$$

Solving for A, we obtain:

$$\text{Amount of loan} = A = \frac{P_n}{T_4(i, n)}$$

EXAMPLE 11-14. You borrow \$200,000 for five years at an interest rate of 14 percent. The annual year-end payment on the loan is calculated as follows:

$$P_5 = \$200,000$$

$$T_4(14\%, 5 \text{ years}) = 3.433 \text{ (from Table 11-4)}$$

$$\text{Amount of loan} = A = \frac{P_5}{T_4(14\%, 5 \text{ years})} = \frac{\$200,000}{3.433} = \$58,258.08$$

EXAMPLE 11-15. You take out a 40-month bank loan of \$5,000 at a 12 percent annual interest rate. You want to find out the monthly loan payment.

$$i = 12\% / 12 \text{ months} = 1\%$$

$$P_{40} = \$5,000$$

$$T_4(1\%, 40 \text{ months}) = 32.835 \text{ (from Table 11-4)}$$

$$\text{Therefore } A = \$5,000 / 32.835 = \$152.28$$

So, to repay the principal and interest on a \$5,000, 12 percent, 40-month loan, you have to pay \$152.28 a month for the next 40 months.

EXAMPLE 11-16. Assume that a firm borrows \$2,000 to be repaid in three equal installments at the end of each of the next 3 years. The bank charges 12 percent interest. The amount of each payment is

$$P_3 = \$2,000$$

$$T_4(12\%, 3 \text{ years}) = 2.402$$

$$\text{Therefore, } A = \$2,000/2.402 = \$832.64$$

Each loan payment consists partly of interest and partly of principal. The breakdown is often displayed in a loan amortization schedule. The interest component of the payment is largest in the first period (because the principal balance is the highest) and subsequently declines, whereas the principal portion is smallest in the first period (because of the high interest) and increases thereafter, as shown in the following example.

EXAMPLE 11-17. Using the same data as in Example 15, we set up the following amortization schedule:

<u>Year</u>	<u>Payment</u>	<u>Interest</u>	<u>Repayment of Principal</u>	<u>Remaining Balance</u>
0				\$2,000.00
1	\$832.64	\$240.00(a)	\$592.64(b)	\$1,407.36
2	\$832.64	\$168.88	\$663.76	\$743.60
3	\$832.64	\$89.23	\$743.41(c)	

(a) Interest is computed by multiplying the loan balance at the beginning of the year by the interest rate. Therefore, interest in year 1 is $\$2,000(0.12) = \240 ; in year 2 interest is $\$1,407.36(0.12) = \168.88 ; and in year 3 interest is $\$743.60(0.12) = \89.23 . All figures are rounded.

(b) The reduction in principal equals the payment less the interest portion ($\$832.64 - \$240.00 = \$592.64$)

(c) Not exact because of accumulated rounding errors.

Annual Percentage Rate (APR)

Different types of investments use different compounding periods. For example, most bonds pay interest semiannually; banks generally pay interest quarterly. If a financial manager wishes to compare investments with different compounding periods, he or she needs to put them on a common basis. The annual percentage rate (APR), or effective annual rate, is used for this purpose and is computed as follows:

$$APR = \left(1 + \frac{i}{m}\right)^m - 1.0$$

where i = the stated, nominal or quoted rate and m = the number of compounding periods per year.

EXAMPLE 11-18. If the nominal rate is 6 percent, compounded quarterly, the APR is

$$\text{APR} = \left(1 + \frac{i}{m}\right)^m - 1.0 = \left(1 + \frac{0.06}{4}\right)^4 - 1.0 = (1.015)^4 - 1.0 = 1.0614 - 1.0 = 0.0614 = 6.14\%$$

This means that if one bank offered 6 percent with quarterly compounding, while another offered 6.14 percent with annual compounding, they would both be paying the same effective rate of interest.

Annual percentage rate (APR) also is a measure of the cost of credit, expressed as a yearly rate. It includes interest as well as other financial charges such as loan origination and certain closing fees. The lender is required to tell you the APR. It provides you with a good basis for comparing the cost of loans, including mortgage plans.

Rates of Growth

In finance, it is necessary to calculate the compound annual rate of growth, associated with a stream of earnings. The compound annual growth rate in earnings per share is computed as follows:

$$F_n = P \cdot T_1(i, n)$$

Solving this for T_1 , we obtain

$$T_1(i, n) = \frac{F_n}{P}$$

EXAMPLE 11-19. Assume that your company has earnings per share of \$2.50 in 20x0, and 10 years later the earnings per share has increased to \$3.70. The compound annual rate of growth in earnings per share is computed as follows:

$$F_{10} = \$3.70 \text{ and } P = \$2.50$$

Therefore,

$$T_1(i, 10) = \frac{\$3.70}{\$2.50} = 1.48$$

From Table 11-1 an T_1 of 1.48 at 10 years is at $i = 4\%$. The compound annual rate of growth is therefore 4 percent.

Compound Annual Rate of Interest

The compound annual interest rate is computed as follows:

$$F_n = P \cdot T_1(i, n)$$

$$\text{or } S_n = P \cdot T_2(i, n)$$

Solving this for T_1 (or T_2), we obtain

$$T_1(i,n) = \frac{F_n}{P}$$

$$T_2(i,n) = \frac{S_n}{P}$$

EXAMPLE 11-20. You agree to pay back \$3,000 in 6 years on a \$2,000 loan made today. You are being charged an interest rate of 7%. This is computed as follows:

$$T_1(i,n) = \frac{F_n}{P}$$

$$T_1 (i, 6 \text{ years}) = \$3,000 / \$2,000 = 1.5$$

so that $i = 7\%$ (from Table 11-1)

EXAMPLE 11-21. You want to have \$500,000 accumulated in a pension plan after 9 years. You deposit \$30,000 per year. The interest rate you must earn is

$$T_2(i,n) = \frac{S_n}{P}$$

$$T_2 (i, 9 \text{ years}) = \$500,000 /$$

$$\frac{\$500,000}{\$30,000} = 16.667$$

so that $i = 15\%$ (approximately, from Table 11-2)

Bond Values

Bonds call for the payment of a specific amount of interest for a stated number of years and the repayment of the face value at the maturity date. Thus, a bond represents an annuity plus a lump sum. Its value is found as the present value of the payment stream. The interest is usually paid semiannually.

$$V = \sum_{t=1}^n \frac{I}{(1+i)^t} + \frac{M}{(1+i)^n}$$

$$= I \cdot T_4(i,n) + M \cdot T_3(i,n)$$

where I = interest payment per period

M = par value, or maturity value, usually \$1,000

i = investor's required rate of return

n = number of periods

EXAMPLE 11-22. Assume there is a 10-year bond with a 10 percent coupon, paying interest semiannually and having a face value of \$1,000. Since interest is paid semiannually, the number of periods involved is 20 and the semiannual cash inflow is $\$100/2 = \50 .

Assume that you have a required rate of return of 12 percent for this type of bond. Then, the present value (V) of this bond is:

$$\begin{aligned} V &= \$50 \cdot T_4(6\%, 20) + \$1,000 \cdot T_3(6\%, 20) \\ &= \$50(11.470) + \$1,000(0.312) = \$573.50 + \$312.00 = \$885.50 \end{aligned}$$

Note that the required rate of return (12 percent) is higher than the coupon rate of interest (10 percent), and so the bond value (or the price investors are willing to pay for this particular bond) is less than its \$1,000 face value.

Conclusion

The basic idea of the time value of money is that money received in the future is not as valuable as money received today. The time value of money is a critical factor in many financial and investment applications such as finding the amount of deposits to accumulate a future sum and the periodic payment of an amortized loan. The development of the time value of money concept permits comparison of sums of money that are available at different points in time. This chapter developed two basic concepts: future value and present value. It showed how these values are calculated and can be applied to various financial and investment situations. Of course, most of these calculations can be easily done using computer software. There are many financial calculators that contain pre-programmed formulas to perform many present value and future applications. Furthermore, spreadsheet software such as Excel has built-in financial functions to perform many such applications. For example, $PMT(\textit{principal}, \textit{interest}, \textit{term})$ in *Excel* calculates the amount of the periodic payment to pay off a loan, given a specified periodic interest rate and number of payment periods.

Table 11-1. The Future Value of \$1 (Compound Amount of \$1.00) = $(1 + i)^n = T_1(i, n)$

Periods	4%	6%	8%	10%	12%	14%	20%
1	1.040	1.060	1.080	1.100	1.120	1.140	1.200
2	1.082	1.124	1.166	1.210	1.254	1.300	1.440
3	1.125	1.191	1.260	1.331	1.405	1.482	1.728
4	1.170	1.263	1.361	1.464	1.574	1.689	2.074
5	1.217	1.338	1.469	1.611	1.762	1.925	2.488
6	1.265	1.419	1.587	1.772	1.974	2.195	2.986
7	1.316	1.504	1.714	1.949	2.211	2.502	3.583
8	1.369	1.594	1.851	2.144	2.476	2.853	4.300
9	1.423	1.690	1.999	2.359	2.773	3.252	5.160
10	1.480	1.791	2.159	2.594	3.106	3.707	6.192
11	1.540	1.898	2.332	2.853	3.479	4.226	7.430
12	1.601	2.012	2.518	3.139	3.896	4.818	8.916
13	1.665	2.133	2.720	3.452	4.364	5.492	10.699
14	1.732	2.261	2.937	3.798	4.887	6.261	12.839
15	1.801	2.397	3.172	4.177	5.474	7.138	15.407
16	1.873	2.540	3.426	4.595	6.130	8.137	18.488
17	1.948	2.693	3.700	5.055	6.866	9.277	22.186
18	2.026	2.854	3.996	5.560	7.690	10.575	26.623
19	2.107	3.026	4.316	6.116	8.613	12.056	31.948
20	2.191	3.207	4.661	5.728	9.646	13.743	38.338
30	3.243	5.744	10.063	17.450	29.960	50.950	237.380
40	4.801	10.286	21.725	45.260	93.051	188.880	1469.800

Table 11-2. The Future Value of an Annuity of \$1 (Compound Amount of an Annuity of \$1) = $T_2(i,n)$

Periods	4%	6%	8%	10%	12%	14%	20%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.040	2.060	2.080	2.100	2.120	2.140	2.200
3	3.122	3.184	3.246	3.310	3.374	3.440	3.640
4	4.247	4.375	4.506	4.641	4.779	4.921	5.368
5	5.416	5.637	5.867	6.105	6.353	6.610	7.442
6	6.633	6.975	7.336	7.716	8.115	8.536	9.930
7	7.898	8.394	8.923	9.487	10.089	10.730	12.916
8	9.214	9.898	10.637	11.436	12.300	13.233	16.499
9	10.583	11.491	12.488	13.580	14.776	16.085	20.799
10	12.006	13.181	14.487	15.938	17.549	19.337	25.959
11	13.486	14.972	16.646	18.531	20.655	23.045	32.150
12	15.026	16.870	18.977	21.385	24.133	37.271	39.580
13	16.627	18.882	21.495	24.523	28.029	32.089	48.497
14	18.292	21.015	24.215	27.976	32.393	37.581	59.196
15	20.024	23.276	27.152	31.773	37.280	43.842	72.035
16	21.825	25.673	30.324	35.950	42.753	50.980	87.442
17	23.698	28.213	33.750	40.546	48.884	59.118	105.930
18	25.645	30.906	37.450	45.600	55.750	68.394	128.120
19	27.671	33.760	41.446	51.160	63.440	78.969	154.740
20	29.778	36.778	45.762	57.276	75.052	91.025	186.690
30	56.085	79.058	113.283	164.496	241.330	356.790	1181.900
40	95.026	154.762	259.057	442.597	767.090	1342.000	7343.900

*Payments (or receipts) at the *end* of each period.

Table 11-3. The Present Value of \$1 = $T_3(i,n)$

PERIODS	3%	4%	5%	6%	7%	8%	10%	12%	14%	16%	18%	20%	22%	24%	25%	26%	28%	30%	40%
1	.9709	.9615	.9524	.9434	.9346	.9259	.9091	.8929	.8772	.8621	.8475	.8333	.8197	.8065	.8000	.7937	.7813	.7692	.7143
2	.9426	.9246	.9070	.8900	.8734	.8573	.8264	.7972	.7695	.7432	.7182	.6944	.6719	.6504	.6400	.6299	.6104	.5917	.5102
3	.9151	.8890	.8638	.8396	.8163	.7938	.7513	.7118	.6750	.6407	.6086	.5787	.5507	.5245	.5120	.4999	.4768	.4552	.3644
4	.8885	.8548	.8227	.7921	.7629	.7350	.6830	.6355	.5921	.5523	.5158	.4823	.4514	.4230	.4096	.3968	.3725	.3501	.2603
5	.8626	.8219	.7835	.7473	.7130	.6806	.6209	.5674	.5194	.4761	.4371	.4019	.3700	.3411	.3277	.3149	.2910	.2693	.1859
6	.8375	.7903	.7462	.7050	.6663	.6302	.5645	.5066	.4556	.4104	.3704	.3349	.3033	.2751	.2621	.2499	.2274	.2072	.1328
7	.8131	.7599	.7107	.6651	.6227	.5835	.5132	.4523	.3996	.3538	.3139	.2791	.2486	.2218	.2097	.1983	.1776	.1594	.0949
8	.7894	.7307	.6768	.6274	.5820	.5403	.4665	.4039	.3506	.3050	.2660	.2326	.2038	.1789	.1678	.1574	.1388	.1226	.0678
9	.7664	.7026	.6446	.5919	.5439	.5002	.4241	.3606	.3075	.2630	.2255	.1938	.1670	.1443	.1342	.1249	.1084	.0943	.0484
10	.7441	.6756	.6139	.5584	.5083	.4632	.3855	.3220	.2697	.2267	.1911	.1615	.1369	.1164	.1074	.0992	.0847	.0725	.0346
11	.7224	.6496	.5847	.5268	.4751	.4289	.3505	.2875	.2366	.1954	.1619	.1346	.1122	.0938	.0859	.0787	.0662	.0558	.0247
12	.7014	.6246	.5568	.4970	.4440	.3971	.3186	.2567	.2076	.1685	.1372	.1122	.0920	.0757	.0687	.0625	.0517	.0429	.0176
13	.6810	.6006	.5303	.4688	.4150	.3677	.2897	.2292	.1821	.1452	.1163	.0935	.0754	.0610	.0550	.0496	.0404	.0330	.0126
14	.6611	.5775	.5051	.4423	.3878	.3405	.2633	.2046	.1597	.1252	.0985	.0779	.0618	.0492	.0440	.0393	.0316	.0254	.0090
15	.6419	.5553	.4810	.4173	.3624	.3152	.2394	.1827	.1401	.1079	.0835	.0649	.0507	.0397	.0352	.0312	.0247	.0195	.0064
16	.6232	.5339	.4581	.3936	.3387	.2919	.2176	.1631	.1229	.0930	.0708	.0541	.0415	.0320	.0281	.0248	.0193	.0150	.0046
17	.6050	.5134	.4363	.3714	.3166	.2703	.1978	.1456	.1078	.0802	.0600	.0451	.0340	.0258	.0225	.0197	.0150	.0116	.0033
18	.5874	.4936	.4155	.3503	.2959	.2502	.1799	.1300	.0946	.0691	.0508	.0376	.0279	.0208	.0180	.0156	.0118	.0089	.0023
19	.5703	.4746	.3957	.3305	.2765	.2317	.1635	.1161	.0829	.0596	.0431	.0313	.0229	.0168	.0144	.0124	.0092	.0068	.0017
20	.5537	.4564	.3769	.3118	.2584	.2145	.1486	.1037	.0728	.0514	.0365	.0261	.0187	.0135	.0115	.0098	.0072	.0053	.0012
21	.5375	.4388	.3589	.2942	.2415	.1987	.1351	.0926	.0638	.0443	.0309	.0217	.0154	.0109	.0092	.0078	.0056	.0040	.0009
22	.5219	.4220	.3418	.2775	.2257	.1839	.1228	.0826	.0560	.0382	.0262	.0181	.0126	.0088	.0074	.0062	.0044	.0031	.0006
23	.5067	.4057	.3256	.2618	.2109	.1703	.1117	.0738	.0491	.0329	.0222	.0151	.0103	.0071	.0059	.0049	.0034	.0024	.0004
24	.4919	.3901	.3101	.2470	.1971	.1577	.1015	.0659	.0431	.0284	.0188	.0126	.0085	.0057	.0047	.0039	.0027	.0018	.0003
25	.4776	.3751	.2953	.2330	.1842	.1460	.0923	.0588	.0378	.0245	.0160	.0105	.0069	.0046	.0038	.0031	.0021	.0014	.0002
26	.4637	.3607	.2812	.2198	.1722	.1352	.0839	.0525	.0331	.0211	.0135	.0087	.0057	.0037	.0030	.0025	.0016	.0011	.0002
27	.4502	.3468	.2678	.2074	.1609	.1252	.0763	.0469	.0291	.0182	.0115	.0073	.0047	.0030	.0024	.0019	.0013	.0008	.0001
28	.4371	.3335	.2551	.1956	.1504	.1159	.0693	.0419	.0255	.0157	.0097	.0061	.0038	.0024	.0019	.0015	.0010	.0006	.0001
29	.4243	.3207	.2429	.1846	.1406	.1073	.0630	.0374	.0224	.0135	.0082	.0051	.0031	.0020	.0015	.0012	.0008	.0005	.0001
30	.4120	.3083	.2314	.1741	.1314	.0994	.0573	.0334	.0196	.0116	.0070	.0042	.0026	.0016	.0012	.0010	.0006	.0004	.0000
40	.3066	.2083	.1420	.0972	.0668	.0460	.0221	.0107	.0053	.0026	.0013	.0007	.0004	.0002	.0001	.0001	.0001	.0000	.0000

Table 11-4. The Present Value of an Annuity of \$1 = $T_4(i,n)$

Periods	3%	4%	5%	6%	7%	8%	10%	12%	14%	16%	18%	20%	22%	24%
1	.9709	.9615	.9524	.9434	.9346	.9259	.9091	.8929	.8772	.8621	.8475	.8333	.8197	.8065
2	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7355	1.6901	1.6467	1.6052	1.5656	1.5278	1.4915	1.4568
3	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.4869	2.4018	2.3216	2.2459	2.1743	2.1065	2.0422	1.9813
4	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.1699	3.0373	2.9137	2.7982	2.6901	2.5887	2.4936	2.4043
5	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.7908	3.6048	3.4331	3.2743	3.1272	2.9906	2.8636	2.7454
6	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.3553	4.1114	3.8887	3.6847	3.4976	3.3255	3.1669	3.0205
7	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	4.8684	4.5638	4.2883	4.0386	3.8115	3.6046	3.4155	3.2423
8	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.3349	4.9676	4.6389	4.3436	4.0776	3.8372	3.6193	3.4212
9	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.7590	5.3282	4.9464	4.6065	4.3030	4.0310	3.7863	3.5655
10	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.1446	5.6502	5.2161	4.8332	4.4941	4.1925	3.9232	3.6819
11	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.4951	5.9377	5.4527	5.0286	4.6560	4.3271	4.0354	3.7757
12	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	6.8137	6.1944	5.6603	5.1971	4.7932	4.4392	4.1274	3.8514
13	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.1034	6.4235	5.8424	5.3423	4.9095	4.5327	4.2028	3.9124
14	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.3667	6.6282	6.0021	5.4675	5.0081	4.6106	4.2646	3.9616
15	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	7.6061	6.8109	6.1422	5.5755	5.0916	4.6755	4.3152	4.0013
16	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	7.8237	6.9740	6.2651	5.6685	5.1624	4.7296	4.3567	4.0333
17	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.0216	7.1196	6.3729	5.7487	5.2223	4.7746	4.3908	4.0591
18	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.2014	7.2497	6.4674	5.8178	5.2732	4.8122	4.4187	4.0799
19	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.3649	7.3658	6.5504	5.8775	5.3162	4.8435	4.4415	4.0967
20	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	8.5136	7.4694	6.6231	5.9288	5.3527	4.8696	4.4603	4.1103
21	15.4150	14.0292	12.8212	11.7641	10.8355	10.0168	8.6487	7.5620	6.6870	5.9731	5.3837	4.8913	4.4756	4.1212
22	15.9369	14.4511	13.1630	12.0416	11.0612	10.2007	8.7715	7.6446	6.7429	6.0113	5.4099	4.9094	4.4882	4.1300
23	16.4436	14.8568	13.4886	12.3034	11.2722	10.3711	8.8832	7.7184	6.7921	6.0442	5.4321	4.9245	4.4985	4.1371
24	16.9355	15.2470	13.7986	12.5504	11.4693	10.5288	8.9847	7.7843	6.8351	6.0726	5.4509	4.9371	4.5070	4.1428
25	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.0770	7.8431	6.8729	6.0971	5.4669	4.9476	4.5139	4.1474
26	17.8768	15.9828	14.3752	13.0032	11.8258	10.8100	9.1609	7.8957	6.9061	6.1182	5.4804	4.9563	4.5196	4.1511
27	18.3270	16.3296	14.6430	13.2105	11.9867	10.9352	9.2372	7.9426	6.9352	6.1364	5.4919	4.9636	4.5243	4.1542
28	18.7641	16.6631	14.8981	13.4062	12.1371	11.0511	9.3066	7.9844	6.9607	6.1520	5.5016	4.9697	4.5281	4.1566
29	19.1885	16.9837	15.1411	13.5907	12.2777	11.1584	9.3696	8.0218	6.9830	6.1656	5.5098	4.9747	4.5312	4.1585
30	19.6004	17.2920	15.3725	13.7648	12.4090	11.2578	9.4269	8.0552	7.0027	6.1772	5.5168	4.9789	4.5338	4.1601
40	23.1148	19.7928	17.1591	15.0463	13.3317	11.9246	9.7791	8.2438	7.1050	6.2335	5.5482	4.9966	4.5439	4.1659

Chapter 11 Review Questions

1. John Watson's uncle recently passed away, and included in the property that he inherited is a bond that pays an 8% coupon, has a face value of \$1,000, has 10 years to maturity, and the investors require a rate of return of 10%. Assuming annual coupon payments, what is the value of the bond?

- A. \$386.00
- B. \$491.60
- C. \$614.50
- D. \$877.60

2. On November 1, 2010, a company purchased a new machine that it does not have to pay for until November 1, 2012. The total payment on November 1, 2012 will include both principal and interest. Assuming interest at a 10% rate, the cost of the machine would be the total payment multiplied by what time value of money concept?

- A. Present value of annuity of 1.
- B. Present value of 1.
- C. Future amount of annuity of 1.
- D. Future amount of 1.

3. Pole Co. is investing in a machine with a 3-year life. The machine is expected to reduce annual cash operating costs by \$30,000 in each of the first 2 years and by \$20,000 in year 3. Using a 14% cost of capital (discount rate), what is the present value of these future savings? Note: The Present Values of \$1 at 14% for period 1 = 0.88, for period 2 = 0.77, and for period 3 = 0.68. The Present Values of an Annuity of \$1 at 14% for period 1 = 0.88, for period 2 = 1.65, and period 3 = 2.32.)

- A. \$59,600
- B. \$69,600
- C. \$63,100
- D. \$69,500

Chapter 11 Review Questions

1. John Watson's uncle recently passed away, and included in the property that he inherited is a bond that pays an 8% coupon, has a face value of \$1,000, has 10 years to maturity, and the investors require a rate of return of 10%. Assuming annual coupon payments, what is the value of the bond?

- A. Incorrect. \$386 results from only taking into account the present value of the lump sum principal of the bond.
- B. Incorrect. \$491.60 results from only taking into account the annuity of coupon payments.
- C. Incorrect. \$614.50 results from incorrectly multiplying the bond's \$1,000 face value by the annuity interest factor, 6.145, instead of the interest factor for the present value of the lump sum, 0.386.
- D. **Correct.** The value of the bond is equal to the sum of (1) the product of the coupon payments and the correct annuity factor, and (2) the product of the face value of the bond and the correct present value factor. Because the bond has 10 periods to maturity and the effective interest rate is 10%, the interest factor for the present value of the lump sum is 0.386, and the interest factor for the present value of the annuity is 6.145. Therefore, multiplying the \$80 annual interest payment by its interest factor of 6.145 equals a present value of \$491.60. Also, the present value of the lump sum is equal to the \$1,000 face value of the bond multiplied by 0.386, which equals \$386.00. Thus, the total value of the bond is the sum of these two present values, or \$877.60.

2. On November 1, 2010, a company purchased a new machine that it does not have to pay for until November 1, 2012. The total payment on November 1, 2012 will include both principal and interest. Assuming interest at a 10% rate, the cost of the machine would be the total payment multiplied by what time value of money concept?

- A. Incorrect. The present value of an annuity determines the value today of a series of future payments (not merely one payment).
- B. **Correct.** The cost of the machine to the company on November 1, 2010 is the present value of the payment to be made on November 1, 2012. To obtain the present value, i.e., today's price, the future payment is multiplied by the present value of \$1 for two periods at 10%.
- C. Incorrect. The future value of an annuity determines the amount available at a specified time in the future after a series of deposits (investments).
- D. Incorrect. The future value of a dollar determines how much will be available at a specified time in the future based on the single investment (deposit) today.

3. Pole Co. is investing in a machine with a 3-year life. The machine is expected to reduce annual cash operating costs by \$30,000 in each of the first 2 years and by \$20,000 in year 3. Using a 14% cost of capital (discount rate), what is the present value of these future savings? Note: The Present Values of \$1 at 14% for period 1 = 0.88, for

period 2 = 0.77, and for period 3 = 0.68. The Present Values of an Annuity of \$1 at 14% for period 1 = 0.88, for period 2 = 1.65, and period 3 = 2.32.)

- A. Incorrect. \$59,600 equals the present value of a 3-year annuity for \$30,000, minus \$10,000.
- B. Incorrect. The present value of a 3-year annuity of \$30,000 is \$69,600.
- C. **Correct.** Using a 14% cost of capital and ignoring tax effects, the present value of a \$30,000 annuity discounted over a 2-year period is \$49,500 ($\$30,000 \times 1.65$). The present value of \$20,000 in year 3 is \$13,600 ($\$20,000 \times 0.68$). Hence, the total present value of the future savings is \$63,100.
- D. Incorrect. \$69,500 equals the present value of a 2-year annuity for \$30,000, plus \$20,000.

Chapter 12:

Capital Budgeting Decisions

Learning Objectives

After studying this chapter, you will be able to:

- Identify the types of capital budgeting decisions.
 - Recognize each of basic capital investment analysis techniques.
 - Understand the various types of depreciation methods.
 - Compute the ROI on an investment.
-

Capital budgeting is the process of making long-term investment decisions. These decisions should be made in light of the goals of the company. The stockholders have entrusted the company with their money and they expect the firm to invest their money wisely. Investments in fixed assets should be consistent with the goal of maximizing the market value of the firm.

There are many investment decisions that the company may have to make in order to grow. Examples of capital budgeting applications are product line selection, keep or sell a business segment decisions, lease or buy decisions, and determination of which asset to invest in. To make long-term investment decisions in accordance with its goal, you must perform three tasks in evaluating capital budgeting projects: (1) estimate cash flows, (2) estimate the cost of capital (or required rate of return), and (3) apply a decision rule to determine if a project is "good" or "bad."

Types of Investment Projects

There are typically two types of long-term investment decisions made by your company:

1. *Selection decisions* in terms of obtaining new facilities or expanding existing facilities: Examples include:
 - a. Investments in property, plant, and equipment as well as other types of assets.
 - b. Resource commitments in the form of new product development, market research, information technology (IT), refunding of long-term debt, etc.
 - c. Mergers and acquisitions in the form of buying another company to add a new product line.

2. *Replacement decisions* in terms of replacing existing facilities with new facilities. Examples include replacing an old machine with a high-tech machine.

What Are the Features of Investment Projects?

Long-term investments have three important features:

3. They typically involve a large amount of initial cash outlays that tend to have a long-term impact on the firm's future profitability. Therefore, this initial cash outlay needs to be justified on a cost-benefit basis.
4. There are expected recurring cash inflows (for example, increased revenues, savings in cash operating expenses, etc.) over the life of the investment project. This frequently requires considering the *time value of money*.
5. Income taxes could make a difference in the accept or reject decision. Therefore, income tax factors must be taken into account in every capital budgeting decision.

How Do You Measure Investment Worth?

Several methods of evaluating investment projects are as follows:

1. Payback period
2. Accounting rate of return (ARR)
3. Net present value (NPV)
4. Internal rate of return (IRR)
5. Profitability index (or cost/benefit ratio)

The NPV method and the IRR method are called *discounted cash flow (DCF)* methods. Each of these methods is discussed below.

Payback Period

The *payback period* measures the length of time required to recover the amount of initial investment. It is computed by dividing the initial investment by the cash inflows through increased revenues or cost savings.

Examples 12-1 and 12-2 calculate the payback periods for two different situations.

EXAMPLE 12-1. Consider the following data:

Cost of investment	\$18,000
Annual after-tax cash savings	\$3,000

Then, the payback period is formulated as follows:

$$\text{Payback period} = \frac{\text{initial investment}}{\text{cost savings}} = \frac{\$18,000}{\$3,000} = 6 \text{ years}$$

Decision rule: Choose the project with the shorter payback period. The rationale behind this choice is: The shorter the payback period, the less risky the project, and the greater the liquidity.

EXAMPLE 12-2. Consider the two projects whose after-tax cash inflows are not even. Assume each project costs \$1,000.

Year	Cash Inflow	
	A(\$)	B(\$)
1	100	500
2	200	400
3	300	300
4	400	100
5	500	
6	600	

When cash inflows are not even, the payback period has to be found by trial and error. The payback period of project A is (\$1,000 = \$100 + \$200 + \$300 + \$400) 4 years. The payback period of project B is \$1,000 = \$500 + \$400 + \$100):

$$2 \text{ years} + \$100/\$300 = 2\text{-}1/3 \text{ years}$$

Project B is the project of choice in this case, since it has the shorter payback period.

The advantages of using the payback period method of evaluating an investment project are that (1) it is simple to compute and easy to understand, and (2) it handles investment risk effectively. The shortcomings of this method are that (1) it does not recognize the time value of money, and (2) it ignores the impact of cash inflows received after the payback period; essentially, cash flows after the payback period determine profitability of an investment.

Accounting Rate of Return

Accounting rate of return (ARR) measures profitability from the conventional accounting standpoint by relating the required investment or sometimes the average investment to the future annual net income.

Decision rule: Under the ARR method, choose the project with the higher rate of return.

EXAMPLE 12-3. Consider the following investment:

Initial investment	\$6,500
Estimated life	20 years
Cash inflows per year	\$1,000
Depreciation per year (using straight line method)	\$325

The accounting rate of return for this project is:

$$\text{APR} = \frac{\text{net income}}{\text{investment}} = \frac{\$1000 - \$325}{\$6,500} = 10.4\%$$

If average investment (usually assumed to be one-half of the original investment) is used, then:

$$\text{APR} = \frac{\$1,000 - \$325}{\$3,250} = 20.8\%$$

The advantages of this method are that it is easily understandable, simple to compute, and recognizes the profitability factor.

The shortcomings of this method are that it fails to recognize the time value of money, and it uses accounting data instead of cash flow data.

Net Present Value

Net present value (NPV) is the excess of the present value (PV) of cash inflows generated by the project over the amount of the initial investment (I):

$$\text{NPV} = \text{PV} - I$$

The present value of future cash flows is computed using the so-called cost of capital (or minimum required rate of return) as the discount rate. In the case of an annuity, the present value would be

$$\text{PV} = A \cdot T_4(i, n)$$

where A is the amount of the annuity. The value of T_4 is found in Table 11-4.

Decision rule: If NPV is positive, accept the project. Otherwise reject it.

EXAMPLE 12-4. Consider the following investment:

Initial investment	\$12,950
Estimated life	10 years
Annual cash inflows	\$3,000
Cost of capital (minimum required rate of return)	12%

Present value of the cash inflows is:

$$\begin{aligned} \text{PV} &= A \cdot T_4(i, n) \\ &= \$3,000 \cdot T_4(12\%, 10 \text{ years}) \\ &= \$3,000 (5.650) && \$16,950 \\ \text{Initial investment (I)} &&& \underline{12,950} \\ \text{Net present value (NPV} &= \text{PV} - \text{I)} && \underline{\underline{\$ 4,000}} \end{aligned}$$

Since the NPV of the investment is positive, the investment should be accepted.

The advantages of the NPV method are that it obviously recognizes the time value of money and it is easy to compute whether the cash flows form an annuity or vary from period to period.

Internal Rate of Return

Internal rate of return (IRR) is defined as the rate of interest that equates I with the PV of future cash inflows. In other words, at IRR,

$$I = PV$$

or

$$NPV = 0$$

Decision rule: Accept the project if the IRR exceeds the cost of capital. Otherwise, reject it.

EXAMPLE 12-5. Assume the same data given in Example 12-4, and set the following equality (I=PV):

$$\$12,950 = \$3,000 \cdot T_4(i, 10 \text{ years})$$

$$T_4(i, 10 \text{ years}) = \$12,950/\$3,000 = 4.317$$

which stands somewhere between 18 percent and 20 percent in the 10-year line of Table 11-4. The interpolation follows:

	PV of an Annuity of \$1 Factor $T_4(i, 10 \text{ years})$	
18%	4.494	4.495
IRR	4.317	
20%	_____	<u>4.192</u>
Difference	<u>0.1777</u>	<u>0.302</u>

Therefore,

$$\begin{aligned} \text{IRR} &= 18\% + (0.177/0.302) (20\% - 18\%) \\ &= 18\% + 0.586(2\%) = 18\% + 1.17\% = 19.17\% \end{aligned}$$

Since the IRR of the investment is greater than the cost of capital (12 percent), accept the project.

The advantage of using the IRR method is that it does consider the time value of money and, therefore, is more exact and realistic than the ARR method. The shortcomings of this method are that (1) it is time-consuming to compute, especially when the cash inflows are not even, although most business calculators have a program to calculate IRR, and (2) it fails to recognize the varying sizes of investment in competing projects.

When cash inflows are not even, IRR is computed by the trial and error method, which is not discussed here. Financial calculators such as Texas Instruments and Sharp have a key for IRR calculations.

Profitability Index

The profitability index is the ratio of the total PV of future cash inflows to the initial investment, that is, PV/I. This index is used as a means of ranking projects in descending order of attractiveness.

Decision rule: If the profitability index is greater than 1, then accept the project.

EXAMPLE 12-6. Using the data in Example 12-4, the profitability index is

$$\frac{PV}{I} = \frac{\$16,950}{\$12,950} = 1.31$$

Since this project generates \$1.31 for each dollar invested (i.e., its profitability index is greater than 1), accept the project.

The profitability index has the advantage of putting all projects on the same relative basis regardless of size.

Selecting the Best Mix of Projects With a Limited Budget

Many firms specify a limit on the overall budget for capital spending. Capital rationing is concerned with the problem of selecting the mix of acceptable projects that provides the highest overall NPV. The profitability index is used widely in ranking projects competing for limited funds.

EXAMPLE 12-7. A company with a fixed budget of \$250,000 needs to select a mix of acceptable projects from the following:

Projects	I(\$)	PV(\$)	NPV(\$)	Profitability Index	Ranking
A	70,000	112,000	42,000	1.6	1
B	100,000	145,000	45,000	1.45	2
C	110,000	126,500	16,500	1.15	5
D	60,000	79,000	19,000	1.32	3
E	40,000	38,000	-2,000	0.95	6
F	80,000	95,000	15,000	1.19	4

The ranking resulting from the profitability index shows that the company should select projects A, B, and D.

	I	PV
A	\$70,000	\$112,000
B	100,000	145,000
D	<u>60,000</u>	<u>79,000</u>
	<u>230,000</u>	<u>\$336,000</u>

Therefore,

$$\text{NPV} = \$336,000 - \$230,000 = \$106,000$$

Income Taxes and Investment Decisions

Income taxes make a difference in many capital budgeting decisions. In other words, the project that is attractive on a before-tax basis may have to be rejected on an after-tax basis. Income taxes typically affect both the amount and the timing of cash flows. Since net income, not cash inflows, is subject to tax, after-tax cash inflows are not usually the same as after-tax net income.

Let us define:

S = Sales

E = Cash operating expenses

d = Depreciation

t = Tax rate

Then,

$$\begin{aligned} \text{before-tax cash inflows (or before-tax cash savings)} &= S - E \\ \text{and net income} &= S - E - d. \end{aligned}$$

By definition,

$$\begin{aligned} \text{After-tax cash inflows} &= \text{Before-tax cash inflows} - \text{Taxes} \\ &= (S - E) - (S - E - d)(t) \end{aligned}$$

Rearranging gives the short-cut formula: After-tax cash inflows = $(S - E)(1 - t) + (d)(t)$

As can be seen, the deductibility of depreciation from sales in arriving at net income subject to taxes reduces income tax payments and thus serves as a tax shield.

$$\text{Tax shield} = \text{Tax savings on depreciation} = (d)(t)$$

EXAMPLE 12-8. Assume:

S = \$12,000

E = \$10,000

d = \$500 per year using the straight line method

t = 30%

Then,

$$\begin{aligned} \text{After-tax cash inflow} &= (\$12,000 - \$10,000)(1 - 0.3) + (\$500)(0.3) \\ &= (\$2,000)(.7) + (\$500)(0.3) \\ &= \$1,400 + \$150 = \$1,550 \end{aligned}$$

Note that a tax shield = tax savings on depreciation = $(d)(t)$
 $= (\$500)(.3) = \150

Since the tax shield is dt , the higher the depreciation deduction, the higher the tax savings on depreciation will be. Therefore, an accelerated depreciation method (such as double-declining balance) produces higher tax savings than the straight-line method. Accelerated methods produce higher present values for the tax savings that may make a given investment more attractive.

EXAMPLE 12-9. The Shalimar Company estimates that it can save \$2,500 a year in cash operating costs for the next ten years if it buys a special-purpose machine at a cost of \$10,000. No salvage value is expected. Assume that the income tax rate is 30%, and the after-tax cost of capital (minimum required rate of return) is 10%. After-tax cash savings can be calculated as follows:

Note that depreciation by straight-line is $\$10,000/10 = \$1,000$ per year. Here before-tax cash savings = $(S - E) = \$2,500$. Thus,

$$\begin{aligned} \text{After-tax cash savings} &= (S - E)(1 - t) + (d)(t) \\ &= \$2,500(1 - 0.3) + \$1,000(0.3) \\ &= \$1,750 + \$300 = \$2,050 \end{aligned}$$

To see if this machine should be purchased, the net present value can be calculated.

$$PV = \$2,050 T_4(10\%, 10 \text{ years}) = \$2,050 (6.145) = \$12,597.25$$

Thus, $NPV = PV - I = \$12,597.25 - \$10,000 = \$2,597.25$

Since NPV is positive, the machine should be purchased.

Types of Depreciation Methods

We saw that depreciation provided the tax shield in the form of $(d)(t)$. Among the commonly used depreciation methods are straight-line and accelerated methods. The two major accelerated methods are sum-of-the-years'-digits (SYD) and double-declining-balance (DDB).

Straight-Line Method

This is the easiest and most popular method of calculating depreciation. It results in equal periodic depreciation charges. The method is most appropriate when an asset's usage is uniform from period to period, as is the case with furniture. The annual depreciation expense is calculated by using the following formula:

$$\text{Depreciation expense} = \frac{\text{cost} - \text{salvage value}}{\text{number of years of useful life}}$$

EXAMPLE 12-10. An auto is purchased for \$20,000 and has an expected salvage value of \$2,000. The auto's estimated life is 8 years. Its annual depreciation is calculated as follows:

$$\begin{aligned} \text{Depreciation expense} &= \frac{\text{cost} - \text{salvage value}}{\text{number of years of useful life}} \\ &= (\$20,000 - \$2,000) / 8 \text{ years} = \$2,250 \text{ per year} \end{aligned}$$

An alternative means of computation is to multiply the *depreciable* cost (\$18,000) by the annual depreciation rate, which is 12.5 percent in this example. The annual rate is calculated by dividing the number of years of useful life into one (1/8 = 12.5%). The result is the same: \$18,000 x 12.5% = \$2,250.

Sum-of-the-Years-Digits (SYD) Method

In this method, the number of years of life expectancy is enumerated in reverse order in the numerator, and the denominator is the sum of the digits. For example, if the life expectancy of a machine is 8 years, write the numbers in reverse order: 8, 7, 6, 5, 4, 3, 2, 1. The sum of these digits is 36, or (8 + 7 + 6 + 5 + 4 + 3 + 2 + 1). Thus, the fraction for the first year is 8/36, while the fraction for the last year is 1/36. The sum of the eight fractions equals 36/36, or 1. Therefore, at the end of 8 years, the machine is completely written down to its salvage value.

The following formula may be used to quickly find the sum-of-the-years' digits (S):

$$S = \frac{(N)(N + 1)}{2}$$

where N represents the number of years of expected life.

EXAMPLE 12-11. In Example 12-10, the *depreciable* cost is \$18,000 (\$20,000 - \$2,000). Using the SYD method, the computation for each year's depreciation expense is

$$S = \frac{(N)(N + 1)}{2} = \frac{8(9)}{2} = \frac{72}{2} = 36$$

Year	Fraction	x Depreciation Amount (\$)	= Depreciation Expense
1	8/36	\$18,000	\$ 4,000
2	7/36	18,000	3,500
3	6/36	18,000	3,000
4	5/36	18,000	2,500
5	4/36	18,000	2,000
6	3/36	18,000	1,500
7	2/36	18,000	1,000
8	1/36	18,000	<u>500</u>
Total			<u>\$18,000</u>

Double-Declining-Balance (DDB) Method

Under this method, depreciation expense is highest in the earlier years and lower in the later years. First, a depreciation rate is determined by doubling the straight-line rate. For example, if an asset has a life of 10 years, the straight-line rate is 1/10 or 10 percent, and the double-declining rate is 20 percent. Second, depreciation expense is computed by multiplying the rate by the book value of the asset at the beginning of each year. Since book value declines over time, the depreciation expense decreases each successive period.

This method *ignores* salvage value in the computation. However, the book value of the fixed asset at the end of its useful life cannot be below its salvage value.

EXAMPLE 12-12. Assume the data in Example 12-10. Since the straight-line rate is 12.5 percent (1/8), the double-declining-balance rate is 25 percent (2 x 12.5%). The depreciation expense is computed as follows:

Year	Book Value at beginning of year	x	Rate (%) =	Depreciation Expense	Year-end Book Value
1	\$20,000		25%	\$5,000	\$15,000
2	15,000		25	3,750	11,250
3	11,250		25	2,813	8,437
4	8,437		25	2,109	6,328
5	6,328		25	1,582	4,746
6	4,746		25	1,187	3,559
7	3,559		25	667	2,002

Note: If the original estimated salvage value had been \$2,100, the depreciation expense for the eighth year would have been \$569 (\$2,669 - \$2,100) rather than \$667, since the asset cannot be depreciated below its salvage value.

TABLE 12-1. Modified Accelerated Cost Recovery System
Classification of Assets
Property class

<i>Year</i>	<i>3-year</i>	<i>5-year</i>	<i>7-year</i>	<i>10-year</i>	<i>15-year</i>	<i>20-year</i>
1	33.3%	20.0%	14.3%	10.0%	5.0%	3.8%
2	44.5	32.0	24.5	18.0	9.5	7.2
3	14.8a	19.2	17.5	14.4	8.6	6.7
4	7.4	11.5a	12.5	11.5	7.7	6.2
5		11.5	8.9a	9.2	6.9	5.7
6		5.8	8.9	7.4	6.2	5.3
7			8.9	6.6a	5.9a	4.9
8			4.5	6.6	5.9	4.5a
9				6.5	5.9	4.5
10				6.5	5.9	4.5
11				3.3	5.9	4.5
12					5.9	4.5
13					5.9	4.5
14					5.9	4.5
15					5.9	4.5
16					3.0	4.4
17						4.4
18						4.4
19						4.4
20						4.4
21						<u>2.2</u>
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>

a. Denotes the year of changeover to straight-line depreciation.

How Does MACRS Affect Investment Decisions?

Although the traditional depreciation methods still can be used for computing depreciation for book purposes, 1981 saw a new way of computing depreciation deductions for tax purposes. The new rule is called the *Modified*

Accelerated Cost Recovery System (MACRS) rule, was enacted by Congress in 1981 and then modified somewhat in 1986 under the Tax Reform Act of 1986. This rule is characterized as follows:

1. It abandons the concept of useful life and accelerates depreciation deductions by placing all depreciable assets into one of eight age property classes. It calculates deductions, based on an allowable percentage of the asset's original cost (See Tables 12-1 and 12-2). With a shorter life than useful life, the company would be able to deduct depreciation more quickly and save more in income taxes in the earlier years, thereby making an investment more attractive. The rationale behind the system is that this way the government encourages the company to invest in facilities and increase its productive capacity and efficiency. (Remember that the higher d , the larger the tax shield $(d)(t)$).
2. Since the allowable percentages in Table 12-2 add up to 100%, there is no need to consider the salvage value of an asset in computing depreciation.
3. The company may elect the straight line method. The straight-line convention must follow what is called the *half-year convention*. This means that the company can deduct only half of the regular straight-line depreciation amount in the first year. The reason for electing to use the MACRS optional straight-line method is that some firms may prefer to stretch out depreciation deductions using the straight-line method rather than to accelerate them. Those firms are the ones that just start out or has little or no income and wish to show more income on their income statements.

TABLE 12-2
MACRS TABLES BY PROPERTY CLASS

MACRS Property Class & Depreciation Method	Useful Life (ADR Midpoint Life)	Examples of Assets
3-year property 200% declining balance	4 years or less	Most small tools are included; the law specifically excludes autos and light trucks from this property class.
5-year property 200% declining balance	More than 4 years to Less than 10 years	Autos and light trucks, computers, typewriters, copiers, duplicating equipment, heavy general-purpose trucks, and research and experimentation equipment are included.
7-year property 200% declining balance	10 years or more to less than 16 years	Office furniture and fixtures, and most items of machinery and equipment used in production are included
10-year property 200% declining balance	16 years or more to less than 20 years	Various machinery and equipment, such as that used in petroleum distilling and refining and in the milling of grain, are included.
15-year property 150% declining balance	20 years or more to less than 25 years	Sewage treatment plants telephone and electrical distribution facilities, and land improvements are included.
20-year property 150% declining balance	25 years or more	Service stations and other real property with an ADR midpoint life of less than 27.5 years are included.
27.5-year property straight-line	Not applicable	All residential rental property is included.
31.5-year property straight-line	Not applicable	All nonresidential real property is included.

“a” The term ADR midpoint life means the “useful life” of an asset in a business sense; the appropriate ADR midpoint lives for assets are designated in the tax Regulations.

EXAMPLE 12-13. Assume that a machine falls under a 3-year property class and costs \$3,000 initially. The straight line option under MACRS differs from the traditional straight line method in that under this method the company would deduct only \$500 depreciation in the first year and the fourth year ($\$3,000/3 \text{ years} = \$1,000$; $\$1,000/2 = \500). The table below compares the straight line with half-year convention with the MACRS.

<u>Year</u>	<u>Straight Line (half-year) depreciation</u>	<u>Cost</u>		<u>MACRS %</u>	<u>MACRS deduction</u>
1	\$500	\$3,000	x	33.3%	\$999
2	1,000	3,000	x	44.5	1,335
3	1,000	3,000	x	14.8	444
4	<u>500</u>	3,000	x	7.4	<u>222</u>
	<u>\$3,000</u>				<u>\$3,000</u>

EXAMPLE 12-14. A machine costs \$1,000. Annual cash inflows are expected to be \$500. The machine will be depreciated using the MACRS rule and will fall under the 3-year property class. The cost of capital after taxes is 10%. The estimated life of the machine is 4 years. The tax rate is 30%. The formula for computation of after-tax cash inflows $(S - E)(1 - t) + (d)(t)$ needs to be computed separately. The NPV analysis can be performed as follows:

<u>(S - E)(1 - t):</u>				<u>Present Value factor @</u>		<u>Present</u>	
<u>\$500(1 - 0.3) = \$350 for 4 years</u>				<u>10%</u>		<u>value</u>	
					3.170 ^(a)	\$1,109.5	
<u>Year</u>	<u>Cost</u>		<u>MACRS%</u>	<u>d</u>	<u>(d)(t)</u>		
1	\$1,000	x	33.3%	\$333	\$99.9	.909(b)	90.81
2	\$1,000	x	44.5	445	133.5	.826(b)	110.27
3	\$1,000	x	14.8	148	44.4	.751(b)	33.34
4	\$1,000	x	7.4	74	22.2	.683(b)	<u>15.16</u>
							<u>\$1,359.08</u>

(a) $T_4(10\%, 4 \text{ years}) = 3.170$ (from Table 11-4).

(b) T_3 values obtained from Table 11-3.

Therefore, $NPV = PV - I = \$1,359.08 - \$1,000 = \$359.08$, which is positive, so that the machine should be bought.

The Cost of Capital

The cost of capital is defined as the rate of return that is necessary to maintain the market value of the firm (or price of the firm's stock). Project managers must know the cost of capital, often called the *minimum required rate of return*, in making capital budgeting decisions. It has been used either as a discount rate under the NPV method or as a hurdle rate under the IRR method. The cost of capital is computed as a weighted average of the various capital components, which are items on the right-hand side of the balance sheet such as debt, preferred stock, common stock, and retained earnings.

Cost of Debt and Preferred Stock

The cost of debt is stated on an after-tax basis, since the interest on the debt is tax deductible. However, the cost of preferred stock is the stated annual dividend rate. This rate is not adjusted for income taxes because the preferred dividend, unlike debt interest, is not a deductible expense in computing corporate income taxes.

EXAMPLE 12-15. Assume that the Hume Company issues a \$1,000, 8 percent, 20-year bond whose net proceeds are \$940. The tax rate is 40 percent. Then, the after-tax cost of debt is:

$$8.00\% (1-0.4) = 4.8\%$$

EXAMPLE 12-16. Suppose that the Hume company has preferred stock that pays a \$12 dividend per share and sells for \$100 per share in the market. Then the cost of preferred stock is:

$$\frac{\text{Dividend per share}}{\text{Price per share}} = \frac{\$12}{\$100} = 12\%$$

Cost of Common Stock

The cost of common stock is generally viewed as the rate of return investors require on a firm's common stock. One way to measure the cost of common stock is to use the *Gordon's growth model*. The model is

$$P_0 = \frac{D_1}{r - g}$$

where

- P_0 = value (or market price) of common stock
- D_1 = dividend to be received in 1 year
- r = investor's required rate of return
- g = rate of growth (assumed to be constant over time)

Solving the model for r results in the formula for the cost of common stock:

$$r = \frac{D_1}{P_0} + g$$

EXAMPLE 12-17. Assume that the market price of the Hume Company's stock is \$40. The dividend to be paid at the end of the coming year is \$4 per share and is expected to grow at a constant annual rate of 6 percent. Then the cost of this common stock is:

$$\frac{D_1}{P_0} + g = \frac{\$4}{\$40} + 6\% = 16\%$$

Cost of Retained Earnings

The cost of retained earnings is closely related to the cost of existing common stock, since the cost of equity obtained by retained earnings is the same as the rate of return investors require on the firm's common stock.

Measuring the Overall Cost of Capital

The firm's overall cost of capital is the weighted average of the individual capital costs, with the weights being the proportions of each type of capital used.

$$\sum (\text{percentage of the total capital structure supplied by each source of capital} \times \text{cost of capital for each source})$$

The computation of overall cost of capital is illustrated in the following example.

EXAMPLE 12-18. Assume that the capital structure at the latest statement date is indicative of the proportions of financing that the company intends to use over time:

		<u>Cost</u>
Bonds (\$1,000 par)	\$20,000,000	4.80%
Preferred stock (\$100 par)	5,000,000	12.00
Common stock (\$40 par)	20,000,000	16.00
Retained earnings	<u>5,000,000</u>	16.00
Total	<u>\$50,000,000</u>	

These proportions would be applied to the assumed individual explicit after-tax costs below:

<u>Source</u>	<u>Weights</u>	<u>Cost</u>	<u>Weighted Cost</u>
Debt	40%(a)	4.80%	1.92%(b)
Preferred stock	10	12.00%	1.20
Common stock	40	16.00%	6.40

Retained earnings	<u>10</u>	16.00%	<u>1.60</u>
	<u>100%</u>		<u>11.12%</u>

(a) $\$20,000,000/\$50,000,000 = .40 = 40\%$

(b) $4.80\% \times 40\% = 1.92\%$

Overall cost of capital is 11.12%

By computing a company's cost of capital, we can determine its minimum rate of return, which is used as the discount rate in present value calculations and in calculating an investment center's residual income (RI). A company's cost of capital is also an indicator of risk. For example, if your company's cost of financing increases, it is being viewed as more risky by investors and creditors, who are demanding higher return on their investments in the form of higher dividend and interest rates.

Conclusion

We have examined the process of evaluating investment projects. We have also discussed five commonly used criteria for evaluating capital budgeting projects, including the net present value (NPV) and internal rate of return (IRR) methods. The problems that arise with mutually exclusive investments and capital rationing were addressed. Since income taxes could make a difference in the accept or reject decision, tax factors must be taken into account in every decision.

Although the traditional depreciation methods still can be used for computing depreciation for book purposes, 1981 introduced a new way of computing depreciation deductions for tax purposes. The new rule is called the accelerated cost recovery system (MACRS). It was enacted by Congress in 1981 and then modified somewhat in 1986 under the Tax Reform Act of 1986. We illustrated the use of MACRS, and presented an overview of the traditional depreciation methods. We also covered how to calculate a firm's cost of capital, which is used either as a discount rate under the NPV method or as a hurdle rate under the IRR method earlier in the chapter and in calculating the residual income (RI) in Chapter 13.

Chapter 12 Review Questions

1. Doro Co. is considering the purchase of a \$100,000 machine that is expected to result in a decrease of \$25,000 per year in cash expenses after taxes. This machine, which has no residual value, has an estimated useful life of 10 years and will be depreciated on a straight-line basis. For this machine, the accounting rate of return (ARR) based on initial investment would be

- A. 10%
- B. 15%
- C. 25%
- D. 35%

2. Neu Co. is considering the purchase of an investment that has a positive net present value (NPV) based on Neu's 12% hurdle rate (minimum required rate of return). The internal rate of return would be

- A. 0
- B. 12%
- C. > 12%
- D. < 12%

Chapter 12 Review Answers

1. Doro Co. is considering the purchase of a \$100,000 machine that is expected to result in a decrease of \$25,000 per year in cash expenses after taxes. This machine, which has no residual value, has an estimated useful life of 10 years and will be depreciated on a straight-line basis. For this machine, the accounting rate of return (ARR) based on initial investment would be

- A. Incorrect. 10% is the depreciation rate per year.
- B. **Correct.** The ARR is based on the accrual method and does not discount future cash flows. Accordingly, the ARR equals the decrease in annual cash expenses after taxes minus annual depreciation, divided by the initial investment. Annual straight-line depreciation is \$10,000 [(\$100,000 cost - \$0 salvage value) ÷ 10 years]. So the ARR would be $(\$25,000 - \$10,000) / \$100,000 = 15\%$.
- C. Incorrect. Depreciation must be deducted from the \$25,000 of cash expenses.
- D. Incorrect. Depreciation must be deducted from, not added to, the \$25,000 of cash expenses.

2. Neu Co. is considering the purchase of an investment that has a positive net present value (NPV) based on Neu's 12% hurdle rate (minimum required rate of return). The internal rate of return would be

- A. Incorrect. The IRR of 0 less than the 12% hurdle rate indicates that the NPV should be significantly negative.
- B. Incorrect. The NPV should be 0 when the IRR is equal to the hurdle rate of 12%.
- C. **Correct.** Internal rate of return (IRR) is defined as the rate of interest that equates initial investment (I) with the PV of future cash inflows. In other words, at IRR, $I = PV$ or $NPV = 0$. As long as r is greater than the NPV's hurdle rate, the NPV must be positive (greater than zero). Because Neu has a positive NPV based on a 12%, the IRR must be greater than 12%.
- D. Incorrect. The $NPV > 0$ means that the IRR should be greater than the minimum rate of return (12% in this problem).

Chapter 13:

Improving Managerial Performance

Learning Objectives

After studying this chapter, you will be able to:

- Recognize and apply the rate of return on investments (ROI).
 - Explain the basic components of the Du Pont formula used to improve profit.
-

The ability to measure managerial performance is essential in controlling operations toward the achievement of organizational goals. As companies grow or their activities become more complex, they attempt to decentralize decision making as much as possible. They do this by restructuring the firm into several divisions and treating each as an independent business. The managers of these subunits or segments are then evaluated on the basis of the effectiveness with which they use the assets entrusted to them. Managerial performance should ideally be evaluated only on the basis of those factors controllable by the manager. Managers may control revenues, costs, and/or investments in resources.

Perhaps the most widely used single measure of success of an organization and its subunits is the rate of return on investment (ROI). Related is the return to stockholders, known as the return on equity (ROE).

What is Return on Investment (ROI)?

ROI relates net income to invested capital (total assets). ROI provides a standard for evaluating how efficiently management employs the average dollar invested in a firm's assets, whether that dollar came from owners or creditors. Furthermore, a better ROI can also translate directly into a higher return on the stockholders' equity.

ROI is calculated as:

$$\text{ROI} = \frac{\text{Net profit after taxes}}{\text{Total assets}}$$

EXAMPLE 13-1. Consider the following financial data:

Total assets = \$100,000

Net profit after taxes = 18,000

$$\text{Then, ROI} = \frac{\text{Net profit after taxes}}{\text{Total assets}} = \frac{\$18,000}{\$100,000} = 18\%$$

The problem with this formula is that it only tells you about how a company did and how well it fared in the industry. It has very little value from the standpoint of profit planning.

What Does ROI Consist Of? - Du Pont Formula

ROI can be broken down into two factors--profit margin and asset turnover. In the past, managers have tended to focus only on the profit margin earned and have ignored the turnover of assets. It is important to realize that excessive funds tied up in assets can be just as much of a drag on profitability as excessive expenses. The Du Pont Corporation was the first major company to recognize the importance of looking at both net profit margin and total asset turnover in assessing the performance of an organization. The ROI breakdown, known as the *Du Pont formula*, is expressed as a product of these two factors, as shown below.

$$\begin{aligned} \text{ROI} &= \frac{\text{Net profit after taxes}}{\text{Total assets}} = \frac{\text{Net profit after taxes}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \\ &= \text{Net profit margin} \times \text{Total asset turnover} \end{aligned}$$

The Du Pont formula combines the income statement and balance sheet into this otherwise static measure of performance. Net profit margin is a measure of profitability or operating efficiency. It is the percentage of profit earned on sales. This percentage shows how many cents attach to each dollar of sales. On the other hand, total asset turnover measures how well a company manages its assets. It is the number of times by which the investment in assets turn over each year to generate sales.

The breakdown of ROI is based on the thesis that the profitability of a firm is directly related to management's ability to manage assets efficiently and to control expenses effectively.

EXAMPLE 13-2. Assume the same data as in Example 13.1. Also assume sales of \$200,000.

$$\text{Then, ROI} = \frac{\text{Net profit after taxes}}{\text{Total assets}} = \frac{\$18,000}{\$100,000} = 18\%$$

Alternatively,

$$\text{Net profit margin} = \frac{\text{Net profit after taxes}}{\text{Total assets}} = \frac{\$18,000}{\$200,000} = 9\%$$

$$\text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}} = \frac{\$200,000}{\$100,000} = 2 \text{ times}$$

Therefore,

$$\text{ROI} = \text{Net profit margin} \times \text{Total asset turnover} = 9\% \times 2 \text{ times} = 18\%$$

The breakdown provides a lot of insights to financial managers on how to improve profitability of the company and investment strategy. (Note that net profit margin and total asset turnover are called hereafter margin and turnover, respectively, for short). Specifically, it has several advantages over the original formula (i.e., net profit after taxes/total assets) for profit planning. They are:

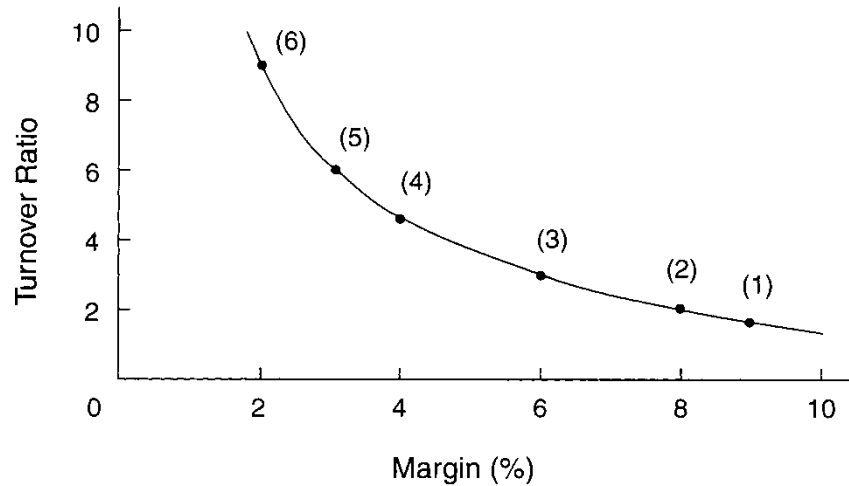
1. The importance of turnover as a key to overall return on investment is emphasized in the breakdown. In fact, turnover is just as important as profit margin in enhancing overall return.
2. The importance of sales is explicitly recognized, which is not in the original formula.
3. The breakdown stresses the possibility of trading one off for the other in an attempt to improve the overall performance of a company. The margin and turnover complement each other. In other words, a low turnover can be made up by a high margin, and vice versa.

EXAMPLE 13-3. The breakdown of ROI into its two components shows that a number of combinations of margin and turnover can yield the same rate of return, as shown below:

	Margin	x	Turnover	= ROI
(1)	9%	x	2 times	= 18%
(2)	8	x	2.25	= 18
(3)	6	x	3	= 18
(4)	4	x	4.5	= 18
(5)	3	x	6	= 18
(6)	2	x	9	= 18

The turnover-margin relationship and its resulting ROI are depicted in Figure 13-1. As the figure shows, the margin and turnover factors complement each other. Weak margin can be complemented by a strong turnover, and vice versa. It also shows how important turnover is as a key to profit making. In effect, these two factors are equally important in overall profit performance.

Figure 13-1. The Margin-Turnover Relationship



ROI And Profit Objective

Figure 13-1 can also be looked at as showing six companies that performed equally well (in terms of ROI), but with varying income statements and balance sheets. There is no ROI that is satisfactory for all companies. Sound and successful operation must point toward the optimum combination of profits, sales, and capital employed. The combination will necessarily vary depending upon the nature of the business and the characteristics of the product. An industry with products tailor-made to customers' specifications will have different margins and turnover ratios, compared with industries that mass produce highly competitive consumer goods. For example, the combination (4) may describe a supermarket operation that inherently works with low margin and high turnover, while the combination (1) may be a jewelry store that typically has a low turnover and high margin.

ROI And Profit Planning

The breakdown of ROI into margin and turnover gives management insight into planning for profit improvement by revealing where weaknesses exist: margin or turnover, or both. Various actions can be taken to enhance ROI. Generally, management can:

1. Improve margin

2. Improve turnover
3. Improve both

Alternative 1 demonstrates a popular way of improving performance. Margins may be increased by reducing expenses, raising selling prices, or increasing sales faster than expenses. Some of the ways to reduce expenses are:

1. Use less costly inputs of materials, although this can be dangerous in today's quality-oriented environment.
2. Automate processes as much as possible to increase labor productivity. But this will probably increase assets, thereby reducing turnover.
3. Bring the discretionary fixed costs under scrutiny, with various programs either curtailed or eliminated. Discretionary fixed costs arise from annual budgeting decisions by management. Examples include advertising, research and development, and management development programs. The cost-benefit analysis is called for in order to justify the budgeted amount of each discretionary program.

A company with pricing power can raise selling prices and retain profitability without losing business. Pricing power is the ability to raise prices even in poor economic times when unit sales volume may be flat and capacity may not be fully utilized. It is also the ability to pass on cost increases to consumers without attracting domestic and import competition, political opposition, regulation, new entrants, or threats of product substitution. The company with pricing power must have a unique economic position. Companies that offer unique, high-quality goods and services (where the service is more important than the cost) have this economic position.

Alternative 2 may be achieved by increasing sales while holding the investment in assets relatively constant, or by reducing assets. Some of the strategies to reduce assets are:

1. Dispose of obsolete and redundant inventory. The computer has been extremely helpful in this regard, making continuous monitoring of inventory more feasible for better control.
2. Devise various methods of speeding up the collection of receivables and also evaluate credit terms and policies.
3. See if there are unused fixed assets.
4. Use the converted assets (primarily cash) obtained from the use of the previous methods to repay outstanding debts or repurchase outstanding issues of stock. You may use those funds elsewhere to get more profit, which will improve margin as well as turnover.

Alternative 3 may be achieved by increasing sales or by any combinations of alternatives 1 and 2.

Figure 13-2 shows complete details of the relationship of ROI to the underlying ratios -- margin and turnover -- and their components. This will help identify more detailed strategies to improve margin, turnover, or both.

EXAMPLE 13-4. Assume that management sets a 20% ROI as a profit target. It is currently making an 18 percent return on its investment.

$$\text{ROI} = \frac{\text{Net profit after taxes}}{\text{Total assets}} = \frac{\text{Net profit after taxes}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}}$$

Present situation:

$$18\% = \frac{18,000}{200,000} \times \frac{200,000}{100,000}$$

The following are illustrative of the strategies which might be used (each strategy is independent of the other).

Alternative 1: Increase the margin while holding turnover constant. Pursuing this strategy would involve leaving selling prices as they are and making every effort to increase efficiency so as to reduce expenses. By doing so, expenses might be reduced by \$2,000 without affecting sales and investment to yield a 20% target ROI, as follows:

$$20\% = \frac{20,000}{200,000} \times \frac{200,000}{100,000}$$

Alternative 2: Increase turnover by reducing investment in assets while holding net profit and sales constant. Working capital might be reduced or some land might be sold, reducing investment in assets by \$10,000 without affecting sales and net income to yield the 20% target ROI as follows:

$$20\% = \frac{18,000}{200,000} \times \frac{200,000}{90,000}$$

Alternative 3: Increase both margin and turnover by disposing of obsolete and redundant inventories or through an active advertising campaign. For example, trimming down \$5,000 worth of investment in inventories would also reduce the inventory holding charge by \$1,000. This strategy would increase ROI to 20%.

$$20\% = \frac{19,000}{200,000} \times \frac{200,000}{95,000}$$

Excessive investment in assets is just as much of a drag on profitability as excessive expenses. In this case, cutting unnecessary inventories also helps cut down expenses of carrying those inventories, so that both margin and turnover are improved at the same time. In practice, alternative 3 is much more common than alternative 1 or 2.

ROI And Return on Equity (ROE)

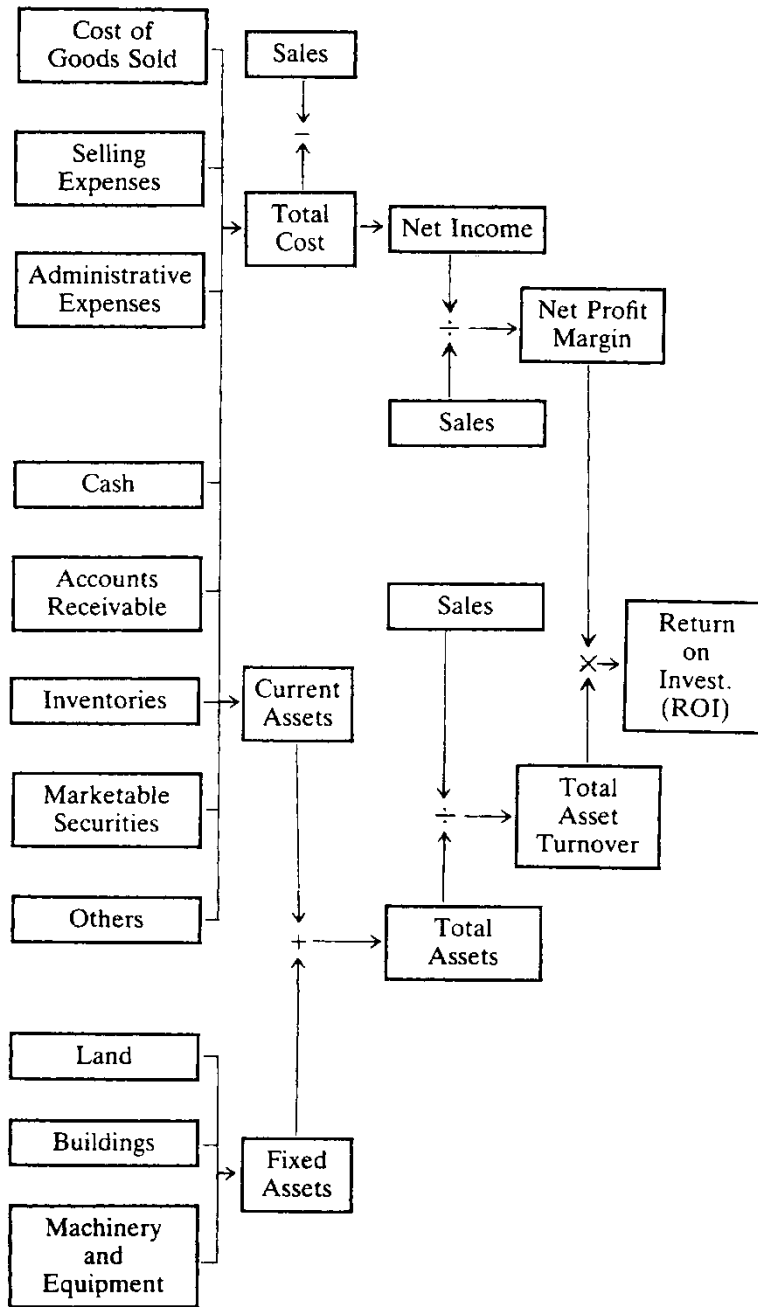
Generally, a better management performance (i.e., a high or above-average ROI) produces a higher return to equity holders. However, even a poorly managed company that suffers from a below-average performance can generate an above-average return on the stockholders' equity, simply called the return on equity (ROE). This is because borrowed funds can magnify the returns that a company's profits represent to its stockholders.

Another version of the Du Pont formula, called the modified Du Pont formula reflects this effect. The formula ties together the ROI and the degree of financial leverage (use of borrowed funds). The financial leverage is measured by the equity multiplier, which is the ratio of a company's total asset base to its equity investment, or, stated another way, the ratio of how many dollars of assets held per dollar of stockholders' equity. It is calculated by dividing total assets by stockholders' equity. This measurement gives an indication of how much of a company's assets are financed by stockholders' equity and how much with borrowed funds.

The return on equity (ROE) is calculated as:

$$\text{ROE} = \frac{\text{Net profit after taxes}}{\text{Stockholders' equity}} = \frac{\text{Net profit after taxes}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Stockholders' equity}}$$
$$= \text{ROI} \times \text{Equity multiplier}$$

Figure 13-2. Relationships of Factors Influencing ROI

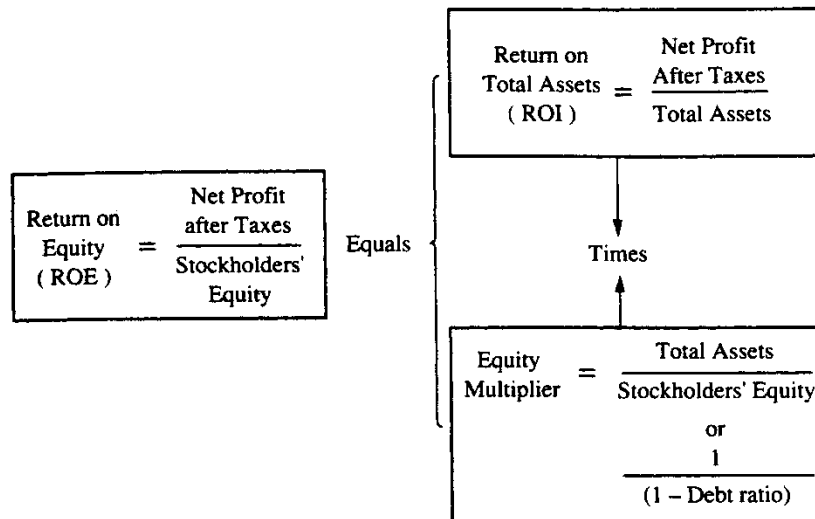


ROE measures the returns earned on the owners' (both preferred and common stockholders') investment. The use of the equity multiplier to convert the ROI to the ROE reflects the impact of the leverage (use of debt) on the stockholders' return.

$$\begin{aligned}
 \text{The equity multiplier} &= \frac{\text{Total assets}}{\text{Stockholders' equity}} \\
 &= \frac{\text{Total assets}}{\text{Total assets} - \text{Total liabilities}} \\
 &= \frac{1}{1 - \frac{\text{Total liabilities}}{\text{Total assets}}} \\
 &= \frac{1}{(1 - \text{debt ratio})}
 \end{aligned}$$

Figure 13-3 shows the relationship among ROI, ROE, and financial leverage.

Figure 13-3. ROI, ROE, and Financial Leverage



EXAMPLE 13-5. In Example 13-1, assume stockholders' equity of \$45,000.

$$\text{Then, equity multiplier} = \frac{\text{Total assets}}{\text{Stockholders' equity}} = \frac{\$100,000}{\$45,000} = 2.22$$

$$= \frac{1}{(1 - \text{debt ratio})} = \frac{1}{(1 - 0.55)} = \frac{1}{0.45} = 2.22$$

$$\text{ROE} = \frac{\text{Net profit after taxes}}{\text{Stockholders' equity}} = \frac{\$18,000}{\$45,000} = 40\%$$

$$\text{ROE} = \text{ROI} \times \text{equity multiplier} = 18\% \times 2.22 = 40\%$$

If the company used only equity, the 18% ROI would equal ROE. However, 55% of the firm's capital is supplied by creditors (\$45,000/\$100,000 = 45% is the equity-to-asset ratio; \$55,000/\$100,000 = 55% is the debt ratio). Since the 18% ROI all goes to stockholders, who put up only 45% of the capital, the ROE is higher than 18%. This example indicates the company was using leverage (debt) favorably.

EXAMPLE 13-6. To further demonstrate the interrelationship between a firm's financial structure and the return it generates on the stockholders' investments, let us compare two firms that generate \$300,000 in operating income. Both firms employ \$800,000 in total assets, but they have different capital structures. One firm employs no debt, whereas the other uses \$400,000 in borrowed funds. The comparative capital structures are shown as:

	A	B
Total assets	\$800,000	\$800,000
Total liabilities	--	400,000
Stockholders' equity(a)	800,000	400,000
Total liabilities and stockholders' equity	\$800,000	\$800,000

Firm B pays 10% interest for borrowed funds. The comparative income statements and ROEs for firms A and B would look as follows:

Operating income	\$300,000	\$300,000
Interest expense	-	(40,000)
Profit before taxes	\$300,000	\$260,000
Taxes (30% assumed)	(90,000)	(78,000)
Net Profit after taxes (b)	\$210,000	\$182,000
ROE [(b)/(a)]	26.25%	45.5%

The absence of debt allows firm A to register higher profits after taxes. Yet the owners in firm B enjoy a significantly higher return on their investments. This provides an important view of the positive contribution debt can make to a business, but within a certain limit. Too much debt can increase the firm's financial risk and thus the cost of financing.

If the assets in which the funds are invested are able to earn a return greater than the fixed rate of return required by the creditors, the leverage is positive and the common stockholders benefit. The advantage of this

formula is that it enables the company to break its ROE into a profit margin portion (net profit margin), an efficiency-of-asset-utilization portion (total asset turnover), and a use-of-leverage portion (equity multiplier). It shows that the company can raise shareholder return by employing leverage - taking on larger amounts of debt to help finance growth.

Since financial leverage affects net profit margin through the added interest costs, management must look at the various pieces of this ROE equation, within the context of the whole, to earn the highest return for stockholders. Financial managers have the task of determining just what combination of asset return and leverage will work best in its competitive environment. Most companies try to keep at least a level equal to what is considered to be "normal" within the industry.

A Word of Caution

Unfortunately, leverage is a two-edged sword. If assets are unable to earn a high enough rate to cover fixed finance charges, then stockholders suffer. The reason is that part of the profits from the assets which the stockholder has provided to the firm will have to go to make up the shortfall to the long-term creditors, and he/she will be left with a smaller return than otherwise have been earned.

Conclusion

This chapter covered in detail various strategies to increase the return on investment (ROI). The breakdown of ROI into margin and turnover, popularly known as the *Du Pont* formula, provides lots of insight into: (a) the strengths and weaknesses of a business and its segments, and (b) what needs to be done in order to improve performance. Another version of the Du Pont formula --the modified Du Pont formula-- relates ROI to ROE (stockholders' return) through financial leverage. It shows how leverage can work favorably for the owners of the company.

Chapter 13 Review Questions

1. Which combination of changes in asset turnover and profit margin on sales will maximize the return on investment?
 - A. Increase asset turnover, and decrease profit margin
 - B. Increase asset turnover, and increase profit margin
 - C. Decrease asset turnover, and increase profit margin
 - D. Decrease asset turnover, and decrease profit margin

2. Return on investment (ROI) may be calculated by dividing net profit after taxes by debt ratios. True or False?

3. Return on investment (ROI) may be calculated by multiplying net profit margin by equity. True or False?

4. An investor has been given several financial ratios for a firm but none of the financial reports. Which combination of ratios can be used to derive return on equity?
 - A. Market-to-book-value ratio and total-debt-to-total-assets ratio.
 - B. Net profit margin, total assets turnover, and equity multiplier.
 - C. Price-to-earnings ratio, earnings per share, and net profit margin.
 - D. Price-to-earnings ratio and return-on-assets ratio.

5. The following ratios relate to a company's financial situation compared with that of its industry: The company has a ROI = 7.9% and a ROE = 15.2%. The industry has a ROI = 9.2% and a ROE = 12.9%. What conclusion could a financial analyst validly draw from these ratios?
 - A. The company's product has a high market share, leading to higher profitability.
 - B. The company uses more debt than does the average company in the industry.
 - C. The company's profits are increasing over time.
 - D. The company's shares have a higher market value to carrying amount than does the rest of the industry.

Chapter 13 Review Answers

1. Which combination of changes in asset turnover and profit margin on sales will maximize the return on investment?

- A. Incorrect. A decrease in margin lowers the return on investment.
- B. **Correct.** Asset turnover measures how efficiently assets are used to produce revenues by dividing sales by the average total assets. The profit margin measures the net income produced by each dollar of revenues. As assets are used more efficiently and as each dollar of revenues produces more income, the return on investment is maximized.
- C. Incorrect. As assets are used less efficiently, the return on investment decreases.
- D. Incorrect. As assets are used less efficiently and as profit margin on sales decreases, the return on investment decreases.

2. Return on investment (ROI) may be calculated by dividing net profit after taxes by debt ratios. True or False?

True is incorrect. ROI cannot be determined using this ratio. A debt ratio is debt divided by total assets.

False is correct. The rate of return measures the ability of the company to earn a profit on its total assets. The formula is: $ROI = (\text{net profit after taxes}) / (\text{total assets})$

3. Return on investment (ROI) may be calculated by multiplying net profit margin by equity. True or False?

True is incorrect. The Du Pont formula (net profit margin times total asset turnover) shows how important both margin and turnover are in enhancing return on investment (ROI).

False is correct. The Du Pont formula breaks down the return on investment (ROI) into net profit margin and total asset turnover, as such: $ROI = (\text{net profit after taxes}) / (\text{total assets}) = [(\text{net profit after taxes}) / \text{Sales}] \times [\text{Sales} / (\text{total assets})] = \text{net profit margin} \times \text{total asset turnover}$.

4. An investor has been given several financial ratios for a firm but none of the financial reports. Which combination of ratios can be used to derive return on equity?

- A. Incorrect. The market-to-carrying-amount ratio and the total-debt-to-total-assets ratio do not provide any information about net profit available to shareholders.
- B. **Correct.** The net profit margin equals the net profit available to common shareholders divided by sales. The total assets turnover equals sales divided by total assets, and the product of these two ratios is the return on investment (ROI). This result is the basic Du Pont formula. In the extended Du Pont equation,

the ROI is multiplied by the leverage factor, also called the equity multiplier (total assets/common equity). The extended Du Pont equation gives the return on common equity. This result is obtained because the total assets and sales factors cancel in the multiplication of the three ratios. $ROE = (\text{net profit after taxes}) / (\text{stockholders' equity}) = [(\text{net profit after taxes}) / (\text{total assets})] \times [(\text{total assets}) / (\text{stockholders' equity})] = ROI \times \text{Equity Multiplier} = \text{net profit margin} \times \text{total asset turnover} \times \text{equity multiplier}$.

- C. Incorrect. The price-to-earnings ratio, EPS, and the net profit margin do not provide information about the carrying amount of common equity.
- D. Incorrect. The price-to-earnings ratio and the return-on-assets ratio do not provide information about the carrying amount of common equity.

5. The following ratios relate to a company's financial situation compared with that of its industry: The company has a ROI = 7.9% and a ROE = 15.2%. The industry has a ROI = 9.2% and a ROE = 12.9%. What conclusion could a financial analyst validly draw from these ratios?

- A. Incorrect. The question gave no information about market share.
- B. **Correct.** The use of financial leverage has a multiplier effect on the return on assets. The extended Du Pont formula illustrates this point by showing that the return on equity equals the ROI times the leverage factor, also called the equity multiplier (total assets/common equity). Thus, greater use of debt increases the equity multiplier and the return on equity. In this example, the equity multiplier is 1.92 (15.2% ROE/7.9% ROI), and the industry average is 1.40 (12.9% ROE/9.2% ROI). The higher equity multiplier indicates that the company uses more debt than the industry average.
- C. Incorrect. This comparison is with an industry average, not over time.
- D. Incorrect. Share valuation is a response to many factors. The higher-than-average return on equity does not mean that the company has a more favorable market-to-carrying-amount ratio.

Chapter 14:

Evaluating and Improving Your Department's Performance

Learning Objectives

After studying this chapter, you will be able to:

- Define a responsibility center and list the types of responsibility centers.
 - Recognize the value of transfer pricing.
-

In the previous chapter, we discussed how to analyze and evaluate managerial performance. We touched on a broad measure of performance—that is, return on investment (ROI). In this chapter, we will focus on the performance of a *segment* within a firm. The ability to measure performance is essential in developing management incentives and controlling the operation toward the achievement of organizational goals. You should know the financial strengths and weaknesses for your responsibility center, and what actions you should take, if any, to improve performance.

A segment is a part or activity of a company for which a manager desires cost or revenue data. Examples of segments are divisions, sales territories, individual stores, service centers, manufacturing plants, sales departments, product lines, distribution channels, processes, programs, geographic areas, types of customers, jobs, and contracts. Segmental reports may be prepared for activity at different levels within your responsibility center and in varying formats, depending on your needs.

Segmental reporting reveals your department's performance. It also shows whether or not your product lines are profitable. Segment reports will help you determine what types of goods are being bought by your customers, what profit you are earning from each customer, which sales territories have a poor sales mix, whether or not your salespeople are doing a good job, and whether or not production workers are performing effectively.

Analysis of segmental performance helps you evaluate the success or failure of your segment. For example, divisional performance measures are concerned with the contribution of the division to profit and quality as well as whether or not the division meets overall goals.

In evaluating a product line, consideration should be given to profitability, growth, competition, and capital employed, You will have to determine whether to drop unprofitable products or substantially raise prices.

Within a customer class, there may also be a difference in selling costs to different customers within that class. Why? Perhaps some customers need more extensive services (e.g., delivery, warehousing). Customer analysis will show the difference in profitability among customers so that corrective action may be taken. The analysis will aid in formulating selling prices and monitoring and controlling distribution costs. It will help you determine the impact on profitability of proposed price and volume changes.

Appraising Manager Performance

In appraising your performance as the manager of the segment, you must determine which factors were under your control (e.g., advertising budget) and which factors were not (e.g., economic conditions). Comparison should be made of the performance of your division to other divisions in the company as well as to similar divisions in competing companies. Appraisal should also be made of the risk and earning potential of your division.

The reasons to measure your performance as a division manager are as follows:

- It assists in formulating incentives and controlling operations to meet company and departmental goals.
- It points to trouble spots needing attention.
- It helps you determine who should be rewarded for good performance.
- It helps you determine who is not doing well so that corrective action may be taken.
- It aids in allocating time among projects.
- It provides job satisfaction since you receive feedback.

Divisional performance is analyzed by responsibility center, which is comprised of a revenue center, a cost center, a profit center, and an investment center.

Responsibility Center

Responsibility accounting is the system for collecting and reporting revenue and cost information by areas of responsibility. It operates on the premise that you should be held responsible for your performance, the performance of your subordinates, and for all activities within your responsibility center. It is both a planning and control technique. Responsibility accounting (1) facilitates delegation of decision making, (2) helps promote "management by objective," in which managers agree on a set of goals (your performance is evaluated based on the attainment of these goals), and (3) permits effective use of "management by exception." Managerial

performance should ideally be evaluated only on the basis of those factors controllable by the manager. Managers may control revenues, costs, and/or investments in resources.

Figure 14-1 shows responsibility centers within an organization, while Figure 14-2 presents an organization chart of a company.

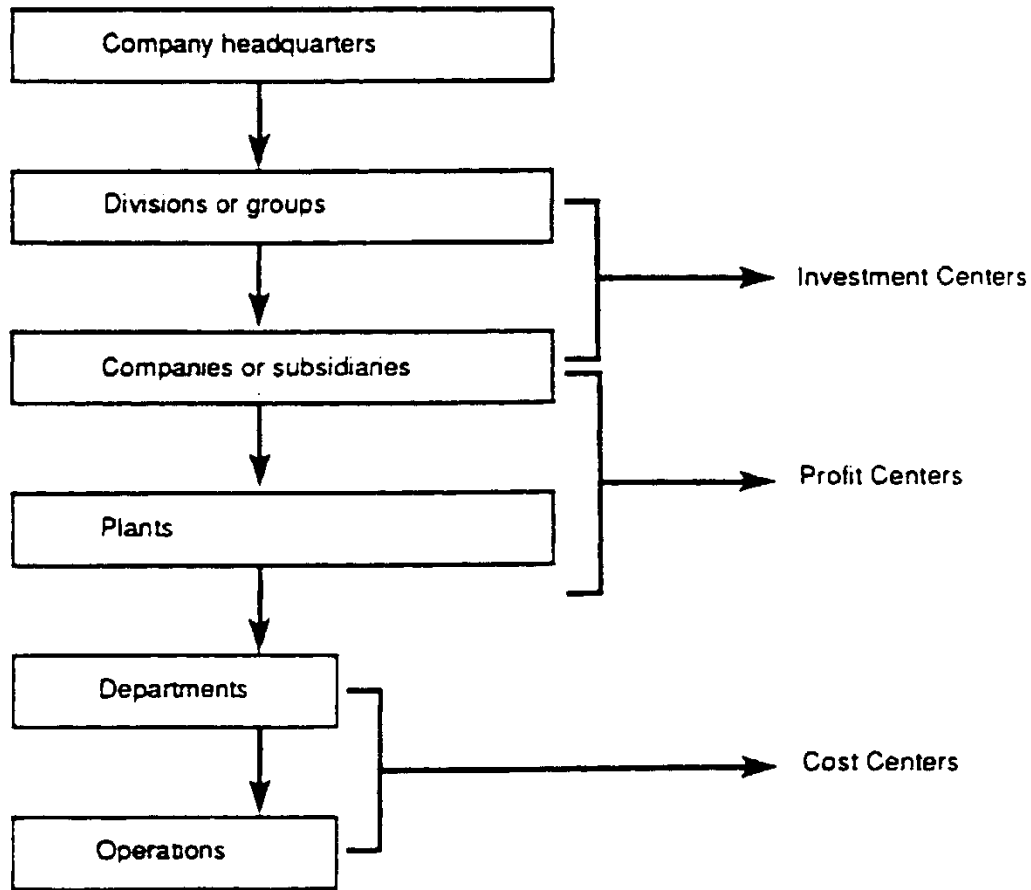
A responsibility center is a unit that has control over costs, revenues, and investment funds. This center may be responsible for all three functions or for only one function. Responsibility centers are found in both centralized and decentralized organizations. A profit center is often associated with a decentralized organization, while a cost center is usually associated with a centralized one.

There are lines of responsibility within a company. Exxon-Mobil, for example, is organized primarily by business functions: exploitation, refining, and marketing. General Foods, on the other hand, is organized by product lines. To understand these lines, you should know how your company is organized.

Revenue Center

As the manager of a revenue center, you are responsible for obtaining a target level of sales revenue. An example is a district sales office. The performance report contains the budgeted and actual sales for the center by product, including evaluation. Usually, you are responsible for marketing a product line. But a revenue center typically has a few costs (e.g., salaries, rent). Hence, you are responsible mostly for revenues and only incidentally for some costs (typically *not* product costs). Accountability for departmental sales revenue also assumes that you have the authority to determine product sales prices.

Figure 14-1. Responsibility Centers within a Company



If you are to generate profitable sales, you must know what areas have the greatest profitability. This requires sound sales analysis and cost evaluation. Sales analysis may involve one or more of the following: prior sales performance, looking at sales trends over the years, and comparing actual sales to budgeted sales. Analyses may be in dollars and/or units. The types of analysis include by salesperson, terms of sale, order size, channel of distribution, customer, product, and territory. Sub-analyses may also be made for evaluating product sales in each territory.

Sales analyses can help you uncover unwanted situations, such as when most of your division's sales are derived from a small share of your product line. Further, you may see that only a few customers give you most of your sales volume. Thus, a small part of the selling effort is needed for a high percentage of your business. After studying the information, you may more narrowly focus your sales effort, resulting in fewer selling expenses. Territorial assignments may be changed, or the product line may be simplified.

Sales analysis will also allow you to see if sales effort is directed toward the wrong products and if sales of products are going toward less profitable lines. In appraising sales effort, consideration should be given to the number of calls, ads placed, and mailings, and their results.

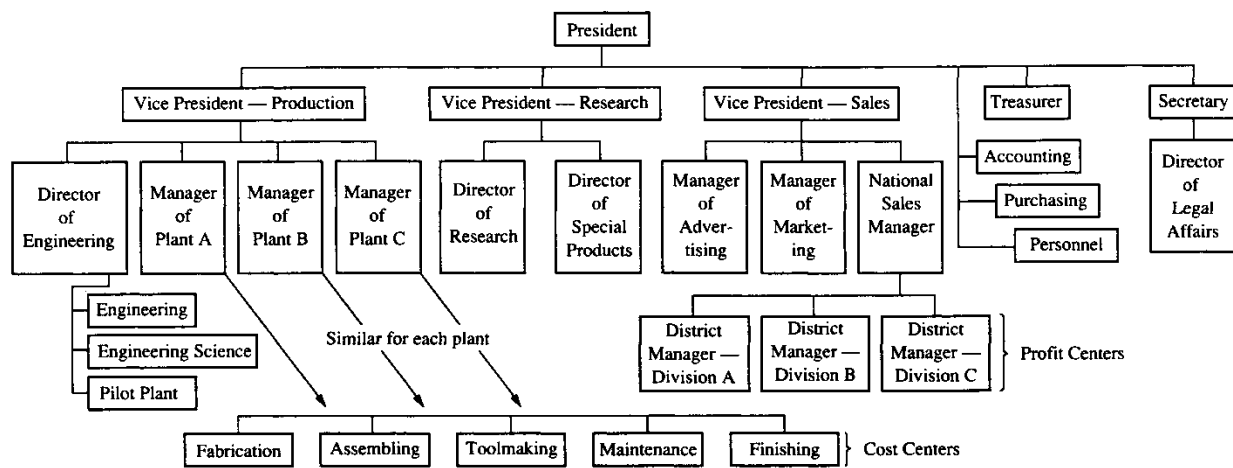
You should keep a record of sales levels for the same product at varying prices so as to establish a relationship of volume to price.

Also, sales orders and back orders may be used as measures of projected volume. You can determine whether orders have been lost by stockouts or delayed shipments.

Cost Center

A cost center is typically the smallest segment of activity or responsibility for cost accumulation. Examples of cost centers include the maintenance department or the fabricating department in a manufacturing company. Cost centers may be relatively small—a single department with few employees - or very large such as an administrative area of a large company or an entire factory. Some cost centers may be comprised of smaller cost centers. For instance, a factory may be segmented into numerous departments, each of which is a cost center. Generally, cost centers pertain more to departments than to divisions.

Figure 14-2. Organization Chart of a Company



A cost center manager is responsible for direct operational costs and for meeting production budgets and quotas. The cost center manager, usually a department head, carries the authority and responsibility for costs and for quantity and quality of not only products but services as well. For example, the personnel manager oversees both the costs and the quality of services rendered. Managers of cost centers, however, have no

control over sales or marketing activities. Departmental profit is difficult to derive because of problems in allocating revenue and costs.

With a cost center, you must compare budgeted cost to actual cost. Variances are investigated to determine the reasons for particular costs; necessary corrective action is taken to correct problems; and efficiencies are accorded recognition. The cost center approach is useful when you possess control over your costs at a specific operating level.

You may use the cost center approach when problems arise in relating financial measures to output. Cost center evaluation is most suitable for the following functions, where problems in quantifying the output in financial terms occur: accounting and financial reporting, legal, computer services, marketing, personnel, and public relations.

You will also find the cost center approach appropriate for nonprofit and governmental units where budgetary appropriations are assigned. Actual expenditures are compared to budget. Your performance depends on your ability to achieve output levels given budgetary constraints.

When looking at your performance, say at bonus time, the relevant costs are those incremental costs you have control over. Incremental costs are those expenditures that would not exist if the center were abandoned. Hence, allocated common costs (e.g., general administration) should not be included in appraising your performance. Such costs should, however, be allocated in determining the profit for the division. Cost allocation must conform to department goals and should be applied consistently among divisions.

Cost center evaluation will not be worthwhile unless reliable budget figures exist. If a division's situation significantly changes, an adjustment to the initial budget is necessary. In such a case, actual cost should be compared with the initial budget figure (original goal) and the revised budget. Flexible budgets should be prepared to enable you to look at costs at different levels of capacity. For example, you can budget figures for expected capacity, optimistic capacity, and pessimistic capacity. Better comparisons of budget to actual can thus be made given changing circumstances.

If you are a manager in the factory, you should consider factory performance measures such as yield percentages for direct materials, number of rejects, capacity utilization, and cost per labor hour.

Provision should exist for chargebacks, where appropriate. For example, if the quality control department makes an effort in its evaluation which leads to acceptance of the product by the purchasing department, the former should be charged with the increased costs necessary to meet acceptable standards incurred by the purchasing department.

When a transfer occurs between cost centers, the transfer price should be based on either actual cost, standard cost, or controllable cost. Transfer price is the price charged between divisions for a product or service. *Warning:* Using actual cost can pass cost inefficiencies onto the next division. There is no incentive to control costs. *Solution:* Using standard cost solves this problem because the selling division will only be credited for what the item *should cost*.

A good transfer price is a controllable cost. The cost center should be charged with actual controllable cost and credited with standard controllable cost for the assembled product or service passed to other divisions. By including just controllable cost, the subjectivity of the allocation of fixed non-controllable cost, does not exist.

You should be aware of the effects of discretionary costs when evaluating performance. Discretionary costs are those that can be easily changed such as advertising and research. A cutback in discretionary costs will produce short-term improvements in profitability but in the long run will likely have a negative effect.

In evaluating administrative functions, performance reports should examine such dollar indicators as executive salaries and service departments as well as 'non-dollar' measures such as number of files handled, phone taken, and invoices processed.

Profit Center

Profits can be expressed in several ways including net income, controllable margin, gross profit, controllable profit, and incremental profit. A center thus measures the performance of a division, a product line, geographic area, or any other quantifiable unit, using one of these expressions. On the other hand, profit centers have associated revenues and expenses, and net income and contribution margin can be computed for them.

A typical profit center is a division selling a limited number of products or serving a particular geographic area. The profit center provides goods and services but also the means for marketing them.

In some instances, profit centers are formed when products or services are used solely within the company. For example, the computer department may be considered a profit center, as it bills each of the administrative and operating units for services rendered.

A profit center demonstrates the following characteristics: (1) defined profit objective, (2) managerial authority for making decisions that have an impact on earnings, and (3) the use of profit-oriented decision rules.

The profit center approach enhances decentralization and delineates units for decision-making purposes. It should be used if your division is self-contained (with its own manufacturing and distribution facilities) and when there are a limited number of interdivisional transfers. The reason is that the profit reported by the division is basically independent of other divisions' operating activities, performance efficiencies, and managerial decisions. Further, divisional earnings should not be increased by any action reducing overall corporate profitability. Also, use the profit center approach when you have decision-making authority in terms of the quantity and mix of goods or services. Because with a profit center, net income is determined as if the division were a separate economic entity, you should be more cognizant of outside market considerations.

In using the profit center approach, it is not essential to allocate fixed costs. In general, fixed costs are much less controllable than variable costs, which are common to a group of divisions. Hence, contribution margin may be a good indicator of your division's performance because it emphasizes cost behavior patterns and controllability of costs that are generally useful for evaluating performance and making decisions. The contribution margin approach aids in computing selling price, output levels, the price to accept an order given an idle capacity

situation, maximization of resource uses, and break-even analysis. Ultimately, if your division meets its target contribution margin, any excess will be available to cover general corporate expenses.

To evaluate divisional and managerial performance, a contribution income statement can be prepared. Table 14-1 presents a contribution margin income statement by division, with a further breakdown into product lines. Table 14-2 illustrates product line profitability.

A difficulty with the profit center approach is that profit is calculated after subtracting non-controllable costs or costs not directly related to divisional activity that have been arbitrarily allocated. The ensuing profit figure may be erroneous. However, cost allocation is required, since divisions must incorporate non-divisional costs that have to be met before the company will show a profit. Policies optimizing divisional earnings will likewise optimize corporate earnings even before the allocation of non-divisional expenses.

It is important to recognize that, while an uncontrollable income statement item is included in appraising the performance of a profit center, it should not be used in evaluating you. An example is the effect of foreign exchange transaction gains and losses because you may have no control over it.

As a profit center *manager*, you are responsible for not only profit and loss items attributable directly to your division but also costs incurred outside of the center (e.g., headquarters, other divisions) for which your center will be billed directly.

Advantages of the profit center approach are that it creates competition in a decentralized company, provides goal congruence between a division and the company, and aids performance evaluation. A drawback is that profits can be manipulated since expenses may be shifted among periods. Examples of discretionary costs where management has wide latitude are research and repairs. Also, this approach does not consider the total assets employed in the division to obtain the profit.

Table 14-1. Contribution Margin Income Statement by Segments

	Entire Company	Division Breakdown		Breakdown of Division Y Product				
		X	Y	Unallocable	1	2	3	4
Sales	\$1,200	\$300	\$900		\$300	\$100	\$200	\$300
Less: Variable manufacturing cost of sales	<u>(700)</u>	<u>(200)</u>	<u>(500)</u>		<u>(100)</u>	<u>(50)</u>	<u>(100)</u>	<u>(250)</u>
Manufacturing contribution margin	\$500	\$100	\$400		\$200	\$50	\$100	\$50
Less: Variable selling and administrative costs	<u>(200)</u>	<u>(50)</u>	<u>(150)</u>		<u>(40)</u>	<u>(40)</u>	<u>(40)</u>	<u>(30)</u>
Contribution margin	\$300	\$50	\$250		\$160	\$10	\$60	\$20
Less: Controllable fixed costs by segment managers	<u>(180)</u>	<u>(40)</u>	<u>(140)</u>	<u>(40)</u>	<u>(30)</u>	<u>(5)</u>	<u>(50)</u>	<u>(15)</u>
Contribution controllable by segment managers	\$120	\$10	\$110	(40)	\$130	\$5	\$10	\$5
Less: Fixed costs controllable by others	<u>(70)</u>	<u>(6)</u>	<u>(64)</u>	<u>(20)</u>	<u>(20)</u>	<u>(15)</u>	<u>(5)</u>	<u>(4)</u>
Segmental contribution	\$50	\$4	\$46	\$(60)	\$110	\$(10)	\$5	\$1
Less: Unallocated costs	<u>(23)</u>							
Net income	<u>\$27</u>							

^a Only those costs logically traceable to a product line should be allocated.

Table 14-2. Contribution By Products

	<u>Entire Company</u>	<u>Product A</u>	<u>Product B</u>
Projected-Sales	<u>\$100,000</u>	<u>\$60,000</u>	<u>\$40,000</u>
Variable costs			
Goods sold	30,000	109,000	20,000
Marketing	<u>5,000</u>	<u>4,000</u>	<u>1,000</u>
Less: Total variable costs	<u>(35,000)</u>	<u>(14,000)</u>	<u>(21,000)</u>
Contribution margin	<u>65,000</u>	<u>46,000</u>	<u>19,000</u>
Direct fixed costs			
Production	4,000	2,000	2,000
Marketing	<u>3,000</u>	<u>2,000</u>	<u>1,000</u>
Less: Total direct fixed costs	<u>(7,000)</u>	<u>(4,000)</u>	<u>(3,000)</u>
Profit contribution	<u>58,000</u>	<u>42,000</u>	<u>16,000</u>
Common fixed costs			
Production	10,000		
Marketing	8,000		
Administrative and general	<u>5,000</u>		
Less: Total common costs	<u>(23,000)</u>		
Income before tax	<u>\$35,000</u>		

Example 14-1. It is important to know at what point to sell an item in order to maximize profitability. You can sell a product at its intermediate point in Division A for \$170 or its final point in Division B at \$260. The outlay cost in Division A is \$120, while the outlay cost in Division B is \$110. Unlimited product demand exists for both the intermediate product and the final product. Capacity is interchangeable. Divisional performance follows:

	<i>Division A</i>	<i>Division B</i>
Selling Price:	\$178	\$260
Less: Outlay cost A	(120)	(120)
Outlay cost B		<u>(110)</u>
Profit	<u>\$ 50</u>	<u>\$ 30</u>

Sell at the intermediate point because of the higher profit.

Other measures in appraising divisional performance that are not of a profit nature but that must be considered are the following:

- Ratios between cost elements and assets to appraise effectiveness and efficiency.

- Productivity measures, including input-output relationships. An example is labor hours in a production run. You have to consider the input in time and money, and the resulting output in quantity and quality. Does the maintenance of equipment ensure future growth?
- Personnel development (e.g., number of promotions, turnover).
- Market measures (e.g., market share, product leadership, growth rate, customer service).
- Product leadership indicators (e.g., patented products, innovative technology, product quality, safety record).
- Human resource relationships (e.g., employee turnover rate, customer relations, including on-time deliveries).
- Social responsibility measures (e.g., consumer medals).

Transfer Pricing

The transfer price is the one credited to the selling division and charged to the buying division for an internal transfer of an assembled product or service. The transfer resembles, for each division, an "arm's length" transaction. A transfer price has to be formulated so that a realistic and meaningful profit figure can be determined for your division. It should be established after proper planning. Thus, you need to know what monetary values to assign to these transfers—market prices, variable costs, full costs of some version of these values. Unfortunately, there is no single transfer price that will please everybody—that is, top management, the selling division, and the buying division involved in the transfer.

Transfer prices are not only important in performance, but also in decisions involving whether to make or buy, whether to sell or process alternative production possibilities. Further, understanding the transfer pricing can help account for possible cost overruns. You need to know what transfer price is being used for transfers and why it is being used.

The best transfer price is the negotiated market value of the assembled product or service since it is a fair price and treats each profit center as a separate economic entity. The negotiated market value equals the outside service fee or selling price for the item (a quoted price for a product or service is only comparable if the credit terms, grade, quality, delivery and auxiliary conditions are precisely the same) less internal cost savings that result from dealing within the organization (e.g., advertising, sales commission, delivery charges, credit and collections costs). The market value of services is based on the going rate for a specific job (e.g., equipment tune-up) and/or the standard hourly rate (e.g., the hourly rate for an engineer). market price may be determined from price catalogues, outside bids, and published data on complete market transactions. If two divisions cannot agree on the transfer price, it may be settled by arbitration at a higher level. A temporarily low transfer price-(e.g., due to oversupply of the item) or high transfer price (e.g., due to a strike situation causing a supply shortage) should not be employed. An average long-term market price should be used.

A negotiated transfer price works best when outside markets for the intermediate product exist, all parties have access to market information, and you are permitted to deal externally if a negotiated settlement is impossible. If one of these conditions is violated, the negotiated price may break down and cause inefficiencies.

The negotiated market price can tell you whether an item should be produced internally or bought through an outside vendor. If the cost of an item produced internally is more than the market price, you may want to go to your superiors to suggest that the item no longer be supplied internally. You can suggest that the company buy the item through a vendor, saving the company money overall. If the item is a by-product, this could tell management that the cost of the materials is too high. This could make the purchasing department look for another vendor. If the negotiated market value is too high, it could also show that the selling department is wasting money.

If the outside market price is inappropriate or not ascertainable (e.g., new product, absence of replacement market, or too costly to be used for transfer pricing), you should use budgeted cost plus profit markup because this transfer price approximates market value and will highlight divisional inefficiencies. For example, if budgeted cost is \$10 and a profit markup on cost of 20% is desired, the transfer price will be \$12. Profit market should take into account the particular characteristics of your division (e.g., product line) rather than the overall corporate profit margin.

There is an incentive to the selling division to control costs because it will not be credited for an amount exceeding budgeted cost plus a markup. Thus, if the selling division's inefficiencies result in excessive actual costs, it would have to absorb the decline in profit to the extent that actual cost exceeds budgeted cost.

Even though actual cost plus profit markup may be used, it has the drawback of passing on cost inefficiencies. In fact, the selling division is encouraged to be cost-inefficient, since the higher its actual cost is, the higher its selling price (since it shows a greater profit) will be. Some division managers use actual cost as the transfer price because of its ease to use, but the problem is that no profit is shown by the selling division and cost inefficiencies are passed on. Further, the cost-based method treats the divisions as cost centers rather than profit or investment centers. Therefore, measures such as return on investment and residual income cannot be used for evaluation purposes.

A transfer price based on cost may be appropriate when minimal services are provided by your department to another. If other departments provide identical or very similar services, a cost-based transfer price may be used since the receiving department will select the services of the department providing the highest quality. Thus, the providing department has an incentive to do a good job. A non-financial manager neatly illustrates this situation:

The two major areas of transfer pricing that directly affect my department are internal training and computer equipment. Training, although internal, is also offered to the public. Because of this competitive situation, training costs are charged to my department at the same amount as to outside companies. Computer equipment, on the other hand, is sold (or leased) to my department at a discount over the price offered to the general public. This is attributable to the fact that computer sales for the company have been rather sluggish, and the discount offers an incentive to buy the company's brand over a competitor's.

We now see how transfer prices are used to determine divisional profit.

Example 14-2. Division A manufactures an assembled product that can be sold to outsiders or transferred to Division B. Relevant information for the period follows:

Division A	Units
Production	1,500
Transferred to Division B	1,200
Sold outside	300
Selling price \$25	
Unit cost \$ 5	

The units transferred to Division B were processed further at a cost of \$7.

They were sold outside at \$45. Transfers are at market value.

Division profit is computed as follows:

	Division A	Division B	Company
Sales	\$ 7,500	\$54,000	\$61,500
Transfer price	<u>30,000</u>	<u> </u>	<u> </u>
	<u>\$37,500</u>	<u>\$54,000</u>	<u>\$61,500</u>
Product cost	\$ 7,500	\$ 8,400	\$15,900
Transfer price		30,000	
	(\$ 7,500)	\$38,400	\$15,900
Profit	\$30,000	\$15,600	\$45,600

We now see whether a buying division should buy inside or outside.

Example 14-3. An assembly division wants to charge a finishing division \$80 per unit for an internal transfer of 800 units. The variable cost per unit is \$50. Total fixed cost in the assembly division is \$200,000. Current production is 10,000 units. Idle capacity exists. The finishing division purchase the item outside for \$73 per unit.

The maximum transfer price should be \$73 because the finishing division should not have to pay a price greater than the outside market price.

Whether the buying division should be permitted to buy the item outside or be forced to buy inside depends on what is best for overall corporate profitability. Typically, the buying division is required to purchase inside at the maximum transfer price (\$73), since the selling division still has to meet its fixed cost when idle capacity exists. The impact on corporate profitability of having the buying division go outside is determined as follows:

Savings to assembly division	
[Units (800) x Variable cost per unit (\$50)]:	\$40,000
Cost to finishing division	
[Units (800) x Outside selling price (\$73)]:	<u>58,400</u>
Stay inside savings	<u>\$18,400</u>

The buying division will be asked to purchase inside the company because, if it went outside, corporate profitability would decline by \$18,400.

A non-financial manager summarizes the importance of transfer pricing policy:

The non-financial manager needs to know what the transfer pricing policy of the company is. If he thinks he is being overcharged by a department, he should go to the manager of the other department and tell him that he can get the item from another location for a better price. He could tell the other manager either lower the price or he will go to the other location. If the manager can lower the price and believes you are serious, he would probably lower the price for two reasons. One, even though it's an internal department, he still needs the business. Second, if upper management finds out that people are using outside vendors, it could prove embarrassing to the selling department. The selling department does not want upper management to think they are mismanaged. They also do not want the auditing division to check their records. Even if there is nothing to hide, no one wants the auditors in their department.

A manager may be trying to decide whether he should shut down an operation due to the lack of profit. Transfer pricing could help him determine which course of action to take. If the operation produces a material that is used in other departments to create a good, the manager can determine what the actual cost to produce the material is. If he determines that he can get the material for a lower price from an outside vendor and that vendor can produce the quantity he needs at the time he needs them, the manager can make a strong case for eliminating the operation and using an outside source. This will cut costs and give him a higher profit margin, and make him look good to his superiors.

The stationery department in my company handles the supplies for the various departments. Most of the items in the inventory are special orders. However, there are items that can also be bought in any stationery store. The cost for most of the items in the stationery department is higher than the price the other departments would pay from an outside source. The company has no policy which states that the departments must buy from the stationery department. Most departments will get items from the outside for several reasons. First, the price is lower. There is no incentive for the managers to buy within. Second, it takes several weeks for the merchandise to arrive. If the manager needs the item in a rush the stationery department can do an emergency delivery but the cost is so much, if it's available on the outside, the manager will buy it externally. The stationery department charges the other departments based on their actual costs. This leads me to the conclusion that either the stationery department is getting overcharged from outside vendors or that the department is wasting a lot. Another possibility is that someone in the stationery department is getting a kickback from a vendor. For the specialized products, the other departments have no choice but to use the stationery department.

Investment Center

An investment center has control over revenue, cost, and investment funds. It is a profit center whose performance is evaluated on the basis of the return earned on investment capital. An example is an auto product line that is manufactured on company premises. Investment centers are widely used in highly diversified companies.

A divisional investment is the amount placed in that division and put under your control. Two major divisional performance indicators are return on investment (ROI) and residual income (RI). Assets assigned to a division include direct assets in the division and allocated corporate assets. Assets are reflected at book value.

You should be able to distinguish between controllable and non-controllable investment. While the former is helpful in appraising your performance, the latter is used to evaluate the entire division. Controllable investment depends on the degree of your division's autonomy. As an investment center manager, you accept responsibility for both the center's assets and the controllable income.

Return on Investment (ROI)

Although ROI was discussed in a prior chapter, we would like to focus on its usefulness as a measure of a manager's performance.

Return on investment equals

$$\frac{\text{Operating Income}}{\text{Operating Assets}}$$

An alternative measure is

$$\frac{\text{Controllable operating profit}}{\text{Controllable net investment (Controllable assets - Controllable liabilities)}}$$

Example 14-4 computes ROI for a hypothetical situation.

Example 14-4. The following financial data pertains to your division:

Operating assets	\$100,000
Operating Income	\$ 18,000
Sales	\$200,000

Your ROI is:

$$\frac{\text{Operating Income}}{\text{Operating Assets}} = \frac{\$ 18,000}{\$100,000} = 18\%$$

The advantages of ROI as a performance indicator are as follows:

- It focuses on maximizing a ratio instead of improving absolute profits.
- It highlights unprofitable divisions.
- It can be used as a base against which to evaluate divisions within the company and to compare the division to a similar division in a competing company.
- It assigns profit responsibility.

- It aids in appraising performance.
- It places emphasis on high-return items.
- It represents a cumulative appraisal of all capital expenditures incurred during your division's existence.
- It is the broadest possible measure of financial performance. Because divisions are often geographically far apart, you are given broad authority in using division assets and acquiring and selling assets.
- It helps make your goals coincide with those of corporate management.
- It focuses on maximizing a ratio instead of improving absolute profits. Alternative profitability measures could be used in the numerator besides net income (e.g., gross profit, contribution margin, segment margin).

Disadvantages of ROI include:

- Different assets in the division must meet the same return rate regardless of the assets' riskiness.
- Established rate of return may be too high and could discourage incentive. A labor-intensive division generally has a higher ROI than a capital-intensive one.
- ROI is a static indicator; it does not show future flows.
- A lack of goal congruence may exist between the company and your division. For example, if your company's ROI is 12%, your division's ROI is 18%, and a project's ROI is 16%, you will not accept the project because it will lower your ROI, even though the project may be best for the entire company.
- ROI ignores risk.
- ROI emphasizes short-run performance instead of long-term profitability. To protect the current ROI, you may be motivated to reject other profitable investment opportunities.
- If the projected ROI at the beginning of the year is set unrealistically high, discouragement of investment center incentive could result.

An understanding of ROI enables you to see how your performance is measured and how your department compares with other departments in the organization.

In an interview, a vice-president of a company commented on the usefulness of ROI in evaluating non-financial managers:

There are two department managers in separate areas with a goal of 15% ROI. Manager A decides that to reach the goal he must increase the sales force by 15 agents. It takes six months to complete the training, become fully functional, and contribute premium dollars. The training costs come to \$60,000 per agent, so we see that Manager A has invested heavily in human resources to increase income and affect his ROI. Manager B decides to appeal to the existing sales force to increase their efficiency and production with promises of no further hiring and encourages them to push the more profitable property lines. Therefore, Manager B increases his department's ROI by increasing income while holding invested capital steady.

You must evaluate these two managers one year later with regard to the company's goal of 15% ROI and profitable growth. Without a full understanding of the implications and limitations of ROI, you decide that Manager B has achieved his goals, while Manager A has only had his people

functional for six months and has not reached his 15% goal. However, being knowledgeable in accounting, you determine that Manager B has merely opted to look good in the short term, but has actually jeopardized the company in the long run by his failure to adequately forecast and plan accordingly. Manager B has not invested wisely in human resources leaving you one year later with a sales force working to capacity with limited growth potential, as they have saturated their markets and are not prepared to invade new markets. Manager A on the other hand has increased his potential by investing wisely and now has 15 additional agents who are fully trained and prepared to lead future company growth by expanding into untapped markets.

Taking a closer look at ROI reveals three added viewpoints. ROI can be positively affected by decreasing costs, increasing revenue, or decreasing total assets. As a non-financial manager, you must be fully aware of these factors so that you can evaluate your position accurately as each option presents its own set of consequences. The proper use of accounting allows you to exercise the proper management controls, along with allowing you to plan and monitor your financial position as you move the organization towards its goals.

Residual Income (RI)

An alternative measure of divisional performance is residual income, which equals divisional operating income less minimum return times total operating assets.

Example 14-5. Divisional operating income is \$250,000, total operating assets are \$2 million, and the cost of capital is 9%. Residual income equals

Divisional operating income	\$250,000
Less: Minimum x total operating assets (9% x \$2,000,000)	<u>(180,000)</u>
Residual Income	<u>\$70,000</u>

The minimum return rate is based upon the company's overall cost of financing adjusted for your division's risk.

Residual income may be projected by division, center, or specific program to ensure that the rate of return on alternative investments is met or improved on by each segment.

A target residual income may be formulated to act as your objective. The trend in residual income to total available assets should be examined in appraising divisional performance.

The advantages of residual income are as follows:

- The same asset may be required to earn the same return rate irrespective of the division the asset is in.
- Different return rates may be employed for different types of assets, depending on riskiness.
- Different return rates may be assigned to different divisions, depending on the risk of those divisions.

- RI provides an economic income, taking into account the opportunity cost of tying up assets in the division.
- RI identifies operating problem areas.
- RI maximizes dollars instead of a percentage, thereby motivating you to accept all profitable investments.

The disadvantages of residual income include the following:

- Assigning a minimum return involves estimating a risk level that is subjective.
- It may be difficult to determine the valuation basis and means of allocating assets to divisions.
- If book value is used in valuing assets, residual income will artificially increase over time, since the minimum return times total assets becomes lower as the assets become older.
- RI cannot be used to compare divisions of different sizes. Residual income tends to favor the larger divisions due to the large amount of dollars involved.
- Since it is a mixture of controllable and uncontrollable elements, there is no segregation.

Decisions Under ROI and RI

The decision whether to use ROI or RI as a measure of your division's performance affects your investment decisions. Under the ROI method, you tend to accept only the investments whose returns exceed the division's ROI. Otherwise, the division's overall ROI would decrease if the investment were accepted. Under the RI method, on the other hand, you would accept an investment as long as it earns a rate in excess of the minimum required rate of return. The addition of such an investment will increase the division's overall RI.

Example 14-6. The following data apply to your division:

Operating assets	\$100,000
Operating Income	\$18,000
Minimum required rate of return	13%
ROI	18%
RI	\$5,000

Assume that you are presented with a project that would yield 15% on a \$10,000 investment. You would not accept this project under the ROI approach since the division is already earning 18%. Acquiring this project will bring down the present ROI to 17.73%, as shown below:

	Present	New Project	Overall
Operating assets (a)	\$100,000	\$10,000	\$110,000
Operating income (b)	18,000	1,500*	19,500
ROI (b/a)	18%	15%	17.73%
* \$ 10,000 x 15% = \$1,500			

Under the RI approach, the manager would accept the new project because it provides a higher rate than the minimum required rate of return (15% vs. 13%). Accepting the new project will increase the overall residual income to \$5,200, as shown below:

	Present	New Project	Overall
Operating assets (a)	\$100,000	\$10,000	\$110,000
Operating income (b)	18,000	1,500	19,500
Less: Minimum required income at 13% (c)	<u>(13,000)</u>	<u>(1,300) *</u>	<u>(14,300)</u>
RI (b - c)	<u>\$ 5,00</u>	<u>\$200</u>	<u>\$ 5,200</u>
* $\$10,000 \times 13\% = \$1,300$			

Conclusion

It is essential to evaluate your segment's performance to identify problem areas. Controllable and uncontrollable factors must be considered. The various means of evaluating performance include cost center, profit center, revenue center, and investment center. Proper analysis under each method is vital in appraising operating efficiency. You should understand the advantages and disadvantages of each method as well so as to determine which method is most appropriate for a situation.

You should be familiar with the profit and loss statements by territory, commodity, method of sale, customer, and salesperson. The profit and loss figures will indicate areas of strength or weakness.

Product line analysis identifies areas that need corrective action such as changing the selling price, eliminating unprofitable products, emphasizing profitable products, modifying advertising strategy, and selecting a channel of distribution.

There are other goals that managers have. They include increasing market share (e.g., your division's sales relative to sales of divisions, number of new customers), improved productivity (e.g. reduction in per unit cost), and improving employee morale (e.g., revenue per employee).

If you are in a service business, some performance measures include billable time, average billing rates, and cost per hour of employee time.

Chapter 14 Review Questions

1. A successful responsibility accounting reporting system is dependent upon
 - A. The correct allocation of controllable variable costs.
 - B. Identification of the management level at which all costs are controllable.
 - C. The proper delegation of responsibility and control.
 - D. A reasonable separation of costs into their fixed and variable components since fixed costs are not controllable and must be eliminated from the responsibility report.

2. A segment of an organization is an investment center if it has
 - A. Authority to make decisions affecting the major determinants of profit, including the power to choose its markets and sources of supply.
 - B. Authority to make decisions affecting the major determinants of profit, including the power to choose its markets and sources of supply and significant control over the amount of invested capital.
 - C. Authority to make decisions over the most significant costs of operations, including the power to choose the sources of supply.
 - D. Responsibility for developing markets for, and selling the output of, the organization.

3. Responsibility accounting defines an operating center that is responsible for revenue and costs as a(n)
 - A. Revenue center.
 - B. Profit center
 - C. Division.
 - D. Operating unit.

4. Residual income of an investment center is the center's
 - A. Operating income plus the minimum required return on its invested capital.
 - B. Operating income less the minimum required return on its invested capital.
 - C. Contribution margin plus the minimum required return on its invested capital.
 - D. Contribution margin less the minimum required return on its invested capital.

5. Residual income (RI) is a better measure for performance evaluation of an investment center manager than return on investment (ROI) because

- A. The problems associated with measuring the asset base are eliminated.
- B. Only the gross book value of assets needs to be calculated.
- C. Desirable investment decisions will not be neglected by high-return divisions.
- D. The arguments about the implicit cost of interest are eliminated.

6. Residual income is a performance evaluation that is used in conjunction with, or instead of, return on investment (ROI). In many cases, residual income is preferred to ROI because.

- A. Residual income is a measure over time, while ROI represents the results for one period.
- B. Residual income concentrates on maximizing absolute dollars of income rather than a percentage return as with ROI.
- C. The imputed interest rate used in calculating residual income is more easily derived than the target rate that is compared to the calculated ROI.
- D. Average investment is employed with residual income while year-end investment is employed with ROI.

7. The price that one division of a company charges another division for goods or services provided is called negotiated pricing. True or False?

8. A limitation of transfer prices based on actual cost is that they

- A. Charge inefficiencies to the department that is transferring the goods.
- B. Charge cost inefficiencies to the buying division that can lead to suboptimal decisions for the company as a whole.
- C. Must be adjusted by some markup.
- D. Lack clarity and administrative convenience.

Chapter 14 Review Answers

1. A successful responsibility accounting reporting system is dependent upon
 - A. Incorrect. Fixed costs may also be controllable, and some costs not controllable may need to be assigned.
 - B. Incorrect. Knowledge about the incurrence of a cost rather than controllability may in practice be an appropriate basis for delegation of responsibility.
 - C. **Correct.** Managerial performance should ideally be evaluated only on the basis of those factors controllable by the manager. Managers may control revenues, costs, and/or investments in resources.
 - D. Incorrect. Fixed costs can be controllable.

2. A segment of an organization is an investment center if it has
 - A. Incorrect. A profit center is responsible for controlling expenses and generating revenues.
 - B. **Correct.** In investment centers, managers are responsible for all activities, including costs, revenues, and investments. An investment center is a profit center with significant control over the amount of capital invested. This control extends to investments such as receivables and property, plant, and equipment, as well as entry into new markets.
 - C. Incorrect. A cost center has authority only over the sources of supply.
 - D. Incorrect. A revenue center is responsible for developing markets and selling the firm's products.

3. Responsibility accounting defines an operating center that is responsible for revenue and costs as a(n)
 - A. Incorrect. A revenue center is responsible only for revenues, not costs.
 - B. **Correct.** A profit center is responsible for both revenues and costs, whereas, a cost center is responsible only for costs.
 - C. Incorrect. A division can be any type of responsibility center.
 - D. Incorrect. An operating unit can be organized as any type of center.

4. Residual income of an investment center is the center's
 - A. Incorrect. The residual income equals divisional operating income less minimum return times total operating assets.
 - B. **Correct.** Residual income is the excess of the return on an investment over a targeted amount equal to a minimum required return on invested capital. The rate used is ordinarily the weighted-average cost of capital. Thus, an investment center's residual income is the center's income minus the minimum required return on its invested capital.

- C. Incorrect. Residual income is the excess income, not contribution margin, over the minimum required return.
- D. Incorrect. Imputed interest is subtracted from income, not contribution margin. Contribution margin is sales revenue minus variable costs.

5. Residual income (RI) is a better measure for performance evaluation of an investment center manager than return on investment (ROI) because

- A. Incorrect. The methods use the same asset base.
- B. Incorrect. Both approaches can use the gross book value of assets or any other measure for that matter.
- C. **Correct.** Residual income is the excess of the amount of the ROI over a targeted amount equal to an imputed interest charge on investment capital. The advantage of using residual income rather than percentage ROI is that the former emphasizes maximizing a dollar amount instead of a percentage. Managers of divisions with a high ROI are encouraged to accept projects with returns exceeding the cost of capital even if those projects reduce the department's ROI.
- D. Incorrect. Use of the residual income method requires knowledge of the cost of capital; thus arguments about the implicit cost of interest may escalate with use of the residual income method.

6. Residual income is a performance evaluation that is used in conjunction with, or instead of, return on investment (ROI). In many cases, residual income is preferred to ROI because.

- A. Incorrect. Both measures represent the results for a single period.
- B. **Correct.** Residual income equals earnings in excess of a minimum desired return. Thus, it is measured in dollars. If performance is evaluated using ROI, a manager may reject a project that exceeds the minimum return if the project will decrease overall ROI. For example, given a target rate of 20%, a project with an ROI of 22% might be rejected if the current ROI is 25%.
- C. Incorrect. The target rate for ROI is the same as the imputed interest rate used in the residual income calculation.
- D. Incorrect. The same investment base should be employed in both methods. The investment base must be measured consistently—average investment or year-end investment. If the data is available, average investment should be used.

7. The price that one division of a company charges another division for goods or services provided is called negotiated pricing. True or False?

True is incorrect. There are several different approaches to determine a transfer price. Negotiated pricing is an approach, along with the variable cost based price and the market price.

False is correct. A transfer price is the price charged by one segment of an organization for a product or service supplied to another segment of the same organization.

8. A limitation of transfer prices based on actual cost is that they

- A. Incorrect. Inefficiencies are charged to the buying department. The transfer should be at standard variable cost so as to isolate any variance resulting from the buyer.
- B. **Correct.** The optimal transfer price of a selling division should be set at a point that will have the most desirable economic effect on the firm as a whole while at the same time continuing to motivate the management of every division to perform efficiently. Setting the transfer price based on actual costs rather than standard costs would give the selling division little incentive to control costs (pass cost efficiencies).
- C. Incorrect. By definition, cost-based transfer prices are not adjusted by some markup.
- D. Incorrect. Cost-based transfer prices provide the advantages of clarity and administrative convenience.

Chapter 15:

Sources of Short-Term Financing

Learning Objectives

After studying this chapter, you will be able to:

- Identify sources of short-term financing.
 - Recognize the value and process of issuing commercial paper and other financing activities.
-

“Short-term financing” refers to financing that will be repaid in 1 year or less. It may be used to meet seasonal and temporary fluctuations in funds position or to meet your permanent needs. For instance, short-term financing may be used to provide additional working capital, to finance current assets (e.g., receivables and inventory), or to provide interim financing for a long-term project (e.g., acquisition of plant and equipment).

When compared to long-term financing, short-term financing has several advantages: it is easier to arrange, less expensive, and more flexible. The drawbacks of short-term financing are that interest rates fluctuate more often, refinancing is frequently required, there is a risk of not being able to repay, and delinquent repayment may be detrimental to your credit rating.

Sources of short-term financing include trade credit, bank loans, bankers' acceptances, finance company loans, commercial paper, receivable financing, and inventory financing. A particular source may be more appropriate in a given circumstance, and some are more desirable than others because of interest rates or collateral requirements.

You should consider the merits of the different alternative sources of short term financing. The factors bearing upon the selection of a particular source include:

1. Cost.
2. Effect on credit rating. Some sources of short-term financing may negatively impact your credit rating (e.g., factoring accounts receivable).
3. Risk. Consider the reliability of the source of funds for future borrowing. If you are materially affected by outside forces, you need more stability and reliability in financing.

4. Restrictions. Certain lenders may impose restrictions, such as requiring a minimum level of working capital.
5. Flexibility. Certain lenders are more willing than others to work with you (e.g., to periodically adjust the amount of funds needed).
6. Expected money market conditions (e.g., future interest rates).
7. Inflation rate.
8. Profitability and liquidity positions.
9. Stability and maturity of your operations.
10. Tax rate.

Trade Credit

Trade credit (accounts payable) refers to balances owed to suppliers. It is a spontaneous (recurring) financing source, since it comes from normal operations, and is the least expensive form of financing inventory. Because of its ease in use, trade credit is the largest source of short-term financing for many firms both large and small. Trade credit has many advantages: it is readily available, since suppliers want business; collateral is not required; interest is typically not demanded or, if so, the rate is minimal; it is convenient; and trade creditors are frequently lenient if you get into financial trouble. If you have liquidity difficulties, you may be able to stretch (extend) accounts payable; however, this may lower your credit rating and may eliminate any cash discount offered.

Example 15-1. You purchase \$500 worth of merchandise per day from suppliers. The terms of purchase are net/60, and you pay on time. How much is your accounts payable balance?

$$\$500 \text{ per day} \times 60 \text{ days} = \$30,000$$

Cash Discount

You should take advantage of a cash discount offered on the early payment of accounts payable because the failure to do so may result in a high opportunity cost. The cost of not taking a discount equals:

$$\frac{\text{Discount lost}}{\text{Dollar Proceeds you have use of by not taking the discount}} \times \frac{360}{\text{Number of days you have use of the money by not taking the discount}} = \text{Opportunity Cost(\%)}$$

Example 15-2. You buy \$1,000 in merchandise on terms of 2/10, net/30. You fail to take the discount, paying the bill on day 30. The opportunity cost is:

$$\frac{\$20}{\$980} \times \frac{360}{20} = 36.7\%$$

You should take the discount, even if you needed to borrow the money from the bank, since the interest rate on a bank loan would be far less than 36.7%

When Are Bank Loans Advisable?

Most banking activities are conducted by commercial banks. Other institutions (e.g., savings and loan associations, credit unions) provide banking services as well. Commercial banks allow you to operate with minimal cash and still be confident of planning activities even in times of uncertainty. These banks favor short-term loans; however, loans in excess of 1 year may be given (see Chapter 17).

To be eligible for a bank loan, you must have sufficient equity and good liquidity. A banker gathers information regarding your business operations and often expresses the bank's opinions of your practices. Depending on your financial standing, the bank may take a "soft" or "hard" position including warnings of not renewing loans or demanding immediate payment if you do not agree to its suggestions. If your company is large, a group of banks may form a consortium to furnish the desired level of capital. One bank is appointed the prime negotiator.

When a short-term bank loan is taken, you usually issue a borrower's statement (see Exhibit 15-1) and sign a note. This note is a written statement that you agree to repay the loan at the due date. A note payable may be paid at maturity or in installments and consists of principal and interest.

Exhibit 15-1. *Typical Statement Required of Corporate Borrower*

To ABC Bank:

To obtain credit from time to time with you for our negotiable paper, we provide financial statements as of December 31, 20XI. We will notify you immediately of any significant unfavorable change in our financial position, and, in the absence of such notice or of a new and full written statement, this may be construed as a continuing statement and substantially accurate; and it is hereby agreed that upon requesting further credit, this statement shall have the same force as if delivered as an original statement of our financial position at the time when further credit is needed.

If any judgment is entered or any legal action is commenced against the undersigned, or if the undersigned becomes financially troubled, or on the failure of the undersigned to notify you of any important change in the financial status of the undersigned, or if the undersigned assigns any accounts

or transfers any assets which you deem materially affect the business, then all obligations held by you upon which the undersigned is responsible shall at your option, be immediately due, notwithstanding the date of payment as fixed by the obligation then held by you, and any credit balance of the undersigned may be applied by you in satisfaction of any such debt.

A bank loan is not a source of spontaneous financing as is trade credit. You must apply for loans, and lenders must grant them. Without additional funds, you may have to restrict your plans; therefore, as your need for funds change, you should alter your borrowings from banks. For example, a self-liquidating (seasonal) loan may be used to pay for a temporary increase in accounts receivable or inventory. As soon as the assets realize cash, you repay the loan.

Loans, of course, earn interest, and the prime interest rate is the lowest interest rate applied to short-term loans from a bank. Banks charge only their most creditworthy clients the prime rate; other borrowers are charged higher interest rates. You must realize that the prime interest rate is a negotiating point for borrowed funds. Your interest rate will probably be higher depending upon your risk.

Bank financing may take any of the following forms:

- Unsecured loans
- Secured loans
- Lines of credit
- Installment loans

Are You Eligible for an Unsecured Loan?

Most short-term, unsecured (no collateral) loans are self-liquidating. This kind of loan is recommended if you have an excellent credit rating. It is appropriate if you have immediate cash and can either repay the loan in the near future or can quickly obtain longer-term financing. Seasonal cash shortfalls and desired inventory buildups are reasons to use an unsecured loan. There are two disadvantages to this kind of loan: (1) it carries a higher interest rate than a secured loan and (2) payment in a lump sum is required.

What Will You Give to Obtain a Secured Loan?

If your credit rating is deficient, the bank may lend money only on a secured basis—that is, with some form of collateral behind the loan. Collateral may take many forms including inventory, marketable securities, or fixed assets. A warehouse receipt is a type of secured inventory financing. In some cases, even though you are able to obtain an unsecured loan, you may still give collateral to get a lower interest rate.

What Line of Credit Can You Get?

Under a line of credit, the bank agrees to lend money on a recurring basis up to a specified amount (see Exhibit 15-2). Credit lines are typically established for a 1-year period and may be renewed annually.

Exhibit 15-2. Sample Letter Extending Line of Credit

Grace Bank
New York, N.Y.
March 16, 2005

Mr. Jim Balk
Treasurer
Harris Manufacturing Corporation
New York, NY

Dear Mr. Balk:

Based upon our review of your year-end audited financial statements, we renew your \$2 Million unsecured line of credit for next year. Borrowings under this line will be at a rate of 1% over the prime rate.

This line is subject to your company maintaining its financial position and being out of bank debt for at least 90 days during the fiscal year.

Sincerely,
Bob Jones
Vice President

The advantages of a line of credit are the easy and immediate access to funds during tight money market conditions and the ability to borrow only as much as needed and repay immediately when cash is available. The disadvantages relate to the collateral requirements and the additional financial information that must be presented to the bank. Also, the bank may place restrictions upon you, such as a ceiling on capital expenditures or the maintenance of a minimum level of working capital. Further, the bank typically charges a commitment fee on the amount of the unused credit line.

When you borrow under a line of credit, you may be required to maintain a deposit with the bank that does not earn interest. This deposit is referred to as a *compensating balance* and is stated as a percentage of the loan. The compensating balance effectively increases the cost of the loan. A compensating balance may also be placed on the unused portion of a line of credit, in which case the interest rate would be reduced.

Example 15-3. You may borrow \$200,00 and are required to keep a 12% compensating balance. You also have an unused line of credit in the amount of \$100,000, for which a 10% compensating balance is required. The minimum balance that must be maintained is:

$$\begin{aligned}(\$200,000 \times 12) + (\$100,000 \times .10) &= \$24,000 + \$10,000 \\ &= \$34,000\end{aligned}$$

A line of credit is typically decided upon prior to the actual borrowing. In the days between the arrangement for the loan and the actual borrowing, interest rates may change. Therefore, your agreement with the bank will stipulate it is at the prime interest rate prevailing when the loan is extended plus a risk premium. Note that the prime interest rate is not known until you actually borrow the money. For example, if you arrange for a line of credit when the prime interest rate is 8% and the interest rate on the loan is stipulated at 2% above prime, but the prime interest rate is 10% on the day you actually borrow the money, you will be charged an interest rate of 12%.

Be on guard! Some banks may test your financial capability by requiring you to "clean up" the loan--that is, repay it for a brief time during the year (e.g., for 1 month). The payment shows the bank that the loan is actually seasonal rather than permanent. If you are unable to repay a short-term loan, you should probably finance with long-term funds.

What Is an Installment Loan?

An installment loan requires monthly payments. When the principal on the loan decreases sufficiently, refinancing can take place at lower interest rates. The advantage of this kind of loan is that it may be tailored to satisfy seasonal financing needs. The disadvantage is that you may have a cash problem in a particular month but still have to pay the monthly installment payment.

How Do You Compute Interest?

Interest on a loan may be paid either at maturity (ordinary interest) or in advance (discounting the loan). When interest is paid in advance, the loan proceeds are reduced and the effective (true) interest cost is increased.

Example 15-4. You borrow \$30,000 at 16% interest per annum and repay the loan 1 year later. The interest is:

$$\$30,000 \times .16 = \$4,800$$

The effective interest rate is 16% ($\$4,800/\$30,000$)

Example 15-5. Assume the same facts as in Example 15-4, except the note is discounted. The proceeds of this loan are smaller than in the previous example.

$$\begin{aligned} \text{Proceeds} &= \text{Principal} - \text{Interest} \\ &= \$30,000 - \$4,800 \\ &= \$25,200 \end{aligned}$$

The true interest rate for this discounted loan is:

$$\text{Effective interest rate} = \frac{\text{Interest}}{\text{Proceeds}} = \frac{\$4,800}{\$25,200} = 19\%$$

Example 15-6. Bank A will give you a 1-year loan at an interest rate of 20% payable at maturity, while Bank B will lend on a discount basis at a 19% interest rate. The effective rate for Bank B is calculated as follows:

$$\frac{19\%}{81\%} = 23.5\%$$

Bank A's 20% rate is the lowest effective rate.

When a loan has a compensating balance requirement, the proceeds received are decreased by the amount of the compensating balance. The compensating balance will increase the effective interest rate.

Example 15-7. The effective interest rate for a 1-year, \$600,000 loan that has a nominal interest rate of 19%, with interest due at maturity and with a 15% compensating balance required, is calculated as follows:

$$\begin{aligned} \frac{\text{Interest rate} \times \text{principal}}{\text{Percentage of proceeds available} \times \text{Principal}} &= \frac{.19 \times \$600,000}{(1.00 - .15) \times \$600,000} \\ &= \frac{\$114,000}{\$510,000} \\ &= 22.4\% \end{aligned}$$

Example 15-8. Assume the same facts as in Example 15-7, except that the loan is discounted. The effective interest rate is:

$$\begin{aligned} \frac{\text{Interest rate} \times \text{principal}}{\text{Percentage of proceeds available} \times \text{Principal less compensating balance}} &= \frac{.19 \times \$600,000}{(0.85 \times \$600,000) - \$114,000} \\ &= \frac{\$114,000}{\$510,000} \\ &= 28.8\% \end{aligned}$$

Example 15-9. You have a credit line of \$400,000, but you must maintain a compensating balance of 13% on outstanding loans and a compensating balance of 10% on the unused credit. The interest rate on the loan is 18%. You borrow \$275,000. The required compensating balance is:

$$\begin{aligned} .13 \times \$275,000 &= \$35,750 \\ .10 \times 125,000 &= \underline{12,500} \\ &= \underline{\underline{\$48,250}} \end{aligned}$$

The effective interest rate (with line of credit) is:

$$\begin{aligned} \frac{\text{Interest rate (on loan) x Principal}}{\text{Principal - Compensating balance}} &= \frac{0.18 \times \$275,000}{\$275,000 - \$48,250} \\ &= \frac{\$49,500}{\$226,750} \\ &= 21.8\% \end{aligned}$$

On an installment loan, the effective interest rate computation is more complicated. Assuming a 1-year loan payable in equal monthly installments, the effective rate is:

$$\frac{\text{Interest}}{\text{Average Loan balance}}$$

The average loan balance is one-half the loan amount. The interest is computed on the face amount of the loan.

Example 15-10. You borrow \$40,000 at an interest rate of 10% to be paid in 12 monthly installments. The average loan balance is:

$$\frac{\$40,000}{2} = \$20,000$$

The effective interest rate is:

$$\frac{\$4,000}{\$20,000} = 20\%$$

Example 15-11. Assume the same facts as in Example 15-10, except that the loan is discounted. The interest of \$4,000 is deducted in advance, so the proceeds received are:

$$\$40,000 - \$4,000 = \$36,000$$

The average loan is:

$$\frac{\$36,000}{2} = \$18,000$$

The effective interest rate is:

$$\frac{\$4,000}{\$18,000} = 22.2\%$$

Working with a Bank

When applying for a loan, you should know that the loan officer will prepare financial ratios of your liquidity (ability to meet short term debt) and will ask questions to determine your managerial competency. Since the banker will want to know whether you will be able to repay the loan, he or she will want to see your cash flow forecasts. You will make a good impression if you have the financial statements and documents readily available and are prepared to discuss your financial condition, particularly being able to explain ratios that depart from industry norms.

Banks are eager to lend money to meet self-liquidating, cyclical business needs. A short-term bank loan is an inexpensive way to obtain funds to satisfy working capital requirements during the business cycle. However, you must be able to explain what the needs are in an intelligent manner so the banker has confidence in your abilities.

In a long-term banking relationship, bankers offer professional assistance in addition to financing. They may recommend ways to improve the quality of business policies (e.g., to enter new markets, etc.)

What are Banker's Acceptances?

A *banker's acceptance* is a draft, drawn by you and accepted by a bank, which orders payment to a third party at a later date. The creditworthiness of the draft is of good quality because it has the backing of the bank, not the client. It is, in essence, a debt instrument created out of a self-liquidating transaction. Bankers' acceptances are often used to finance the shipment handling of both domestic and foreign merchandise. Acceptances act as short-term financing because they typically have maturities of 180 days.

Example 15-12. A U.S. oil refiner arranges with its U.S. commercial bank for a letter of credit to a Saudi Arabian exporter with whom the U.S. has undertaken a transaction. The letter of credit regarding the shipment states that the exporter can draw a time draft for a given amount on the U.S. bank. The exporter draws a draft on the bank and negotiates it with a local Saudi Arabian bank, receiving immediate payment. The Saudi Arabian bank sends the draft to the U.S, the latter accepts the draft, there is an acceptance to meet the maturity date.

Are You Forced to Take Out a Commercial Finance Company Loan?

When credit is unavailable from a bank, you may have to go to a commercial finance company (e.g., CIT Financial). The finance company loan has a higher interest rate than a bank, and generally it is secured. Typically, the amount of collateral placed will be greater than the balance of the loan. Collateral includes accounts receivable, inventories, and fixed assets. Commercial finance companies also finance the installment purchases of industrial equipment by firms. A portion of their financing is sometimes obtained through commercial bank borrowing at wholesale rates.

Issuing Commercial Paper

Commercial paper can be issued only if you possess a very high credit rating. Therefore, the interest rate is less than that of a bank loan, typically 1/2% below the prime interest rate. Commercial paper is unsecured and sold at a discount (below face value). The maturity date is usually less than 270 days, otherwise registration with the Securities and Exchange Commission (SEC) is needed. When a note is sold at a discount, it means that interest is immediately deducted from the face of the note by the creditor, but you will pay the full face value. Commercial paper may be issued through a dealer or directly placed to an institutional investor. It ordinarily does not have an active secondary market.

The benefits of commercial paper are that no security is required, the interest rate is typically less than through bank or finance company borrowing, and the commercial paper dealer often offers financial advice. The drawbacks are that commercial paper can be issued only by large, financially sound companies, and commercial paper dealings relative to bank dealings are impersonal.

Example 15-13. You issue \$500,000 of commercial paper every 2 months at a 13% rate. There is a \$1 000 placement cost each time. The percentage cost of the commercial paper is:

Interest (\$500,000 x .13)	\$65,000	
Placement cost (\$1,000 x 6)	<u>6,000</u>	
Cost	<u>\$71,000</u>	
Percentage cost of commercial paper	<u>\$71,000</u>	
	\$500,000	= 14.2%

Using Receivables for Financing

In accounts receivable financing, the accounts receivable are the security for the loan as well as the source of repayment. Accounts receivable financing generally takes place under the following conditions:

- Receivables are a minimum of \$25,000
- Sales are a minimum of \$250,000.
- Individual receivables are at a minimum of \$100.
- Receivables apply to selling merchandise rather than rendering services.
- Customers are financially strong.
- Sales returns are not great.
- Title to the goods passes to the buyer at shipment.

Receivable financing has several advantages, including avoiding the need for long-term financing and obtaining a recurring cash flow. Accounts receivable financing has the drawback of high administrative costs when there are many small accounts; however, with the use of personal computers these costs can be curtailed.

Accounts receivable may be financed under either a factoring or assignment (pledging) arrangement. *Factoring* is the outright sale of accounts receivable to a bank or finance company *without recourse*. The purchaser of the factoring arrangement (also called *the factor*) takes all credit and collection risks. The proceeds received are equal to the face value of the receivables less the commission charge, which is usually 2% to 4% higher than the prime interest rate. The cost of the factoring arrangement is the factor's commission for credit investigation, interest on the unpaid balance of advanced funds, and a discount from the face value of high-credit-risk receivables. Remissions by customers are made directly to the factor.

The advantages of factoring are immediate availability of cash, reduction in overhead because the credit examination function is no longer needed, obtaining of financial advice, receipt of advances as required on a seasonal basis, and strengthening of the balance sheet position.

The disadvantages of factoring include both the high cost and the negative impression left with customers due to the change in ownership of the receivables. Also, factors may antagonize customers by their demanding methods of collecting delinquent accounts.

In an *assignment* (pledging), there is no transfer of the ownership of the accounts receivable. Receivables are given to a finance company *with recourse*. The finance company usually advances between 50% and the face value of the receivables in cash. You are responsible for charge, interest on the advance, and any resulting bad debt losses. Remissions continue to be made directly to you.

The assignment of accounts receivable has the advantages of availability of cash, cash advances available on a seasonal basis, and avoidance of negative customer feelings. The disadvantages include the high cost, the continuance of the clerical function associated with accounts receivable, and the bearing of all credit risk.

You also must be aware of the impact of a change in account receivable policy on the cost of financing receivables. When accounts receivable are financed, the cost of financing may rise or fall under different circumstances. For example, when credit standards are relaxed, costs rise; when defaults are given to the finance company, costs decrease; and when the minimum invoice amount of a credit sale is increased, costs decline. You should compute the costs of accounts receivable financing and select the least expensive alternative.

Example 15-14. You have \$120,000 per month in accounts receivable that a factor will purchase from you, advancing you up to 80% of the receivables for an annual charge of 14% and a 1.5% fee on receivables purchased. The cost of this factoring arrangement is:

Factor fee [.015 x (\$120,000 x 12)]	\$21,600
Cost of borrowing [.14 x (\$120,000 x .8)]	<u>13,440</u>
Total cost	<u>\$35,040</u>

Example 15-15. Your factor charges a 3% fee per month. The factor lends you up to 75% of receivables purchased for an additional 1% per month. Your credit sales are \$400,000 per month. As a result of the factoring arrangement, you save \$6,500 per month in credit costs and a bad debt expense of 2% of credit sales.

XYZ Bank has offered an arrangement to lend you up to 75% of the receivables. The bank will charge 2% per month interest plus a 4% processing charge on receivable lending.

The collection period is 30 days. If you borrow the maximum per month, should you stay with the factor or switch to XYZ Bank? The cost of the factor is:

Purchased receivables $.03 \times \$400,000$)	\$12,000
Lending fee $ [.01 \times (.75 \times \$400,000)]$	<u>3,000</u>
Total cost	<u>\$15,000</u>

The cost of the bank financing is:

Interest $ [.02 \times (.75 \times \$400,000)]$	\$ 6,000
Processing charge $ [.04 \times (.75 \times \$400,000)]$	12,000
Additional cost of not using the factor.	
Credit costs	6,500
Bad debts $ (.02 \times \$400,000)$	<u>8,000</u>
Total cost	<u>\$32,500</u>

You should stay with the factor.

Using Inventories for Financing

Inventory financing typically occurs when you have completely used your borrowing capacity on receivables. The inventory itself must be good security for a loan, it must consist of marketable, nonperishable, and standardized goods that have quick turnover, and it should not be subject to rapid obsolescence. Inventory financing should consider the price stability of the merchandise and the costs of selling it.

The advance is high when there is marketable inventory. In general, the financing of raw materials and finished goods is about 75% of their value. The interest rate is approximately 3% to 5% over the prime interest rate. This high interest rate is one of the disadvantages of inventory financing. The restrictions placed on inventory represent another drawback.

The types of inventory financing include a floating (blanket) lien, warehouse receipt, and trust receipt. They are sources of secured financing. With a *floating lien*, the creditor's security lies in the aggregate inventory rather than in its components. Even though you sell and restock, the lender's security interest continues. With a

warehouse receipt, the lender receives an interest in the inventory stored at a public warehouse; however, the fixed costs of this arrangement are high. There may be a field warehouse arrangement in which the warehouse sets up a secured area directly at your location. You have access to the goods but must continually account for them. Generally, the inventory would not be in the immediate possession of the seller. With a *trust receipt* loan, the creditor has title to the goods but releases them to you to sell on the creditor's behalf. As goods are sold, you remit the funds to the lender. A good example of trust receipt use is in automobile dealer financing. The drawback of the trust receipt arrangement is that a trust receipt must be given for specific items.

A *collateral certificate* may be issued by a third party to the lender guaranteeing the existence of pledged inventory. The advantage of a collateral certificate is flexibility because merchandise does not have to be segregated or possessed by the lender.

Example 15-16. You wish to finance \$500,000 of inventory. Funds are required for 3 months. A warehouse receipt loan may be taken at 16% with a 90% advance against the inventory's value. The warehousing cost is \$4,000 for the 3-month period. The cost of financing the inventory is:

Interest [.16 x .90 x \$500 000 x (3/12)	\$18,000
Warehousing cost	<u>\$ 4,000</u>
Total cost	<u>\$22,000</u>

Example 15-17. You show growth in operations but are presently experiencing liquidity difficulties. Six large financially sound companies are responsible for 75% of your sales. Sales amount to \$1,800,000, and net income is \$130,000. On the basis of the financial information that is provided in the following balance sheet, would you be able to borrow on receivables or inventory?

Receivable financing can be expected since a high percentage of sales are made to only six large financially strong companies. Receivables will thus show good collectability. It is also easier to control accounts.

Inventory financing is not likely, due to the high percentage of partially completed items. Lenders are reluctant to finance inventory when a large work-in-process balance exists because the goods will be difficult to further process and sell by lenders.

Assets

Current assets

Cash	\$27,000	
Receivables	380,000	
Inventory (consisting of 55% of work-in-progress)	<u>320,000</u>	
Total current assets		\$727,000
Fixed Assets		<u>250,000</u>
Total Assets		<u>\$977,000</u>

Liabilities and Stockholders' Equity

Current liabilities	\$260,000	
Accounts payable	200,000	
Loans payable	<u>35,000</u>	
Total current liabilities		\$495,000
Non current liabilities		
Bond payable		<u>110,000</u>
Total liabilities		\$605,000
Stockholder's equity		
Common Stock	\$250,000	
Retained earnings	<u>122,000</u>	
Total stockholder's equity		<u>372,000</u>
Total liabilities and stockholder's equity		<u>\$977,000</u>

What Other Assets May Be Used for Financing?

Inventory and receivables are not the only assets that may be used as security for short-term bank loans. Real estate, plant and equipment, cash surrender value of life insurance policies, and securities may also be used. Also, lenders are typically willing to advance a high percentage of the market value of bonds, and loans may also be made based on a guaranty of a third party.

Conclusion

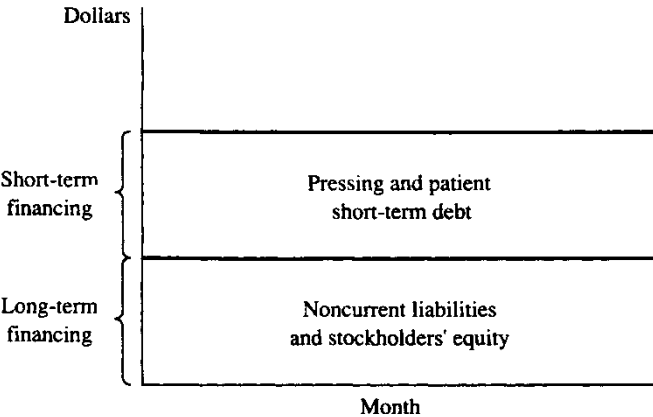
In short-term financing, the best financing tool should be used to meet your objectives. The financing instrument depends upon your particular circumstances. Consideration is given to such factors as cost, risk, reactions, stability of operations, and tax rate. Sources of short-term financing include trade credit, bank loans, bankers' acceptances, finance company loans, commercial paper, receivable financing, and inventory financing. If you think you will be short of cash during certain times, arrange for financing (e.g., a line of credit) in advance instead of waiting for an emergency. If you are small business, you would not have access to major capital markets. In fact, the only options available, outside of owner financing, are bank loans and a line of credit from suppliers.

Table 15-1 presents a summary of the major features of short-term financing sources, and Figure 15-1 illustrates temporary and permanent financing.

Table 15-1. A Summary of the Major Features of Short-Term Financing Sources

Types of Financing	Source	Cost or Terms	Features
Spontaneous Sources			
Accounts payable	Suppliers	No explicit cost but there is an opportunity cost if a cash discount for early payment is not taken. Companies should take advantage of the discount offered.	The main source of short-term financing typically on terms of 0 to 120 days.
Accrued expenses	Employees and tax agencies	None	Expenses incurred but not yet paid (e.g., accrued wages payable, accrued taxes payable).
Unsecured sources			
Bank loans			
1. Single payment note	Commercial banks	Prime interest rate plus risk premium. The interest rate may be fixed or variable. Unsecured loans are less costly than secured loans.	A single-payment loan to satisfy a funds shortage to last a short time period.
2. Lines of credit	Commercial banks	Prime interest rate plus risk premium. The interest rate may be fixed or variable. A compensating balance is typically required. The line of credit must be "cleaned up" periodically.	An agreed upon borrowing limit for funds to satisfy seasonal needs.
Commercial paper	Commercial banks, insurance companies, other financial institutions, and other companies	A little less than the prime interest rate.	Unsecured short-term note of financially strong companies.
Secured sources			
Accounts receivable as collateral			
1. Pledging	Commercial banks and finance companies	Typically 2% to 5% above prime plus fees (usually 2% to 3%). Low administrative costs. Advances typically ranging from 60% to 85%.	Qualified accounts receivable accounts serve as collateral upon collection of the account, the borrower remits to the lender. Customers are not notified of the arrangement. With recourse means that the risk of nonpayment continues to be borne by the company.
2. Factoring	Factors, commercial banks, and commercial finance companies	Typically a 2% to 3% discount from the face value of factored receivables. Interest on advances of almost 3% over prime. Interest on surplus balances held by factor of about 1/2% per month. Costs with factoring are higher than with pledging.	Certain accounts receivable are sold on a discount basis without recourse. This means that the factor bears the risk of nonpayment. Customers are notified of the arrangement. The factor provides more services than is the case with pledging.
Inventory collateral			
1. Floating liens	Commercial banks and commercial finance companies	About 4% above prime. Advance is about 40% of collateral value.	Collateral is all the inventory. There should be a stable inventory with many inexpensive items.
2. Trust receipts (floor planning)	Commercial banks and commercial finance companies	About 3% above prime. Advances ranging from 80% to 100% of collateral value.	Collateral is specific inventory that is typically expensive. Borrower retains collateral. Borrower remits proceeds to lender upon sale of the inventory.
3. Warehouse receipts	Commercial banks and commercial finance companies	About 4% above prime plus about a 2% warehouse fee. Advance of about 80% of collateral value.	Collateralized inventory is controlled by lender. A warehousing company issues a warehouse receipt held by the lender. The warehousing company acts as the lender's agent.

Figure 15-1. Illustrative Financing



Chapter 15 Review Questions

1. Which one of the following financial instruments generally provides the largest source of short-term credit for small firms?
 - A. Installment loans.
 - B. Commercial paper.
 - C. Trade credit.
 - D. Bankers' acceptances.

2. If a firm borrows \$500,000 at 10% and is required to maintain \$50,000 as a minimum compensating balance at the bank, what is the effective interest rate on the loan?
 - A. 10.0%
 - B. 11.1%
 - C. 9.1%
 - D. 12.2%

3. An example of secured short-term financing is
 - A. Commercial paper.
 - B. A warehouse receipt.
 - C. A revolving credit agreement.
 - D. Line of credit.

4. A small retail business would most likely finance its merchandise inventory with
 - A. Commercial paper.
 - B. A warehouse receipt loan.
 - C. A line of credit.
 - D. A chattel mortgage.

5. A manufacturing firm wants to obtain a short-term loan and has approached several lending institutions. All of the potential lenders are offering the same nominal interest rate but the terms of the loans vary. Which of the following combinations of loan terms will be most attractive for the borrowing firm?
 - A. Simple interest, no compensating balance.

- B. Discount interest, no compensating balance.
- C. Simple interest, 20% compensating balance required.
- D. Discount interest, 20% compensating balance required.

Chapter 15 Review Answers

1. Which one of the following financial instruments generally provides the largest source of short-term credit for small firms?

- A. Incorrect. Installment loans are usually a longer-term source of financing and are more difficult to acquire than short-term sources of financing.
- B. Incorrect. Commercial paper is normally used only by large companies with high credit ratings.
- C. **Correct.** Trade credit (accounts payable) refers to balances owed to suppliers. It is a spontaneous (recurring) financing source, since it comes from normal operations, and is the least expensive form of financing inventory. Because of its ease in use, trade credit is the largest source of short-term financing for many firms both large and small.
- D. Incorrect. Bankers' acceptances are drafts drawn on bank deposits; the acceptance is a guarantee of payment at maturity. It is a popular source of short-term financing, albeit not the largest source.

2. If a firm borrows \$500,000 at 10% and is required to maintain \$50,000 as a minimum compensating balance at the bank, what is the effective interest rate on the loan?

- A. Incorrect. 10% is the nominal rate.
- B. **Correct.** At 10%, the interest on a \$500,000 loan is \$50,000 per year. However, the \$500,000 loan is effectively reduced to \$450,000 of usable funds by the compensating balance requirement. Thus, the borrower pays \$50,000 of interest for a \$450,000 loan, an effective rate of 11.1% ($\$50,000/\$450,000$).
- C. Incorrect. 9.1% equals \$50,000 divided by \$550,000.
- D. Incorrect. 12.2% equals \$55,000 divided by \$450,000.

3. An example of secured short-term financing is

- A. Incorrect. Commercial paper is a type of unsecured, short-term promissory note issued by large firms to other firms, insurance companies, mutual funds, etc.
- B. **Correct.** A document of title is usually issued by a bailee covering goods in the bailee's possession or care (UCC 1-201). It represents ownership of the goods and is ordinarily needed to obtain the goods from the bailee. The two major types of documents of title are bills of lading (issued by carriers) and warehouse receipts. With a warehouse receipt, the lender receives an interest in the inventory stored at a public warehouse; however, the fixed costs of this arrangement are high. There may be a field warehouse arrangement in which the warehouse sets up a secured area directly at your location. You have access to the goods but must continually account for them.
- C. Incorrect. A revolving credit agreement is a formal line of credit, usually with a bank, that large firms often use.

- D. Incorrect. A line of credit is an arrangement, which may be formal or informal, between a commercial bank and its customer concerning the maximum loan amount available.

4. A small retail business would most likely finance its merchandise inventory with

- A. Incorrect. Only large companies with excellent credit ratings have access to the commercial paper market.
- B. Incorrect. A retail store must have instant access to its inventory to provide continuous services to customers. Thus, a loan on a warehouse receipt loan would not be suitable because the inventory would not be in the immediate possession of the seller.
- C. **Correct.** A small retail store would not have access to major capital markets. In fact, the only options available, outside of owner financing, are bank loans and a line of credit from suppliers. It is this latter alternative that is most often used because it permits the store to finance inventories for 30 to 60 days without incurring interest cost. A line of credit is an arrangement between a bank and a borrower in which the bank commits itself to lend up to a certain maximum amount to the borrower in a given period.
- D. Incorrect. A chattel mortgage is most often used for financing moveable equipment. It is not well-suited to financing inventory of a small retailer with high turnover because of the difficulty of identification.

5. A manufacturing firm wants to obtain a short-term loan and has approached several lending institutions. All of the potential lenders are offering the same nominal interest rate but the terms of the loans vary. Which of the following combinations of loan terms will be most attractive for the borrowing firm?

- A. **Correct.** The most desirable set of terms are those that result in the lowest cost of borrowing. Discount interest results in a higher effective borrowing cost than simple interest because the bank deducts interest in advance so the borrower receives less than the face value of the loan. A compensating balance results in a higher effective borrowing cost because the compensating balance is an amount of cash that the firm is unable to use. The cheapest terms, given that all options have the same nominal interest rate, will be simple interest with no compensating balance.
- B. Incorrect. Discount interest results in a higher effective borrowing cost than simple interest because the bank deducts interest in advance so the borrower receives less than the face value of the loan.
- C. Incorrect. A compensating balance results in a higher effective borrowing cost because the compensating balance is an amount of cash that the firm is unable to use.
- D. Incorrect. Discount interest and a compensating balance are disadvantageous to the borrower.

Chapter 16:

Considering Term Loans and Leasing

Learning Objectives

After studying this chapter, you will be able to:

- Define the use of intermediate-term bank loans.
 - Understand the advantages of revolving credit.
-

This chapter considers intermediate-term loans, primarily from banks and leasing arrangements to meet your financing needs. Intermediate-term loans include bank loans, revolving credit, insurance company term loans, and equipment financing.

Intermediate-Term Bank Loans

Intermediate-term loans are typically loans with a maturity of more than 1 year but less than 5 years. They are appropriate when short-term unsecured loans are not, such as when a business is acquired, new fixed assets are purchased, and long-term debt is required. If you wish to float long-term debt or issue common stock but conditions are unfavorable in the market, you may seek an intermediate loan to bridge the gap until long-term financing can be undertaken on favorable terms.

The interest rate on an intermediate-term loan is typically higher than that on a short-term loan because of the longer maturity period. The interest rate may be either fixed or variable (according to, for instance, changes in the prime interest rate). The cost of an intermediate-term loan changes with the amount of the loan and your financial strength.

Ordinary intermediate-term loans are payable in periodic, equal installments, except for the last payment, which may be higher (referred to as balloon payment). The schedule of loan payments should be based on the cash flow position to satisfy the debt. The periodic payment in a term loan is computed as follows:

$$\text{Periodic payment} = \frac{\text{Amount of Loan}}{\text{Present value factor}}$$

Example 16-1. You contract to repay a term loan in five equal year-end installments. The amount of the loan is \$150,000 and the interest rate is 10%. The payment each year is

$$\frac{\$150,000}{3.791} = \$39,567.40$$

where 3.791 = T4 (10%, 5 years) = Present value of annuity for 5 years at 10% (from Table 11-4)

Example 16-2. You may want to determine the amount of loan, and what portion of the periodic payment represents principal and interest. You take out a term loan to be paid off in 20 year-end annual installments of \$2,000 each. The interest rate is 12%. The amount of the loan is

$$\$2,000 = \frac{\text{Amount of Loan}}{7.469}$$

$$\text{Amount of Loan} = \$2,000 \times 7.469 = \$14,938.00$$

where 7.469 = T4(12%, 20 years) from Table 11-4

The amortization schedule for the first 2 years is shown in the table:

Year	Payment	Interest ^a	Principal	Balance
0				\$14,938.00
1	\$2,000	\$1,792.56	\$207.44	\$14,730.56
2	\$2,000	\$1,767.67	\$232.33	\$14,498.23

^a 12% times the balance of the loan at the beginning of the year.

When taking out an intermediate-term loan, you will encounter several kinds of restrictive provisions that are designed to protect the lender. You may find that the agreement includes general provisions that are used in most agreements and vary depending upon your situation. Examples are working capital and cash dividend requirements. Or the agreement may contain routine (uniform) provisions which are employed in most agreements and are applied universally. Examples are the payment of taxes and the maintenance of proper insurance to ensure maximum lender protection. Lastly, you may encounter specific provisions that are tailored to a particular situation. Examples are the placing of limits on future loans and the carrying of adequate life insurance for executives.

The advantages of intermediate-term loans include the following:

- Intermediate-term loan provide flexibility in that the term may be altered as your financing requirements change.
- Financial information is kept confidential, since no public issuance is involved.
- The loan may be arranged quickly, relative to a public offering.

- These loans avoid the possible nonrenewal of a short-term loan.
- Public flotation costs are not involved.

The disadvantages of intermediate-term loans are as follows:

- Collateral and possible restrictive covenants are required, in contrast to commercial paper and unsecured short-term bank loans.
- Budgets and financial statements may have to be submitted periodically to the lender.
- “Kickers”, or “Sweeteners”, such as stock warrants or a share of the profits, are sometimes requested by the bank.

Using Revolving Credit

Revolving credit, usually used for seasonal financing, may have a 3-year maturity, but the notes evidencing revolving credit are short, usually 90 days. The advantages of revolving credit are flexibility and ready availability. Within the time period of the revolving credit, you may renew a loan or enter into additional financing up to a maximum amount. There are typically fewer restrictions on revolving credit but at the cost of a slightly higher interest rate.

Insurance Company Term Loans

Insurance companies and other institutional lenders may extend intermediate-term loans. Insurance companies typically accept loan maturity dates exceeding 5 years, but their rate of interest is often higher than that of bank loans. Insurance companies do not require compensating balances, but usually there is a payment penalty, which is typically not the case with a bank loan. You may take out an insurance company loan when you desire a longer maturity range. *Note:* A compensating balance results in a higher effective borrowing cost because the compensating balance is an amount of cash that the firm is unable to use. The cheapest terms, given that all options have the same nominal interest rate, will be simple interest with no compensating balance.

Financing with Equipment

Equipment may serve as collateral for a loan. An advance is made against the market value of the equipment. The more marketable the equipment is, the higher the advance will be. Also considered is the cost of selling the equipment. The repayment schedule is designed so that the market value of the equipment at any given time is in excess of the unpaid loan principal.

Equipment financing may be obtained from banks, finance companies, and manufacturers of equipment. Equipment loans may be secured by a chattel mortgage or a conditional sales contract. A chattel mortgage serves as a lien on property excluding real estate. In a conditional sales contract, the seller keeps title to the equipment until the buyer has satisfied the terms; otherwise, the seller will repossess the equipment. The buyer

makes periodic payments to the seller over a specified time period. A conditional sales contract is generally used if you are a small company with a low credit rating.

Leasing

The parties in a lease are the *lessor* who legally owns the property, and the *lessee*, who uses it in exchange for making rental payments.

The following types of leases exist:

- **Operating (service) lease.** This type of lease includes both financing and maintenance services. You lease property owned by the lessor. The lessor may be the manufacturer of the asset or it may be a leasing company that buys assets from the manufacturer to lease to others. The lease payments under the contract are typically not adequate to recover the full cost of the property. Maintenance and service are provided by the lessor, and related costs are included in the lease payments. There usually exists a cancellation clause, which provides you with the right to cancel the contract and return the property prior to the expiration date of the agreement. The life of the contract is less than the economic life of the property.
- **Financial Lease.** This type of lease does not typically provide for maintenance services, is non-cancelable, and the rental payments equal the full price of the leased property. The life of the contract approximates the life of the property.
- **Sale and leaseback.** With this lease arrangement, you sell an asset to another (usually a financial institution) and then lease it back. This allows you to obtain cash from the sale and still have the property for use.
- **Leveraged lease.** In a leveraged lease, a third party serves as the lender. Here, the lessor borrows money from the lender to buy the asset. The property is then leased to you.

Leasing has several advantages, including the following:

- Immediate cash outlay is not required.
- Typically, a purchase option exists, allowing you to obtain the property at a bargain price at the expiration of the lease. This provides the flexibility to make the purchase decision based on the value of the property at the termination date.
- The lessor's expert service is made available.
- Typically, fewer financing restrictions (e.g., limitations on dividends) are placed by the lessor than are imposed when obtaining a loan to purchase the asset.
- The obligation for future rental payment does not have to be reported on the balance sheet if the lease is considered an operating lease.
- Leasing allows you, in effect, to depreciate land, which is not allowed if land is purchased.

- In bankruptcy or reorganization, the maximum claim of lessors is 3 years of lease payments. With debt, creditors have a claim for the total amount of the unpaid financing.

There are several drawbacks to leasing, including the following:

- In the long run, the cost is higher than if the asset is bought.
- The interest cost of leasing is typically higher than the interest cost on debt.
- If the property reverts to the lessor at termination of the lease, you must either sign a new lease or buy the property at higher current prices. Also, the salvage value of the property is realized by the lessor.
- You may have to retain property no longer needed (i.e., obsolete equipment).
- You cannot make improvements to the leased property without the permission of the lessor.

You may want to determine the periodic payment required on a lease.

Example 16-3. You enter into a lease for a \$100,000 machine. You are to make 10 equal annual payments at year-end. The interest rate on the lease is 14%. The periodic payment equals

$$\frac{\$100,000}{5.2161} = \$19,171$$

where $T_4(10, 14\%)$ = the present value of an ordinary annuity factor for $n = 10$, $i = 14\% = 5.2161$ (Table I 1 -4).

Example 16-4. Use the same facts as those for Example 16-3, except that the annual payments are to be made at the beginning of each year. The periodic payment is computed as follows:

Year	Factor
0	1.0
1-9	<u>4.946</u>
	<u>5.946</u>

$$\frac{\$100,000}{5.946} = \$16,818$$

The interest rate associated with a lease agreement can also be computed. Divide the value of the leased property by the annual payment to obtain the factor, which is then used to find the interest rate with the help of an annuity table.

Example 16-5. You leased \$300,000 of property and are to make equal annual payments at year-end of \$40,000 for 11 years. The interest rate associated with the lease agreement is

$$\frac{\$300,000}{\$40,000} = 7.5$$

Going to the present value of annuity table (T4) and looking across the 11-years entry to a factor nearest to 7.5, we find 7.4987 at a 7% interest rate. Thus, the interest rate in the lease agreement is 7%.

The capitalized value of a lease can be found by dividing the annual lease payment by an appropriate present value of annuity factor.

Example 16-6. Property is to be leased for 8 years at an annual rental payment of \$140,000, payable at the beginning of each year. The capitalization rate is 12%. The capitalized value of the lease is

$$\frac{\text{Annual lease payment}}{\text{Present value factor}} = \frac{\$140,000}{1 + 4.5638} = \$25,163$$

Lease-Purchase Decision

Often you must decide whether it is better to buy an asset or to lease it. Present value analysis may be used to determine the cheapest alternative (see Chapter 12).

Conclusion

This chapter discussed intermediate-term loans, primarily from banks and leasing arrangements to meet your financing needs. Intermediate-term loans include bank loans, revolving credit, insurance company term loans, and equipment financing.

Chapter 16 Review Questions

1. A major difference between operating and financial leases is that
 - A. Operating leases usually do not provide for maintenance but financial leases do.
 - B. Operating lease contracts are written for a period that exceeds the economic life of the leased equipment.
 - C. Operating leases frequently contain a cancellation clause, whereas financial leases are not cancelable.
 - D. The lessee finances the assets leased for an operating lease.

Chapter 16 Review Answers

1. A major difference between operating and financial leases is that

- A. Incorrect. Operating leases usually provide for maintenance but financial leases do not.
- B. Incorrect. Operating lease contracts are written for a period less than the economic life.
- C. **Correct.** Operating leases provide both financing and maintenance services to the lessee. An operating or service lease is usually for a term less than the economic life of the asset, and the lease payments are for an amount less than the full cost. Moreover, a cancellation clause in the agreement usually permits the lessee to return the asset before expiration of the term, for example, because of technological change. A financial lease is tantamount to a sale financed by the lessor. The payments are equal to the full cost of the asset, cancellation is not permitted, and maintenance is ordinarily not provided.
- D. Incorrect. The lessor finances the assets leased for an operating lease.

Chapter 17:

Long-Term Debt and Equity Financing

Learning Objectives

After studying this chapter, you will be able to:

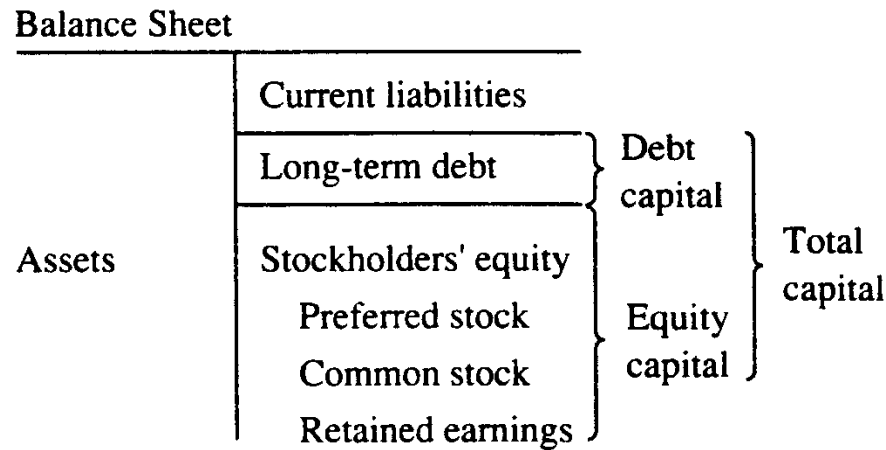
- Define the process of investment banking.
 - Define the best use of venture capital financing.
 - Recognize examples of types of long-term debt and their usefulness.
 - Understand and give examples of equity securities.
-

This chapter will provide you with a deeper understanding of the financing of your company. You will learn the fundamentals of equity and long-term debt financing. Equity financing consists of issuing preferred stock and common stock. Long-term debt financing consists primarily of issuing bonds. Long-term financing is often used to finance long-lived assets (e.g., land, plant) or construction projects.

First, the role of the investment banker is considered. Further, a comparison of public versus private placement of securities is provided. The advantages and disadvantages of issuing long-term debt, preferred stock, and common stock are presented as well. You will also learn what financing strategy is most appropriate, given set of circumstances, for your company.

Figure 17-1 shows the general picture with financing assets through debt and equity.

Figure 17-1. Financing Assets through Debt and Equity



Investment Banking

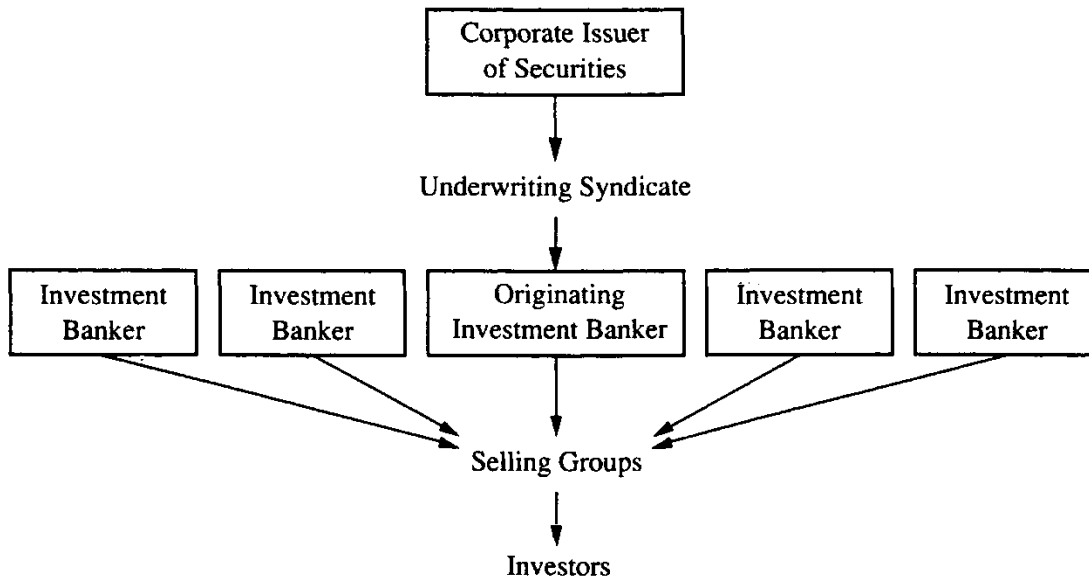
Investment banking involves the sale of a security issue. Investment bankers conduct the following activities:

1. **Underwriting.** The investment banker buys a new security issue, pays the issuer, and markets the securities. The underwriter's compensation is the difference between the price at which the securities are sold to the public and the price paid to the issuing company.
2. **Distributing.** The investment banker markets your security issue.
3. **Advising.** The investment banker gives you advice regarding the optimal way to obtain funds. The investment banker is knowledgeable about the alternative sources of long-term funds, debt and equity markets, and Securities and Exchange Commission (SEC) regulations.
4. **Providing funds.** The investment banker provides funds to you during the distribution period.

An issuer of new securities ordinarily selects an investment banker in a negotiated deal because of the costs incurred in learning about the issuer and setting an issue price. The probability of closing a deal is high in a negotiated deal, so the banker is willing to incur such costs. When several investment bankers form a group because a particular issue is large and/or risky, they are termed a *syndicate*. A syndicate is a temporary association of investment bankers brought together for the purpose of selling new securities. One investment banker among the group will be selected to manage the syndicate (originating house) and to underwrite the major amount of the issue. One bid price for the issue is made on behalf of the group, but the terms and features of the issue are set by you.

The distribution channels for a new security issue appear in Figure 17-2.

Figure 17-2. Distribution Channels for a New Security Issue



In another approach to investment banking, the investment banker agrees to sell your securities on a best-efforts basis, or as an agent. Here, the investment banker does not act as underwriter but instead sells the stock and receives a sales commission. An investment banker may insist on this type of arrangement when he or she has reservations about the success of the security offering.

Besides investment bankers, there are firms that specialize in specific financial functions with respect to stock. A *dealer* buys securities and holds them in inventory for subsequent sale, expecting a profit on the spread. *The spread* is the price appreciation of the securities. A *broker* receives and forwards purchase orders for securities to the applicable stock exchange or over-the-counter market. The broker is compensated with a commission on each sale.

Publicly and Privately Placed Securities

Equity and debt securities may be issued either publicly or privately. Whether to issue securities publicly or privately will depend on the type and amount of financing your company requires. In a public issuance, the shares are bought by the general public. In a private placement, you issue securities directly to either one or a few large investors. The large investors are financial institutions such as insurance companies, pension plans, and commercial banks.

Private placement has the following advantages relative to a public issuance:

- The flotation cost is less. Flotation cost is the expense of registering and selling the stock issue. Examples are brokerage commissions and underwriting fees. The flotation cost for common stock exceeds that for preferred stock. Flotation cost, expressed as a percentage of gross proceeds, is higher for smaller issues than for larger ones.
- It avoids SEC filing requirements.
- It avoids the disclosure of information to the public.
- There is less time involved in obtaining funds.
- It may not be practical to issue securities in the public market if you are so small that an investment banker would not find it profitable.
- Your credit rating may be low, and, as a result, investors may not be interested in purchasing securities when the money supply is low.

Private placement has the following drawbacks relative to a public issuance:

- It is more difficult to obtain significant amounts of money privately than publicly.
- Large investors typically use stringent credit standards, requiring the company to be in strong financial position.
- Large institutional investors may watch more closely the company's activities than smaller investors in a public issuance.
- Large institutional investors are more capable of obtaining voting control of the company.

Going Public – Initial Public Offerings (IPO)

Going public, or often called an *initial public offering (IPO)* refers to selling formerly privately held shares to new investors on the organized exchange (New York Stock Exchange) or the over-the-counter market for the first time. For the individual company, going public marks an historic moment. It often is the springboard for greater growth and success. There are the advantages and disadvantages of raising capital through a public offering. The market for stocks of companies that are going public is called the new issue market.

The public sale of ownership interests can generate funds for business expansion, working capital, and repayment of debt, diversification, acquisitions, marketing, and other uses. In addition, a successful IPO increases the visibility and appeal of your company, thereby escalating the demand and value for shares. Investors can benefit from an IPO not only because of the potential increase in market value for their stock, but also because publicly-held stock is more liquid and can be readily sold if the business appears to falter or if the investor needs quick cash. The availability of a public market for shares will also help determine the taxable values of the shares and assist in estate transfers.

How Does Going Public Work?

A company considering *going public* will typically work with an underwriter (an investment bank) who, either singly, or as part of a group (syndicate), purchases the stock from the company (the issuer) at a discount from the public offering price. The underwriter or syndicate then sells the shares to the public through brokerage firms and other institutions. Creation of a syndicate pools the risk for underwriters and widens distribution channels for the new issue.

The underwriter advises the company on the marketability of, and demand for, its shares. Estimating the demand for the new stock issue is as much art as science. To estimate the demand, the underwriter and any dealers will collect *indications of interest* from their investors as to how many shares each would like to purchase.

Often, some IPOs may be oversubscribed, implying the demand for shares is larger than the number of shares to be issued. In the case of oversubscription, the underwriters determine who will get the shares at the public offering price. After the underwriter issues the shares, the shares begin trading on the open market. The laws of demand and supply take over. The price of IPO shares can increase or decrease substantially in a short time. For example, a company could have an IPO price of \$15 per share, with the first trade in the open market executed at \$80. Most of the players in the IPO market are fund managers from big institutions.

The Pros of Going Public

- Going public raises money--if it is common stock, it does not have to be repaid. . The typical IPO raises \$20 - 40 million, but offerings of \$100 million are not unusual. This will vary widely by industry. Once public, companies can easily go back to the public market to raise more money. Typically, one third of all IPO issuers return to the public market within five years to issue a "seasoned equity offering." Firms generally prefer to obtain equity by retained earnings because of the flotation costs and market pressure involved with the sale of new common stock. However, if a firm needs more money than can be generated from retained earnings, a common stock offering may be necessary.
- As a company expands and becomes more valuable, its owners usually have most of their wealth tied up in the company. By selling some of their stock in a public offering, they can reduce the riskiness of their personal portfolios through this diversification of their holdings.
- Management often experiences an increase in prestige and reputation. Public firms have higher profiles than private firms. This is important in industries where success requires suppliers and consumers to make long-term investments. For example, software requires training and no manager wants to buy software from a firm that may not be around for future improvements, upgrades, bug fixes, etc. The suppliers' and consumers' perception of company success is a self-fulfilling prophecy. However, public firms are usually bigger to begin with, and this may explain why public firms have a better image, on average. Going public will not increase its sales. The important question is if going public improves the company's stockholders' perception of success.

- Publicly traded stock can make a business more attractive to prospective and existing employees if stock option and other stock compensation plans are offered. Employee stock-based programs are worth more if transfer restrictions, such as those normally accompanying private company stock, are not placed on the stock.
- Mergers and Acquisitions - Many private companies do not just appear on the “radar screen” of potential acquirers. Being public makes it much easier for other firms to notice and analyze the company for synergy.
- The use of proceeds from the sale of the issue is generally unrestricted.
- Public companies can acquire other businesses with stock, without depleting cash reserves.
- Other financing alternatives may improve.

The Cons of Going Public

- Much jealously-guarded information must be disclosed. The guarded items include management salaries, competitive position, transactions between the company and its management, and the identity of significant customers and suppliers. In addition to the required disclosure of results of operations and financial condition, public companies must be prepared to disclose information about the company, officers, directors and certain shareholders. This information might include company sales and profits by product line, salaries and other compensation of officers and directors, data about major customers, competitive position, pending litigation, and related party transactions. By releasing the information it will become available to competitors, customers, employees and the general public. The information is required in the initial registration statement and updated annually through annual reports, proxies and other public disclosure documents. The company’s IPO filings are with the Securities and Exchange Commission (www.sec.gov).
- In addition to the time and effort required to prepare for the filing and offering, a company must be prepared to incur the cost of going public. The principal costs include the underwriter's compensation, legal and accounting fees, printing charges, and transfer agent and filing fees. A company expecting to go public with a high-quality offering should anticipate spending \$750,000 to \$1 million, excluding underwriter's commissions. The magnitude of these costs usually make public offerings grossing less than \$50 million impractical. Furthermore, principals must remember that there is no guarantee that the offering will be a success. With the exception of underwriter's compensation, the costs are incurred regardless of the outcome. The cost of going public does not stop with the initial offering. Other costs associated with being a public company are ongoing. Management must devote time and money to such new areas as shareholder relations, public relations, public disclosures, periodic filings with the SEC, and reviewing stock activity. All of this time, and the time of the personnel hired to handle these functions, would be spent on other management tasks in a privately held company. There are other out-of-pocket expenses. Shareholder meetings, annual and quarterly reports, public relations efforts

and legal, accounting and auditing fees must be paid. The total cost of these expenses vary from company to company, but in most cases they range from \$50,000 to \$150,000 annually.

- Corporate decision making becomes more cumbersome as the company attempts to move from a tightly-controlled, entrepreneurially-oriented company to a professionally managed one where ownership and management are divorced. Any decision, long-term or short-term, may be manifested promptly in the company's stock price. The company may worry constantly about improving quarterly earnings (and stock prices) instead of trying to take a longer perspective in developing its strategy.
- All IPO participants in the coalition are jointly liable for each other's actions. In practice, they were routinely sued for various omissions in the IPO prospectus when the public market valuation fell below the IPO offering price. *The Private Securities Litigation Reform Act of 1995* protects the disclosure of firm projections and forced the suing shareholders to have substantial participation in the firm. Although nothing can eliminate lawsuits, this act reduces the likelihood of successful suits and therefore encourages settlement terms.
- Since the number of shares outstanding increases when the company goes public, greater earnings must be achieved to avoid reducing earnings per share.
- If the market price declines, many problems may result: management is usually personally blamed; the flexibility of issuing stock to make acquisitions may be hampered; if the decline occurs soon after the offering, litigation against everyone involved may take place; and other financing alternatives may evaporate.
- If the company is sitting on a gold mine, future earnings have to be shared with outsiders. After a typical IPO, about 40% of the company remains with insiders, but this can vary from 1% - 88%, with 20% - 60% being the comfortable norm.
- Outsiders can take control and even fire the entrepreneur. There is pressure on the managers to produce annual earnings gains, even when it may be in the shareholders' best long-term interests to adopt a strategy that reduces short term earnings but raises them in the future years. These factors have led a number of newly public firms to go private in leveraged buyout deals where the managers borrow the money to buy out the non-management stockholders. The use of IPOs is limited primarily because:
 - (a) there is a very high cost and much complexity in complying with federal and state laws governing the sale of business securities; offering your business's ownership for public sale does little good unless your company has sufficient investor awareness and appeal to make the IPO worthwhile; and
 - (b) Management must be ready to handle the administrative and legal demands of widespread public ownership. Of course, an IPO also means a dilution of the existing shareholders' interests, and the possibility of takeovers or adjustments in management control are present.

How to Avoid the Drawbacks of Going Public

Here are some tips for avoiding the pitfalls of going public.

- Assemble the proper team. This involves selecting an underwriter, accountant, counsel, and perhaps some new directors.
- When choosing an underwriter, distribution capacity is important.
- An underwriter appropriate for one company or one industry may be inappropriate for another. In addition to technical ability, personalities and confidence should be considered.
- The selection of accountants and lawyers need careful examination.
- The registration process is complex, coupled with absolute liability for the company for material misstatements or omissions--regardless of good faith or motive. It is important to remember that malpractice insurance in the securities field is the most expensive of any specialty. That carries a message. It is good to hire a "Big Five" or nationally prominent accounting firm because it enhances marketability and confidence. The use of a large accounting and legal firm may be viewed by the underwriter as insurance in the event of litigation.
- Securities laws are complicated. The sale of "securities" to the public is regulated by federal and state laws that have two primary objectives:
 - (a) Require businesses to disclose material information about the company to investors, and
 - (b) Prohibit misrepresentation and fraud in the sale of securities. Under federal law, a "security" is broadly defined and would include stocks, notes, bonds, evidence of indebtedness, and most ownership interests. The law defines a "public offering" of a security not by the number of investors to whom the stock is offered, but by the classification of whether the investors are considered "sophisticated" or not. However, state law definitions of a "security" and of a "public offering" can vary from the federal law.

What is the Process of Going Public?

A company that is thinking of going public should start acting like a public company as much as two years in advance. Several "to do's" include developing a business plan and preparing detailed financial results on a regular basis. Once a company decides to go public, it needs to choose its IPO team consisting of a lead investment bank, accountant, lawyer, etc. The IPO process officially begins with an "all hands" meeting. This meeting usually takes place six to eight weeks before a company officially registers with the SEC. At this meeting all members of the IPO team assign certain duties to each individual and plan a timetable for going public.

The most important and time consuming task facing the IPO team is the development of the prospectus, which is a business document that basically serves as a brochure for the company. Since the SEC requires a "quiet

period” on firms once they file an IPO until 25 days after a stock starts trading, the prospectus will have to do most of the talking and selling for the team. The prospectus includes all financial data for a company for the past five years. It also includes information on the management team and a description of a company’s target market, competitors, and growth strategy. There is much more information in the prospectus, and the underwriting team goes to great efforts to make sure that it is all accurate.

The next step in the IPO process is the grueling worldwide tour, also known as the road show. The road show usually lasts a week, with company management going to a new city every day to meet with prospective investors and show off their business plan. The typical stops generally include the larger cities such as Los Angeles, San Francisco, Boston, and Chicago. If necessary, international cities such as London and Hong Kong are included. The management team’s performance on the road show is crucial. It helps determine the success of the IPO. The team has to impress institutional investors and influence them to make significant long-term investments.

Once the road show ends and the final prospectus is distributed to investors, management officials meet with their investment bank to decide on the final offering size and price. Investment banks generally suggest an appropriate price based on expected demand for the deal and other market conditions. The pricing of an IPO is a delicate balancing act. Investment firms have to be concerned with two different sets of customers, the company going public, which wants to raise as much money as possible, and the investors buying the shares of stock, who expect to see immediate gains from their investment. If public interest appears to be slowing it is common for the offering price and number of shares to decrease from expected ranges. Sometimes, a company even has to postpone an offering due to insufficient demand. If a deal is especially hot, the offering size and/or price can be raised from initial projections.

Once the offering price has been agreed to, an IPO is declared effective. This is generally done after a market closes, with the trading of the new stock beginning the next day. In the meantime, the chief underwriter works to confirm its buy orders. The chief underwriter is responsible for ensuring smooth trading during the first crucial days. This underwriter is legally allowed to support the price of a newly issued stock through buying shares in the market or selling them short. They can also impose penalty bids on brokers to discourage “flipping”, which is when investors sell shares of an IPO soon after the stock starts trading. An IPO is not declared final until seven days after the firm’s initial market appearance. On rare occasions, an IPO can be cancelled even after the stock begins trading.

Alternatives to Going Public

Many businesses can sell stock to insiders or to a small group of investors without being subject to securities laws; in effect, they can take advantage of alternatives to going public. However, it's not always clear where the exemptions end, so you should always consult a knowledgeable attorney before selling any stock in your company. The process of soliciting money from the public through the issuance and sale of securities requires a working knowledge of the state and federal registration statements concerning the securities to be sold, complex disclosure documents about the company with detailed information for potential investors, and

financial statements. Employing professionals (attorney, accountant, and sometimes a stock underwriter) to assist in the process is a practical necessity.

While many small businesses sell interests in their companies that are "securities," as defined by federal or state laws, the transactions are often exempt from registration regulations because the offerings are sufficiently small in dollar amount, and they are restricted to a limited number and/or type of investor. These exempt offers of securities are called "limited private offerings" and they can avoid much of the cost and delay of a public offering. Unfortunately, to qualify for any of the exemptions, you must fit the criteria for both federal and state security laws. Limited private offerings can be either debt or equity instruments, or a hybrid of both. For instance, a convertible debt warrant would be a debt instrument that allowed the holder to convert the debt into an equity interest at a certain time. These alternative offerings allow the business to tailor the amount of immediate equity (ownership and control) that it relinquishes, and the amount of debt (cash outflow) that it can safely assume. In this module, discussion of the use of limited private offerings is largely confined to equity financing.

Federal exemptions. At the federal level, the most popular exemption from registration requirements for small businesses is Rule 504, commonly known as "Regulation D." Under this provision, private companies that are selling less than \$1 million worth of securities to any number of investors within a 12-month period are exempt from federal registration requirements. Solicitations of investors by a private business may be made through almost any means, including advertisements and seminars, and no specific disclosure requirements regarding the stock or the company are required. Most startups and smaller businesses would fall within this exemption.

Even if a securities offer is exempt from the registration requirements of federal or state law, the anti-fraud provisions of those laws may still apply. Therefore, you must take care to prevent misrepresentations or omissions in the offering that create an overly optimistic picture of the investment. The investor should be provided with sufficient information to make an informed decision regarding the investment.

Another exemption may be available to either private or publicly held companies that sell less than \$5 million within a 12-month period, if the sales are made only to "accredited investors" and no more than 35 such investors are involved. Accredited investors include institutional investors (e.g., banks, brokers and dealers, insurance companies), company insiders (e.g., officers and directors), and wealthy investors ("wealthy" meaning they have more than \$200,000 individual annual income or, individually or jointly with their spouse, have a net worth of over \$1 million).

A lesser degree of exemption from regulation exists for a private or publicly-held company that sells an unlimited issuance of securities to an unlimited number of accredited investors, or to no more than 35 non-accredited but "sophisticated investors" (sophisticated investors have sufficient knowledge and experience so that they understand the risks of the sale, or the issuer reasonably believes the investors have these qualifications). Finally, an exemption exists for private offerings of stock that are sold only to persons living in the same state where the company is both incorporated and does significant business, although reliance upon this intra-state exemption is subject to continual policing because the securities must remain within the state.

State exemptions. Because each state has securities regulations, the local exemptions must be checked. Just because a sale may be exempt from federal registration does not mean state registration is not required. State securities laws are commonly referred to as "blue sky" laws because the regulations were originally enacted to prevent unscrupulous issuers from selling "speculative schemes that have no more basis than so many feet of blue sky." The state laws need not match the federal regulatory exemptions and even though a Uniform Securities Act exists for states to follow, that Act has not been adopted by each state nor is it consistently interpreted in those states which claim to follow it. The result is that consultation with a qualified professional is a practical necessity before soliciting investors for sales of securities. Forty-seven states currently have relaxed their securities regulations for small business by offering a Small Company Offering Registration (SCOR) procedure. Even if your business is not based in one of these states, you may still register and sell your securities in the states, which have adopted SCOR. For a current list of eligible states, contact the North American Securities Administrators Association at 202-737-0900, or at www.nasaa.org.

Venture Capital Financing

Venture capital firms supply funding from private sources for investing in select companies that have a high, rapid growth potential and a need for large amounts of capital. Venture capital (VC) firms speculate on certain high-risk businesses producing a very high rate of return in a very short time. The firms typically invest for periods of three to seven years and expect at least a 20 percent to 40 percent annual return on their investment.

When dealing with venture capital firms, keep in mind that they are under great pressure to identify and exploit fast growth opportunities before more conventional financing alternatives become available to the target companies. Venture capital firms have a reputation for negotiating tough financing terms and setting high demands on target companies. Three bottom-line suggestions:

- Make sure to read the fine print.
- Watch for delay maneuvers (they may be waiting for your financial position to weaken further).
- Guard your trade secrets and other proprietary information zealously.

Venture capital financing may not be available, nor a good choice of financing, for many businesses. Usually, venture capital firms favor existing businesses that have a minimal operating history of several years; financing of startups is limited to situations where the high risk is tempered by special circumstances, such as a company with extremely experienced management and a very marketable product or service. In 1995, venture capital firms invested in less than 2000 companies. The target companies often have revenues in excess of two million dollars and a preexisting capital investment of at least one million.

VCs research target companies and markets more vigorously than conventional lenders, although the ultimate investment decision is often influenced by the market speculations of the particular venture capitalists. Due to the amount of money that venture capital firms spend in examining and researching businesses before they invest, they will usually want to invest at least a quarter of a million dollars to justify their costs.

Be wary of "shopping" innovative ideas to multiple venture capitalists or private investors. Use caution in revealing any information you consider proprietary. Even if you already have intellectual property protection (e.g., a patent, trademark, or copyright), you don't want to be forced to police your rights. Do your best to limit the details of your particular innovation and seek confidentiality arrangements for additional protection of any preexisting legal rights you may have.

The price of financing through venture capital firms is high. Ownership demands for an equity interest in 30 percent to 50 percent of the company are not uncommon even for established businesses, and a startup or higher risk venture could easily require transfer of a greater interest. Although the investing company will not typically get involved in the ongoing management of the company, it will usually want at least one seat on the target company's board of directors and involvement, for better or worse, in the major decisions affecting the direction of the company.

The ownership interest of the VC firm is usually a straight equity interest or an ownership option in the target company through either a convertible debt (where the debt holder has the option to convert the loan instrument into stock of the borrower) or a debt with warrants to a straight equity investment (where the warrant holder has the right to buy shares of common stock at a fixed price within a specified time period). An arrangement that eventually calls for an initial public offering is also possible. Despite the high costs of financing through venture capital companies, they offer tremendous potential for obtaining a very large amount of equity financing and they usually provide qualified business advice in addition to capital.

Venture capital firms are located nationwide, and a directory is available through the National Venture Capital Association, 1655 N. Fort Meyer Dr., Arlington, VA 22209, (703-524-2549). In addition, other sources for venture capital can be found through bankers, insurance companies, and business associations.

Types of Long-Term Debt

All companies incur debt; the amount of debt will largely depend on the company's available collateral. For long-term debt financing, sources include mortgages and bonds. Either instrument may be appropriate, depending on a company's circumstances. To determine which instrument will serve your company's needs best, you will need to know the characteristics, advantages, and disadvantages of these long-term debt sources.

Mortgages

Mortgages are notes payable that have real assets as collateral and request periodic payments. Mortgages can be issued to finance the purchase of assets, construction of plant, and modernization of facilities. The bank requires that the value of the property exceed its mortgage. Most mortgage loans are made for between 70% and 90% on the collateral. Mortgages may be obtained from a bank, a company, or another financial institution. It is easier to obtain loans for multiple-use real assets than for single-use real assets.

There are two types of mortgages: a *senior* mortgage, which has first claim on assets and earnings, and a *junior* mortgage, which has a subordinate lien.

A mortgage may have a closed-end provision that prevents you from issuing additional debt of the same priority against the same property. If the mortgage is open-ended, you can issue additional first-mortgage bonds against the property.

Mortgages have a number of advantages, including favorable interest rates, fewer financing restrictions, extended maturity date for loan repayment, and relatively easy availability.

Bonds

Long-term debt principally takes the form of bonds payable and loans payable. A *bond* is a certificate indicating that you have borrowed a given sum of money and agree to repay it. A written agreement, called an *indenture*, describes the features of the bond issue (e.g., payment dates, call and conversion privileges (if any), and restrictions). The indenture is a contract between your company, the bondholder, and the trustee. The trustee makes sure that you meet the terms of the bond contract. In many instances, the trustee is the trust department of a commercial bank. Although the trustee is an agent for the bondholder, it is selected by your company prior to the issuance of the bonds. The indenture provides for certain restrictions on you such as a limitation on dividends and minimum working capital requirements. If a provision of the indenture is violated, the bonds are in default. The indenture may also have a negative pledge clause, which precludes the issuance of new debt taking priority over existing debt in the event of liquidation. The clause can apply to assets currently held as well as to assets that may be purchased in the future.

Computing Interest

Bonds usually come in \$1,000 denominations. Many bonds have maturities of 10 to 30 years. The interest payment to the bondholder is called *nominal interest* (coupon interest, stated interest), which is the interest on the face value (maturity value, par) of the bond. Although the interest rate is stated on an annual basis, interest on a bond is typically paid semiannually. Interest expense is tax-deductible.

Example 17-1. You issue a 10%, 10-year bond. The tax rate is 34%. The annual after-tax cost of the debt is 6.6% ($10\% \times 66\%$).

Example 17-2. You issue a \$100,000, 8%, 10-year bond. The semiannual interest payment is \$4,000 ($\$100,000 \times 8\% \times 6/12$). With a 34% tax rate, the after-tax semiannual interest is \$2,640 ($\$4,000 \times 66\%$).

A bond sold at face value is said to be sold at 100%. If a bond is sold below its face value (less than 100%) it is issued at a *discount*. If a bond is sold above face value, (more than 100%) it is sold at a *premium*.

Why would your company's bond be sold at a discount or a premium? A bond may be sold at a discount when the interest rate on the bond is below the prevailing market interest rate for that type of security. It may also be issued at a discount if your company is risky, or there is a very long maturity period. A bond is issued at a premium when the opposite market conditions exist.

Example 17-3. You issue a \$100,000, 10%, 20-year bond at 94%. The maturity value of the bond is \$100,000. The annual cash interest payment is \$10,000 (10% x \$100,000). The proceeds received for the issuance of the bond equal \$94,000 (\$100,000 x 94%). The amount of the discount is \$6,000 (\$100,000 - \$94,000). The annual discount amortization is \$300 (\$6,000/20).

The yield on a bond is the effective (real) interest rate you incur. The price of a bond depends on several factors such as maturity date, interest rate, and collateral. Bond prices and market interest rates are inversely related. For example, as market interest rates increase, the price of the existing bond falls because investors can invest in new bonds paying higher interest rates.

Types of Bonds

The various types of bonds your company may issue are as follows:

1. **Debentures.** Because debentures are unsecured (no collateral) debt. Although no assets are mortgaged as security for the bonds, debentures are secured by the full faith and credit of the issuing firm. Debentures are a general obligation of the borrower and rank equally with convertible bonds. Only companies with the best credit ratings can issue debentures because only the company's credit rating and reputation secure the bonds
2. **Subordinated debentures.** The claims of the holders of these bonds are subordinated to those of senior creditors. Debt with a prior claim over the subordinated debentures is set forth in the bond indenture. Typically, in liquidation, subordinated debentures come after short-term debt.
3. **Mortgage bonds.** These are bonds secured by real assets. The first mortgage claim must be met before a distribution is made to a second mortgage claim. There may be several mortgages for the same property (e.g., building).
4. **Collateral trust bonds.** The collateral for these bonds is your company's security investments in other companies (bonds or stocks), which are given to a trustee for safekeeping.
5. **Convertible bonds.** These may be converted to stock at a later date, based on a specified conversion ratio. The *conversion ratio* equals the par value of the convertible security divided by the conversion price. Convertible bonds are typically issued in the form of subordinated debentures. Convertible bonds are more marketable and are typically issued at a lower interest rate than regular bonds because they offer the *conversion right* to common stock. Of course, if bonds are converted to stock, debt repayment is not involved. A convertible bond is a quasi-equity security because its market value is tied to the value of the shares of stock into which the bond can be converted.
6. **Income bonds.** These bonds pay interest only if there is a profit. However, because it accumulates regardless of earnings, the interest, if bypassed, must be paid in a later year when adequate earnings exist.
7. **Guaranteed bonds.** These are debt issued by one party with payment guaranteed by another.

8. **Serial bonds.** A portion of these bonds comes due each year. At the time serial bonds are issued, a schedule shows the yields, interest rates, and prices for each maturity. The interest rate on the shorter maturities is lower than the interest rate on the longer maturities because less uncertainty exists regarding the future.
9. **Deep discount bonds.** These bonds have very low interest rates and thus are issued at substantial discounts. The return to the holder comes primarily from appreciation in price rather than from interest payments.
10. **Zero coupon bonds.** These bonds do not provide for interest. The return to the holder is in the form of appreciation in price.
11. **Variable-rate bonds.** The interest rates on the bonds are adjusted periodically to changes in money market conditions. These bonds are popular when there is uncertainty about future interest rates and inflation.
12. **Junk bonds** These bonds are high risk and therefore high-yield securities that are normally issued when the debt ratio is very high. Thus, the bondholders have as much risk as the holders of equity securities. Such bonds are not highly rated by credit evaluation companies. Junk bonds have become accepted because of the tax deductibility of the interest paid.
13. **Inflation-linked bonds.** These bonds have coupons (and the principal amount as well) that are adjusted according to the rate of inflation. The U.S. Treasury Inflation Protection Securities (TIPS) is an example.

A summary of the characteristics and priority claims associated with bonds appears in Table 17-1.

Bond Ratings

Financial advisory services (e.g., Standard and Poor's, Moody's) rate publicly traded bonds according to risk in terms of the receipt of principal and interest. An inverse relationship exists between the quality of a bond issue and its yield. That is, low-quality bonds will have a higher yield than high quality bonds. Hence, a risk-return trade-off exists for the bondholder. Bond ratings are important because they influence marketability and the cost associated with the bond issue.

The Advantages and Disadvantages of Debt Financing

You will need to determine whether or not your company should issue long-term debt.

The advantages of issuing long-term debt include the following:

- Interest is tax-deductible, while dividends are not.
- Bondholders do not participate in superior earnings of your firm.
- The debt is repaid in cheaper dollars during inflation.
- There is no dilution of company control.

- Financing flexibility can be achieved by including a call provision in the bond indenture. A call provision allows your company to pay the debt before the expiration date of the bond.
- It may safeguard your company's future financial stability (e.g., in times of tight money markets when short-term loans are not available.)

Table 17-1. Summary of Characteristics and Priority Claims of Bonds

Bond Type	Characteristics	Priority of Lender's Claim
Debentures	Available only to financially strong companies. Convertible bonds are typically debentures.	General creditor
Subordinated debentures	Comes after senior debt holders	General Creditor
Mortgage bonds	Collateral is real property or buildings.	Paid from the proceeds from the sale of mortgaged assets. If any deficiency exist, general creditor status applies.
Collateral trust bonds	Secured by stock and(or) bonds owned by the issuer. Collateral value is usually 30% more than bond value.	Paid from the proceeds of stock and (or) bond that is collateralized. If there is a deficiency, general creditor, general creditor, status applies.
Income bonds	Interest is only paid if there is net income. Often issued when a company is in reorganization because of financial problems.	General creditor.
Deep-discount (and zero coupon) bonds	Issued at very low or no (zero) coupon rates. Issued at prices significantly below face value. Usually callable at par value.	Unsecured or secured status may apply depending on the features of the issue.
Variable-rate-bonds	Coupon rate changes within limits based on changes in money or capital market rates. Appropriate when uncertainty exists regarding inflation and future interest rates. Because of the automatic adjustment to changing market conditions, the bonds sell near face value.	Unsecured or secured status may apply depending on the features of the issue.

The following disadvantages may apply to issuing long-term debt:

- Interest charges must be met regardless of your company's earnings.
- Debt must be repaid at maturity.
- Higher debt implies greater financial risk, which may increase the cost of financing.
- Indenture provisions may place stringent restrictions on your company.
- Over-commitments may arise because of forecasting errors.

Should you buy a bond? To investors, bonds have the advantages of a fixed interest payment each year and of greater safety than equity securities because bondholders have a priority claim in the event of corporate bankruptcy. To investors, bonds have the disadvantages of not participating in incremental earnings and of no voting rights.

How does issuing debt stack up against equity securities to your company? The advantages of issuing debt rather than equity securities are as follows: interest is tax deductible, whereas dividends are not; during inflation, the payback will be in cheaper dollars; no dilution of voting control occurs; and flexibility in financing can be achieved by including a call provision in the bond indenture. The disadvantages of debt incurrence relative to issuing equity securities are that fixed interest charges and principal repayment must be met irrespective of your firm's cash flow position, and stringent indenture restrictions often exist.

The proper mixture of long-term debt to equity depends on company organization, credit availability, and the after-tax cost of financing. Where a high degree of debt already exists, you should take steps to minimize other corporate risks.

When should long-term debt be issued? Debt financing is more appropriate at these times:

1. The interest rate on debt is less than the rate of return earned on the money borrowed. By using other people's money (OPM), the after-tax profit of the company will increase. Stockholders have made an extra profit with no extra investment!
2. Stability in revenue and earnings exists so that the company will be able to meet interest and principal payments in both good and bad years. However, cyclical factors should not scare a company away from having any debt. The important thing is to accumulate no more interest and principal repayment obligations than can reasonably be satisfied in bad times as well as good.
3. There is a satisfactory profit margin so that earnings exist to meet debt obligations.
4. There is a good liquidity and cash flow position.
5. The debt/equity ratio is low so that the company can handle additional obligations.
6. Stock prices are currently depressed so that it does not pay to issue common stock at the present time.

7. Control considerations are a primary factor so that if common stock was issued, greater control might fall in the wrong hands.
8. Inflation is expected so that debt can be paid back in cheaper dollars.
9. Bond indenture restrictions are not burdensome.

Tip: If your company is experiencing financial difficulties, it may wish to refinance short-term debt on a long-term basis (e.g., by extending the maturity dates of existing loans). This may alleviate current liquidity and cash flow problems.

As the default risk of your company becomes higher, so will the interest rate to compensate for the greater risk.

Recommendation: When a high degree of debt (financial leverage) exists, try to reduce other risks (e.g., product risk) so that total corporate risk is controlled.

Bond Refunding

Bonds may be refunded before maturity through either the issuance of a serial bond or the exercise of a call privilege on a straight bond. The issuance of serial bonds allows you to refund the debt over the life of the issue. A call feature in a bond enables you to retire it before the expiration date. The call feature is included in many corporate bond issues.

When future interest rates are expected to drop, a call provision is recommended. Such a provision enables your firm to buy back the higher interest bond and issue a lower-interest one. The timing for the refunding depends on expected future interest rates. A call price is typically set in excess of the face value of the bond. The resulting *call premium* equals the difference between the call price and the maturity value. Your company pays the premium to the bondholder in order to acquire the outstanding bonds prior to the maturity date. The call premium is usually equal to one year's interest if the bond is called in the first year, and it declines at a constant rate each year thereafter. Also involved in selling a new issue are flotation costs (e.g., brokerage commissions, printing costs).

A bond with a call provision typically will be issued at an interest rate higher than one without the call provision. The investor prefers not to face a situation where your company can buy back the bond at its option prior to maturity. The investor would obviously desire to hold onto a high-interest bond when prevailing interest rates are low.

Example 17-4. A \$100,000, 8% 10-year bond is issued at 94%. The call price is 103%. Three years after the issue, the bond is called. The call premium is equal to

Call price	\$103,000
Less: Face value of bond	<u>(100,000)</u>
Call premium	<u>\$ 3,000</u>

The desirability of refunding a bond requires present value analysis, which was discussed in Chapter 12.

Example 17-5. Your company has a \$20 million, 10% bond issue outstanding that has 10 years to maturity. The call premium is 7% of face value. New 10-year bonds in the amount of \$20 million can be issued at an 8% interest rate. Flotation costs of the new issue are \$600,000.

Refunding of the original bond issue should occur as shown below.

Old interest payments ($\$20,000,000 \times 0.10$)	\$2,000,000
Less: New interest payments ($\$20,000,000 \times 0.08$)	<u>(1,600,000)</u>
Annual savings	<u>\$ 400,000</u>
Call premium ($\$20,000,000 \times 0.07$)	\$1,400,000
Flotation cost	<u>600,000</u>
Total cost	<u>\$2,000,000</u>

Year	Calculation	Present Value
0	$-\$2,000,000 \times 1$	$-\$2,000,000$
1-10	$\$ 400,000 \times 6.71^a$	<u>2,684,000</u>
	Net present value	<u>\$ 684,000</u>

^a 6.71 = T4 (8%, 10 years) from Table 11-4

Sinking fund requirements may exist in a bond issue. With a sinking fund, you put aside money to buy and retire part of a bond issue each year. Usually, there is a mandatory fixed amount that must be retired, but occasionally the retirement may relate to your company's sales or profit for the current year. If a sinking fund payment is not made, the bond issue may be in default.

Equity Securities

We will now discuss equity financing consisting of preferred stock and common stock. The advantages and disadvantages of issuing preferred and common stock are addressed, along with the various circumstances in which one financing source is better suited than the other. Stock rights are also described.

Preferred Stock

Preferred stock is a hybrid between bonds and common stock. Preferred stock comes after debt but before common stock in liquidation and in the distribution of earnings. Preferred stock may be issued when the cost of common stock is high. It is best to issue preferred stock when your company has excessive debt and an issue of common stock might result in control problems. Preferred stock is a more expensive way to raise capital than a bond issue because the dividend payment is not tax-deductible.

Preferred stock may be cumulative or noncumulative. *Cumulative* preferred stock means that if any prior year's dividend payments have been missed, they must be paid before dividends can be paid to common stockholders. If preferred dividends are in arrears for a long time, your company may find it difficult to resume its dividend payments to common stockholders. With *noncumulative* preferred stock, your company does not need to pay missed preferred dividends. Preferred stock dividends are limited to the rate specified, which is based on the total par value of the outstanding shares. Most preferred stock is cumulative.

Example 17-6. As of December 31, 2X13, your company had 6,000 shares of \$15 par value, 14% cumulative preferred stock outstanding. Dividends were not paid in 2X11-and 2X12. Assuming that your company was profitable in 2X13, the amount of the dividend to be distributed is

Par value of stock = 6,000 shares x \$15 = \$90,000	
Dividends in arrears (\$90,000 x 14% x 2 years)	\$25,200
Current year dividend (\$90,000 x 14%)	<u>12,600</u>
Total dividend	<u>\$37,800</u>

Participating preferred stock means that if declared dividends exceed the amount typically given to preferred stockholders and common stockholders, the preferred and common stockholders will participate in the excess dividends. Unless stated otherwise, the distribution of the excess dividends will be based on the relative total par values. *Nonparticipating* preferred stock does not participate with common stock in excess dividends. Most preferred stock is nonparticipating.

Preferred stock may be callable, which means that you can purchase it back at a subsequent date at a specified call price. The call provision is advantageous when interest rates decline, since your company has the option of discontinuing payment of dividends at an excessive rate by buying back preferred stock issued when bond interest rates were high. Unlike bonds, preferred stock rarely has a maturity date. However, if preferred stock has a sinking fund associated with it, this, in effect, establishes a maturity date for repayment.

In bankruptcy, preferred stockholders are paid after creditors and before common stockholders. In such a case, preferred stockholders receive the par value of their shares, dividends in arrears, and the current year's dividend. Any asset balance then goes to the common stockholders.

The cost of preferred stock usually follows changes in interest rates. Hence, the cost of preferred stock will most likely be low when interest rates are low. When the cost of common stock is high, preferred stock issuance may be achieved at a lower cost.

The cost of preferred stock can be determined by dividing the dividend payment by the net proceeds received.

Example 17-7. You issued preferred stock of \$2 million. The flotation cost is 11% of gross proceeds. The dividend rate is 14%. The effective cost of the preferred stock is

$$\frac{\text{Dividend}}{\text{Net proceeds}} = \frac{0.14 \times \$2,000,000}{\$2,000,000 - (0.11 \times \$2,000,000)}$$

$$= \frac{\$280,000}{\$1,780,000} = 15.7\%$$

To your company, a preferred stock issue has the following advantages:

- Preferred dividends do not have to be paid (important during financial distress), whereas interest on debt must be paid.
- Preferred stockholders cannot force your company into bankruptcy.
- Preferred shareholders do not share in unusually high profits because common stock holders are the real owners of the business.
- If your company is growth oriented, it can generate better earnings for its original owners by issuing preferred stock with a fixed dividend rate than by issuing common stock.
- Preferred stock issuance does not dilute the ownership interest of common stockholders in terms of earnings participation and voting rights.
- Your company does not have to collateralize its assets as it may have to do if bonds are issued.
- The debt to equity ratio is improved.

To your company, a preferred stock has the following disadvantages:

- Preferred stock requires a higher yield than bonds because of greater risk.
- Preferred dividends are not tax-deductible.
- There are higher flotation costs than with bonds.

The advantages of preferred stock over bonds is that one can omit a dividend readily, no maturity date exists, and no sinking fund is required. Preferred stock also has a number of advantages over common stock. It avoids dilution of control and the equal participation in profits that are afforded to common stockholders. Disadvantages of preferred stock issuance compared to bonds are that it requires a higher yield than debt because it is more risky to the holder. Also, dividends are not tax deductible.

To an investor, a preferred stock offers several advantages. First, preferred stock usually provides a fixed dividend payment. Second, preferred stockholders' claims come before common stockholders' in the event of corporate bankruptcy. Third, preferred dividends are subject to an 80% dividend exclusion for *corporate* investors. For example, if a company holds preferred stock in another company and receives dividends of \$10,000, only 20% (or \$2,000) is taxable. On the other hand, interest income on bonds is fully taxable. Unfortunately, the *individual* investor does not qualify for the 80% dividend exclusion.

To an investor, preferred stock represents several disadvantages. For instance, the return is limited because of the fixed dividend rate. Also, there is greater price fluctuation with preferred stock than with bonds because of the lack of a maturity date. Lastly, preferred stockholders cannot require the company to pay dividends if the firm has insufficient earnings.

Common Stock Features

We will now discuss everything you should know about common stock. The owners of a corporation are called stockholders. They elect the board of directors, who in turn choose the company's officers. When the election takes place, management sends proxy statements, which ask stockholders to give management the right to vote their stock. Effective control of the corporation can exist with less than 50% common stock ownership since many stockholders do not bother to vote. Stockholders have limited liability in that they are not personally liable for the debts of the firm.

Common stock refers to the residual equity ownership in the business. Common stockholders have voting power, but their claims come after preferred stockholders in receiving dividends and in liquidation. Common stock does not involve fixed charges, maturity dates, or sinking fund requirements.

Authorized -shares are the maximum shares that can be issued according to the corporate charter. *Issued shares* represent the number of authorized shares that have been sold by the company. *Outstanding shares* are the issued shares held by the investing public. *Treasury stock* is stock that has been reacquired by the firm. It is not retired but instead held for possible future resale, a stock option plan, use in purchasing another company, or the prevention of a takeover by an outside group. Outstanding shares are thus equal to the issued shares less the treasury shares. Dividends are based on the outstanding shares.

The *par value* of a stock is a stated amount of value per share specified in the corporate charter.

If your company is closely held, it only has a few stockholders, who keep full control. There is no requirement to publicly disclose corporate financial data. But a company with 500 or more stockholders must file an annual financial statement with the Securities and Exchange Commission.

A company may issue different classes of common stock. Class A is stock issued to the public and typically has no dividends. However, it usually has voting rights. Class B stock is typically kept by the company's organizers. Dividends are usually not paid on it until the company has generated adequate earnings. Voting rights are provided in order to maintain control.

The price of common stock moves in the opposite direction of market interest rates. For example, if market interest rates increase, stock prices fall because investors will ' transfer funds out of stock into higher yielding money market instruments and bank accounts. Further, higher interest rates make it costly for a company to borrow, resulting in lower profits and the subsequent decline in stock price.

Common stockholders have the following rights:

1. The right to receive dividends.
2. The right to receive assets upon the dissolution of the business.
3. The right to vote.

4. The preemptive right to buy new shares of common stock before their sale to the general public. In this way, current stockholders can maintain their proportionate percentage ownership in the company.
5. The receipt of a stock certificate that evidences ownership. The stock certificate may then be sold by the holder to another in the secondary security market.
6. The right to inspect the company's books.

A stockholder may make a significant profit if another firm wishes to take

the company over. The stockholder typically receives notice of the offer directly from his or her broker or by an announcement in the financial pages of a newspaper (e.g., *The Wall Street Journal*.)

Disadvantages of common stock ownership are that common stockholders' claims come last in the event of corporate bankruptcy and that dividends may be bypassed.

A number of options exist for equity financing in the case of *small businesses*, including the following:

1. Venture capital (investor) groups who invest in typically high risk ventures.
2. Issuances directly to institutional investors (e.g., insurance companies, banks).
3. Issuances to relatives or friends.
4. Issuances to major customers and suppliers.

A determination of the number of shares that must be issued to raise adequate funds to satisfy a capital budget may be needed.

Example 17-8. Your company currently has 650,000 shares of common stock outstanding. The capital budget for the upcoming year is \$1.8 million.

Assuming that new stock may be issued for \$16 a share, the number of shares that must be issued to provide the necessary funds to meet the capital budget is

$$\frac{\text{Funds needed}}{\text{Market price per share}} = \frac{\$1,800,000}{\$16} = 112,500 \text{ shares}$$

Example 17-9. Your company wants to raise \$3 million in its first public issue of common stock. After its issuance, the total market value of stock is expected to be \$7 million. Currently, there are 140,000 outstanding shares that are closely held.

You want to compute the number of new shares that must be issued to raise the \$3 million. The new shares will have $3/7$ (\$3 million/\$7 million) of the outstanding shares after the stock issuance. Thus, current stockholders will be holding $4/7$ of the shares.

140,000 shares	=	4/7 of the total shares
Total shares	=	245,000
New shares	=	3/7 x 245,000 = 105,000 shares

After the stock issuance, the expected price per share is

$$\text{Price per share} = \frac{\text{Market value}}{\text{Shares outstanding}} = \frac{\$7,000,000}{245,000} = \$28.57$$

When a company initially issues its common stock publicly, it is referred to as "going public." The estimated price per share to sell the securities is equal to

$$\frac{\text{Anticipated market value of the company}}{\text{Total outstanding shares}}$$

For an established company, the market price per share can be determined using the *Gordon's growth model* (recall from Chapter 12). The model is

$$P_0 = \frac{D_1}{r - g}$$

or

$$\frac{\text{Expected dividend}}{\text{Cost of capital - Growth rate in dividends}}$$

Example 17-10. Your company expected the dividend for the year to be \$10 a share. The cost of capital is 13%. The growth rate in dividends is expected to be constant at 8%. The price per share is

$$\begin{aligned} \text{Price per share} &= \frac{\text{Expected dividend}}{\text{Cost of capital - Growth rate in dividends}} \\ &= \frac{\$10}{0.13 - 0.08} = \frac{\$10}{0.05} = \$200 \end{aligned}$$

Another approach to pricing the share of stock for an existing company is through the use of the price/earnings (P/E) ratio, which is equal to

$$\frac{\text{Market price per share}}{\text{Earnings per share}}$$

Example 17-11. Your company's earnings per share are \$7. It is expected that the company's stock should sell at eight times its earnings. The market price per share is therefore

$$P/E = \frac{\text{Market price per share}}{\text{Earnings per share}}$$

$$\begin{aligned} \text{Market price per share} &= P/E \text{ multiple} \times \text{Earnings per share} \\ &= 8 \times \$7 = \$56 \end{aligned}$$

You may want to determine the market value of your company's stock. There are a number of different ways to accomplish this.

Example 17-12. Assuming an indefinite stream of future dividends of \$300,000 and a required return rate of 14%, the market value of the stock equals

$$\text{Market value} = \frac{\text{Expected dividends}}{\text{Rate of return}} = \frac{\$300,000}{0.14} = \$2,142,857$$

If there are 200,000 shares, the market price per share is

$$\text{Market value} = \frac{\$2,142,857}{200,000} = \$10.71$$

Example 17-13. Your company is considering a public issue of its securities. The average price/earnings multiple in the industry is 15. The company's earnings are \$400,000. There will be 100,000 shares outstanding after the issuance of the stock. The expected price per share is

$$\begin{aligned} \text{Total market value} &= \text{Net income} \times \text{Price/earnings multiple} \\ &= \$400,000 \times 15 = \$6,000,000 \\ \text{Price per share} &= \frac{\text{Market value}}{\text{Shares}} = \frac{\$6,000,000}{100,000} = \$60 \end{aligned}$$

If your company has *significant* debt, it would be better off financing with an equity issue to lower overall financial risk.

Financing with common stock has the following advantages: (1) there is no requirement to pay dividends; (2) there is no repayment date; and (3) a common stock issue improves your company's credit rating relative to the issuance of debt.

Financing with common stock has several disadvantages. For example, dividends are not tax-deductible. Also, ownership interest is diluted. The additional voting rights could vote to take control away from the current ownership group. Further earnings and dividends are spread over more shares outstanding. Lastly, the flotation costs of a common stock issue are more than with preferred stock and debt financing. It is always cheaper to finance operations from internally generated funds because financing out of retained earnings involves no flotation costs.

A summary comparison of bonds and common stocks is presented in Table 17-2.

Stockholders are typically better off when a company cuts back on dividends instead of issuing common stock as a source of additional funds

Table 17-2. Summary Comparison of Bonds and Common Stock

Bonds	Common Stock
<ul style="list-style-type: none">• Bondholders are creditors• No voting rights exist.• There is a maturity date• Bondholders have prior claims on profits and assets in bankruptcy.• Interest payments represent fixed charges.• Interest payments are deductible on the tax return.• The rate of return required by bondholders is typically lower than that by stockholders.	<ul style="list-style-type: none">• Stockholders are owners• Voting rights exist.• There is no maturity date.• Stockholders have residual claims• Dividend payments do not continue fixed charges.• There is not tax deductibility for dividend payments• The required rate of return by stockholders is typically greater than that by bondholders

When earnings are retained rather than new stock issued, the market price per share of existing stock will rise, as indicated by higher earnings per share. Also, a company typically earns a higher rate of return than stockholders so that by retaining funds market price of stock should appreciate. One caution, however: Lower dividend payments may be looked at negatively in the market and may cause a reduction in the market price of stock due to psychological factors.

Stock Rights

Stock rights are options to buy securities at a specified price at a later date. The preemptive right provides that existing stockholders have the first option to buy additional shares. Exercising this right permits investors to maintain voting control and protects against dilution in ownership and earnings.

How Should You Finance?

Some companies obtain most of their funds from issuing stock and from earnings retained in the business. Other companies borrow as much as possible and raise additional money from stockholders only when they can no longer borrow. Most companies are somewhere in the middle. Companies use different mixes of financing, depending on their circumstances.

In formulating a financing strategy in terms of source and amount, you should consider the following:

1. The cost and risk of alternative financing strategies.
2. The future trend in market conditions and how they will impact upon future fund availability and interest rates. For example, if interest rates are expected to go up, you would be wise to finance with long-term debt at the currently lower interest rates.
3. The current debt to equity ratio. A very high ratio, for example, indicates financial risk, so additional funds should come from equity sources.
4. The maturity dates of present debt instruments. For example, you should avoid making all debt come due at the same time because in an economic downturn you may not have adequate funds to meet all the debt.
5. The restriction in loan agreements. For instance, a restriction may exist placing a cap on the allowable debt to equity ratio.
6. The type and amount of collateral required by long-term creditors.
7. The ability to change financing strategy to adjust to changing economic conditions.
8. The amount, nature, and stability of internally generated funds. If stability exists in earnings generation, the company is better able to meet debt obligations.
9. The adequacy of present lines of credit for current and future needs.
10. The inflation rate because, with debt, the repayment is in cheaper dollars.
11. The earning power and liquidity position of the firm. For example, a liquid company is better able to meet debt payments.
12. The tax rate. For example, a higher tax rate makes debt more attractive because there is a greater tax savings from interest expense.

You have to select the best possible source of financing based on the fact

Example 17-14. Your company is considering issuing either debt or preferred stock to finance the purchase of a plant costing \$1.3 million. The interest rate on the debt is 15%. The dividend rate on the preferred stock is 10%. The tax rate is 34%.

The annual interest payment on the debt is

$$15\% \times \$1,300,000 = \$195,000$$

The annual dividend on the preferred stock is

$$10\% \times \$1,300,000 = \$130,000$$

The required earnings before interest and taxes to meet the dividend payment is

$$\frac{\$130,000}{(1 - 0.34)} = \$196,970$$

If your company anticipates earning \$196,970 without a problem, it should issue the preferred stock.

Example 17-15. Your company has sales of \$30 million a year. It needs \$6 million in financing for capital expansion. The debt-to-equity ratio is 68%. Your company is in a risky industry, and net income is not stable. The common stock is selling at a high P/E ratio compared to the competition. Under consideration is the issuance of either common stock or a convertible bond.

Because your company is in a high-risk industry and has a high debt-to-equity ratio and unstable earnings, the issuance of common stock is recommended.

Example 17-16. Your company is a mature one in its industry. There is limited ownership. The company has vacillating sales and earnings. Your firm's debt-to-equity ratio is 70% relative to the industry standard of 55%. The after-tax rate of return is 16%. Since your company is a seasonal business, there are certain times during the year when its liquidity position is inadequate. Your company is unsure about the best way to finance.

Preferred stock is one possible means of financing. Debt financing is not recommended because of the already high debt to equity ratio, the fluctuation in profit, and the deficient liquidity posture. Because of the limited ownership, common stock financing may not be appropriate because this would dilute the ownership.

Example 17-17. Your company wants to construct a plant that will take about 1 year to construct. The plant will be used to produce a new product line, for which your company expects a high demand. The new plant will materially increase corporate size. The following costs are expected:

Cost to build the plant	\$800,000
Funds needed for contingencies	\$100,000
Annual operating costs	\$175,000

The asset, debt, and equity positions of your company are similar to industry standards. The market price of the company's stock is less than it should be, taking into account the future earning power of the new product line. What would be the appropriate means to finance the construction?

Since the market price of stock is less than it should be and considering the potential of the product line, convertible bonds and installment bank loans might be appropriate means of financing because interest expense is tax-deductible. Additionally, the issuance of convertible bonds might not require repayment, since the bonds are likely to be converted to common stock because of the company's profitability. Installment bank loans can be gradually paid off as the new product generates cash inflow. Funds needed for contingencies can be in the form of open bank lines of credit.

If the market price of the stock was not at a depressed level, financing through equity would be an alternative financing strategy.

Example 17-18. Your company wants to acquire another business but has not determined the optimal means to refinance the acquisition. The current debt to equity position is within the industry guideline. In prior years, financing has been achieved through the issuance of short-term debt.

Profit has shown vacillation and, as a result, the market price of the stock has fluctuated. Currently, however, the market price of stock is strong.

Your company's tax bracket is low.

The purchase should be financed through the issuance of equity securities for the following reasons:

1. The market price of stock is currently at a high level.
2. The issuance of long-term debt will cause greater instability in earnings because of the high fixed interest charges. Consequently, there will be more instability in stock price.
3. The issuance of debt will result in a higher debt to equity ratio relative to the industry norm. This will negatively impact the company's cost of capital and availability of financing.
4. Because it will take a long time to derive the funds needed for the purchase price, short-term debt should not be issued. If short-term debt is issued, the debt would have to be paid before the receipt of the return from the acquired business.

Working a Loan Online

For borrowing money, lenders look for security in your assets and cash flow in addition to your character, so if you can show a healthy balance sheet and a decent credit rating, you can borrow money easily on the Internet.

Among the most useful sites for business borrowers are:

- America's Business Funding' Directory, (www.businessfinance.com) operated by BFS Inc., of Irvine;
- Lendingtree (www.lendingtree.com) provide small business loans in the following types: line of credit, term or installment loans, and receivable financing.
- OneLoanPlace.com (www.oneloanplace.com) offers an online application for all kinds of unsecured business loans.
- Lenders Interactive Services (www.lendersinteractive.com) is a Web-based loan broker for all types of financing: commercial real estate, equipment leasing, factoring, SBA, construction loans, rental property, franchises, and many more.

- www.allbusiness.com , Entrepreneur magazine (www.entrepreneur.com), Inuit (www.intuit.com), and Inc. magazine (www.inc.com) are also useful.

Many are Web-based loan brokers representing a number of banks nationwide--10 at last count--with more signing on monthly. You fill out an online application detailing your business operation and your need for the loan, along with some personal information. Once the Web site checks your personal and business credit ratings electronically, you can get an answer the same day for loans under \$50,000. Loans for larger amounts require additional documentation, usually submitted by mail, so the approval process takes longer.

You can't apply online with America's Business Funding Directory. Instead, the site gathers your business and personal information, probes a database of hundreds of lending sources nationwide and lists those whose lending criteria appear to be a good fit for you. The Web page alerts the lenders of your query, prompting them to make contact with you. It also gives you the names and phone numbers of contacts at the lenders so that you can initiate the process yourself.

The site also offers useful pages detailing the ins and outs of commercial finance, equipment leasing, government funds, investment funds, real estate finance, venture capital, small business development councils and the Service Corps of Retired Executives, a nonprofit organization of business mentors and counselors (www.score.org).

In addition to these, lenders of every stripe maintain Web pages, including all of the big banks targeting business customers, plus commercial finance companies and other sources of business loans. Many allow you to submit online applications for business loans.

Raising Equity and Venture Capital Online

It is not possible to do an equity deal by remote control on the Internet. However, the Internet can help you simplify the first step in your search for equity or venture capital by getting your business plan in front of potential investors. A number of good Web sites seek to help you make these connections, among them:

- The Venture Capital Resource Library (www.vfinance.com), where you can post a synopsis of your business idea along with basic information about your business.
- The National Venture Capital Assn. (www.nvca.org), which lists over 300 venture capital and private equity firms along with links to many of their Web sites, allowing you to gauge the firms' likes and dislikes.
- www.moneycafe.com allows you to identify specific banks, investment banks, venture capital firms, insurers and other sources of finance by state.
- Garage.com (www.garage.com), which matches entrepreneurs and investors through a rigorous and detailed "vetting" process probing business plans, management expertise, and the like.

Conclusion

Your company may finance long-term with debt or equity (preferred stock and common stock) funds. Each has its own advantages and disadvantages. The facts of a situation have to be examined to determine which type is best for your company's circumstances. A firm must select from among several methods of financing arrangements when meeting its capital requirements. To acquire additional growth capital while attempting to maximize earnings per share, a firm should normally select debt over equity initially, even though increased debt is accompanied by interest costs and a degree of risk.

Chapter 17 Review Questions

1. Preferred and common stock differ in that

- A. Failure to pay dividends on common stock will not force the firm into bankruptcy while failure to pay dividends on preferred stock will force the firm into bankruptcy.
- B. Common stock dividends are a fixed amount while preferred stock dividends are not.
- C. Preferred stock has a higher priority than common stock with regard to earnings and assets in the event of bankruptcy.
- D. Preferred stock dividends are deductible as an expense for tax purposes while common stock dividends are not.

2. Which one of the following statements correctly compares bond financing alternatives?

- A. A bond with a call provision typically has a lower yield to maturity than a similar bond without a call provision.
- B. A convertible bond must be converted to common stock prior to its maturity.
- C. A call provision is usually considered detrimental to the investor.
- D. A sinking fund prohibits the firm from redeeming a bond issue prior to its final maturity.

3. Debentures are

- A. Income bonds that require interest payments only when earnings permit.
- B. Subordinated debt and rank behind convertible bonds.
- C. Bonds secured by the full faith and credit of the issuing firm.
- D. Mortgage bonds secured by a lien on specific assets of the firm.

4. Zero-coupon bonds issued by corporations

- A. Are initially sold at par value (a zero discount).
- B. Are initially sold for a price above par value.
- C. Are tax free.
- D. Require no cash outlay from the issuer until the bonds mature.

5. Junk bonds are

- A. Securities rated at less than investment grade.

- B. Worthless securities.
- C. Securities that are highly risky but offer only low yields.
- D. Related only to issues of "fallen angel" companies whose securities have been downgraded.

6. The characteristics of venture capital include all of the following EXCEPT

- A. Initial private placement for the majority of issues.
- B. A minimum holding period of 5 years for new securities.
- C. The use of common stock for most placements.
- D. A lack of liquidity for a period of time.

Chapter 17 Review Answers

1. Preferred and common stock differ in that

- A. Incorrect. Failure to pay dividends will not force the firm into bankruptcy, whether the dividends are for common or preferred stock. Only failure to pay interest will force the firm into bankruptcy.
- B. Incorrect. Preferred dividends are fixed.
- C. **Correct.** In the event of bankruptcy, the claims of preferred shareholders must be satisfied before common shareholders receive anything. The interests of common shareholders are secondary to those of all other claimants.
- D. Incorrect. Neither common nor preferred dividends are tax deductible.

2. Which one of the following statements correctly compares bond financing alternatives?

- A. Incorrect. Callable bonds sometimes pay a slightly higher rate of interest. Investors may demand a greater return because of the uncertainty over the true maturity date.
- B. Incorrect. Conversion is at the option of the investor.
- C. **Correct.** A callable bond can be recalled by the issuer prior to maturity. A call provision is detrimental to the investor because the issuer can recall the bond when market interest rates decline. It is usually exercised only when a company wishes to refinance high-interest debt.
- D. Incorrect. A sinking fund provision requires an issuer to retire a certain portion of its bonds each year or set aside money for repayment in the future. Such a provision increases the probability of repayment for bondholders but does not prohibit early redemption.

3. Debentures are

- A. Incorrect. Unlike, debentures must pay interest regardless of earnings levels.
- B. Incorrect. Debentures are not subordinated except to the extent of assets mortgaged against other bond issues. Debentures are a general obligation of the borrower and rank equally with convertible bonds.
- C. **Correct.** Debentures are unsecured bonds. Although no assets are mortgaged as security for the bonds, debentures are secured by the full faith and credit of the issuing firm. Debentures are a general obligation of the borrower. Only companies with the best credit ratings can issue debentures because only the company's credit rating and reputation secure the bonds.
- D. Incorrect. Debentures are not secured by mortgages on specific assets.

4. Zero-coupon bonds issued by corporations

- A. Incorrect. These bonds are sold at a discount.
- B. Incorrect. These bonds are sold at a discount, not at a premium.
- C. Incorrect. These bonds are subject to taxes.
- D. **Correct.** Zero-coupon bonds pay no interest but sell at a deep discount from their face value. A relatively new type of bond, these instruments are very useful to both investors and investees. The need to reinvest the interest on normal coupon bonds renders the final return uncertain because future reinvestment rates are uncertain. With zero-coupon bonds, the investor knows exactly the return (s)he will earn. Investors might therefore be willing to pay a premium for them, which in turn might lead firms to issue them. No interest payments means the firm faces no additional insolvency risk from the issue until it matures.

5. Junk bonds are

- A. **Correct.** Junk bonds are high risk and therefore high-yield securities that are normally issued when the debt ratio is very high. Thus, the bondholders have as much risk as the holders of equity securities. Such bonds are not highly rated by credit evaluation companies. Junk bonds have become accepted because of the tax deductibility of the interest paid.
- B. Incorrect. Junk bonds are not yet worthless; they simply bear high interest rates and high risk.
- C. Incorrect. Junk bonds typically offer high yields.
- D. Incorrect. Junk bonds are not ones that have been downgraded; they were never high grade.

6. The characteristics of venture capital include all of the following EXCEPT

- A. Incorrect. Venture capital investments are typically private placements.
- B. **Correct.** The concept of venture (risk) capital applies to new enterprises that might not be able to obtain funds in the usual capital markets because of the riskiness of new products. Such companies sometimes try to place securities, normally common stock, with venture capital firms. These are normally private placements of the securities and thus not subject to SEC regulation. The venture capitalists risk low liquidity for their investments until the young corporation becomes successful. The payoff may be substantial if the company does succeed. There is no minimum holding period for venture capital investments.
- C. Incorrect. Common stock is usually a part of most venture capital deals. Venture capitalists want large payoffs in exchange for the risk assumed.
- D. Incorrect. Venture capital investments typically are not liquid for a substantial time after the investment is made.

Chapter 18:

Interpreting Financial Statements

Learning Objectives

After studying this chapter, you will be able to:

- Recognize the different financial statements and their uses.
 - Identify the major components of the balance sheet.
 - Define the value of and the components of the cash flow statement.
-

Managers should have a good understanding of the company in order to make an informed judgment on the financial position and operating performance of the entity. The balance sheet, the income statement, and the statement of cash flows are the primary documents analyzed to determine the company's financial condition. The balance sheets gives the company's position in terms of its assets, liabilities, and equity or net worth, while the income statement gives the company's sources of revenue, expenses, and net income. The statement of cash flows allows you to analyze the company's sources and uses of cash. These financial statements are included in the annual report.

A business entity is an economic unit that enters into business transactions that must be recorded, summarized, and reported. Each business must have a separate set of accounting records and a separate set of financial statements. The financial statements are the means of conveying to management and to interested outsiders a concise picture of the value and profitability of the business for a given period of time. An examination of what can be gained from these statements, and wherein the pitfalls lie, is useful in setting up a program or strategy for planning and controlling profits.

The Income Statement and Balance Sheet

The income statement measures operating performance for a specified time period (like for the year ended December 31, 20x1). The income statement shows the revenue, expenses, and net income (or loss) for a specified period. The definition of each element is as follows.

Revenue

Revenue arises from the sale of merchandise (as by retail business), or the performance of services for a customer or a client (as by a lawyer). Revenue from sales of merchandise or sales of services are often identified merely as *sales*. Other terms used to identify sources of revenue include professional fees, commission revenue, and fares earned. When revenue is earned it results in an increase in either Cash or Accounts Receivable.

Expenses

Expenses result from performing those functions necessary to generate revenue. The amount of an expense is either equal to the cost of the goods sold, the value of the services received (e.g., salary expense), or the expenditures necessary for conducting business operations (e.g. rent expense), during the period.

Net Income (Loss)

Net Income, also called *profits* or *earnings*, is the amount by which total revenue exceeds total expenses for the reporting period. It should be noted that revenue does not necessarily mean receipt of cash and expense does not automatically imply a cash payment. Note that net income and net cash flow (cash receipts less cash payments) are different. For example, taking out a bank loan will generate cash but this is not revenue since merchandise has not been sold nor have services been provided. Further, capital has not been altered because of the loan.

Example 18-1. Joan Biehl is a self-employed consultant. For the month of May 20x1, she earned income of \$10,000 from services rendered. Her business expenses were: telephone \$1,000, electricity \$500, rent \$2,000, secretarial salary \$300, and office supplies used, \$400. Her income statement for the period is as follows:

Joan Biehl
INCOME STATEMENT
For the Month Ended May 31, 20x1

Revenue from professional services		\$10,000
Less: Operating Expenses		
Telephone	\$1,000	
Electricity	500	
Rent	2,000	
Secretarial Salary	300	
Office Supplies	<u>400</u>	
Total Operating Expenses		<u>4,200</u>
Net Income		<u>\$ 5,800</u>

Note that each revenue and expense item has its own account. This specifically enables one to better evaluate and control revenue and expense sources and to examine relationships among account categories. For instance, the ratio of telephone expenses to revenue is 10 percent ($\$1,000/\$10,000$). If in the previous month the relationship was 3 percent, Joan Biehl would, no doubt, attempt to determine the cause for this significant increase.

The balance sheet, also known as the statement of financial position, on the other hand, portrays the financial position of the company at a particular point in time. It shows what is owed (assets), how much is owed (liabilities), and what is left (assets minus liabilities, known as stockholders' equity or net worth). With the balance sheet, you cut the point, freeze the action, and want to know about the company's financial position as of a certain date (like 12/31/20x1, the end of the reporting year). It is a snapshot, while the income statement is a motion picture.

Assets

Assets are economic resources which are owned by an organization and are expected to benefit future operations. Assets may have definite physical form such as buildings, machinery, or supplies. On the other hand, some assets exist not in physical or tangible form, but in the form of valuable legal claims or rights, such as *accounts receivables* from customers and *notes receivables* from debtors.

Assets which will be converted into cash within one year are classified as *current*. Examples are cash, marketable securities, receivables, inventory, prepaid expenses. Prepaid expenses include supplies on hand and advance payments of expenses such as insurance and property taxes.

Assets having a life exceeding one year are classified as *noncurrent*. Examples are long-term investments, equipment, and buildings. Equipment and buildings are often called *plant assets* or *fixed assets*.

Liabilities

Liabilities are debts owed to outsiders (creditors) and are frequently described on the balance sheet by titles that include the word "payable." The liability arising from the purchase of goods or services on credit (on time) is called an *accounts payable*. The form of the liability when money is borrowed is usually a *note payable*, a formal written promise to pay a certain amount of money, plus interest, at a definite future time. *Accounts payable*, as contrasted with a *note payable*, does not involve the issuance of a formal promise written to the creditor, and it does not require payment of interest. Other examples of liabilities include various accrued expenses.

Liabilities payable within one year are classified as *current*, such as accounts payable, notes payable, and taxes payable. Obligations payable in a period longer than one year, for example, bonds payable, are termed *long-term liabilities*.

Equity

Equity is a residual claim against the assets of the business after the total liabilities are deducted. Capital is the term applied to the owner's equity in the business. Other commonly used terms for capital are *owner's equity* and *net worth*. In a sole proprietorship, there is only one capital account since there is only one owner. In a partnership, a capital account exists for each owner. In a corporation, capital represents the *stockholders' equity*, which equals the capital stock issued plus the accumulated earnings of the business (called retained earnings). There are two types of capital stock--common stock and preferred stock. Common stock entitles its owners to voting rights, while preferred stock does not. Preferred stock entitles its owners to priority in the receipt of dividends and in repayment of capital in the event of corporate dissolution.

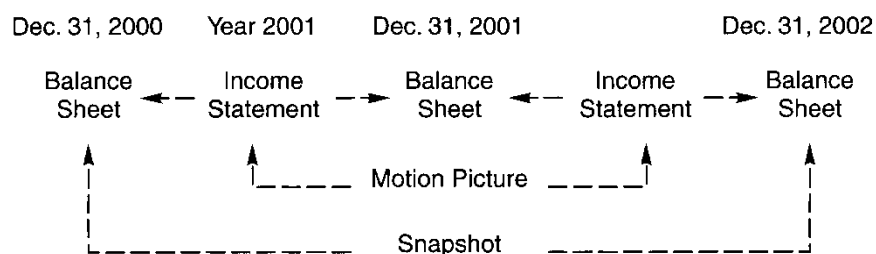
Example 18-2. The equity of the owners of the business is quite similar to the equity commonly referred to with respect to home ownership. If you were to buy a house for \$150,000 by putting down 20 percent, i.e., \$30,000 of your own money and borrowing \$120,000 from a bank, you would say that your equity in the \$150,000 house was \$30,000.

The balance sheet may be prepared either in report form or account form. In the report form, assets, liabilities, and capital are listed vertically. In the account form, assets are listed on the left side and liabilities and capital on the right side.

From the examples given, it is evident that there is a tie-in between the income statement and the balance sheet. Biehl's net income of \$5,800 (last item in her income statement from Example 18.1) is added to capital in her balance sheet in the above example. In effect, the income statement serves as the bridge between two consecutive balance sheets. Further, the net balance of the income statement accounts is used to adjust the Capital Account.

Figure 18-1 shows the relationship between the income statement and the balance sheet. In fact, the income statement serves as a bridge between the two consecutive balance sheets.

FIGURE 18-1. BALANCE SHEET AND INCOME STATEMENT RELATIONSHIP



Example 18-3. (Report Form)

Joan Biehl

Balance Sheet

May 31, 20x1

ASSETS		
Cash		\$10,000
Accounts Receivable		20,000
Office Supplies		10,500
Office Equipment		<u>30,000</u>
Total Assets		<u>\$71,000</u>
LIABILITIES AND CAPITAL		
Liabilities		
Accounts Payable		\$30,000
Capital		
Balance, May 1, 20x1	\$35,600	
Net Income for May	\$5,800	
Less withdrawals	<u>400</u>	
Increase in Capital	<u>5,400</u>	
Total Capital		<u>\$41,000</u>
Total Liabilities and Capital		<u>\$71,000</u>

Example 18-4. (Account Form)

Joan Biehl			
Balance Sheet			
May 31, 20x1			
ASSETS		LIABILITIES AND CAPITAL	
Cash	\$10,000	Liabilities	
Accounts Receivable	20,000	Accounts Payable	\$30,000
Office Supplies	10,500	Capital	
Office Equipment	30,000	Balance, May 1, 20x1	\$35,600
		Net Income for May	\$5,800
		Less: Withdrawals	400
		Increase in Capital	5,400
		Total Capital	<u>41,000</u>
Total Assets	<u>\$71,000</u>	Total Liabilities & Capital	<u>\$71,000</u>

Note: Simply put, with the balance sheet you are asking "how wealthy or poor is the company?," while with the income statement you are asking "how did the company do last year?" and "did it make money and then how much." Neither one is good enough to tell you about the financial health of the company. For example, the fact that the company made a big profit does not necessarily mean it is wealthy, and vice versa. In order to get the total picture, you need both statements to complement each other.

Unfortunately, you still have problems. You would like to know more about the company's financial shape (such as the cash position of the company). However, neither the balance sheet nor the income statement provides the information of the flow of cash during the period. The statement of cash flows provides this information, which will be discussed below.

The Statement of Cash Flows

The statement of cash flows shows the sources and uses of cash, which is a basis for cash flow analysis for managers. The statement aids you in answering vital questions like "where was money obtained?" and "where was money put and for what purpose?" The following provides a list of more specific questions that can be answered by the statement of cash flows and cash flow analysis:

1. Is the company growing or just maintaining its competitive position?
2. Will the company be able to meet its financial obligations?
3. Where did the company obtain funds?
4. What use was made of net income?
5. How much of the required capital has been generated internally?
6. How was the expansion in plant and equipment financed?
7. Is the business expanding faster than it can generate funds?

8. Is the company's dividend policy in balance with its operating policy?
9. Is the company's cash position sound and what effect will it have on the market price of stock?

Cash is vital to the operation of every business. How management utilizes the flow of cash can determine a firm's success or failure. Financial managers must control their company's cash flow so that bills can be paid on time and extra dollars can be put into the purchase of inventory and new equipment or invested to generate additional earnings.

FASB Requirements

Management and external interested parties have always recognized the need for a cash flow statement. Therefore, in recognition of the fact that cash flow information is an integral part of both investment and credit decisions, the *Financial Accounting Standards Board (FASB)* has issued ASC 230, *Statement of Cash Flows (FAS-95, Statement of Cash Flows)*. This pronouncement requires that All business enterprises and not-for-profit organizations include a statement of cash flows as part of the financial statements. A statement of cash flows reports the cash receipts, payments, and net change in cash on hand resulting from the *operating, investing, and financing* activities of an enterprise during a given period. The presentation reconciles beginning and ending cash balances.

Accrual Basis of Accounting

Under *Generally Accepted Accounting Principles (GAAP)*, most companies use the accrual basis of accounting. This method requires that revenue be recorded when earned and that expenses be recorded when incurred. Revenue may include credit sales that have not yet been collected in cash and expenses incurred that may not have been paid in cash. Thus, under the accrual basis of accounting, net income will generally not indicate the net cash flow from operating activities. To arrive at net cash flow from operating activities, it is necessary to report revenues and expenses on a cash basis. This is accomplished by eliminating those transactions that did not result in a corresponding increase or decrease in cash on hand.

Example 18-5. During 20x1, the Eastern Electric Supply Corporation earned \$2,100,000 in credit sales, of which \$100,000 remained uncollected as of the end of the calendar year. Cash that was actually collected by the corporation in 20x1 can be calculated as follows:

Credit sales	\$2,100,000
Less: Credit sales uncollected at year end	<u>100,000</u>
Actual cash collected	<u>\$2,000,000</u>

A statement of cash flows focuses only on transactions involving the cash receipts and disbursements of a company. As previously stated, the statement of cash flows classifies cash receipts and cash payments into operating, investing, and financing activities.

Operating Activities

Operating activities include all transactions that are not investing or financing activities. They only relate to income statement items. Thus cash received from the sale of goods or services, including the collection or sale of trade accounts and notes receivable from customers, interest received on loans, and dividend income are to be treated as cash from operating activities. Cash paid to acquire materials for the manufacture of goods for resale, rental payments to landlords, payments to employees as compensation, and interest paid to creditors are classified as cash outflows for operating activities.

Investing Activities

Investing activities include cash inflows from the sale of property, plant, and equipment used in the production of goods and services, debt instruments or equity of other entities, and the collection of principal on loans made to other enterprises. Cash outflows under this category may result from the purchase of plant and equipment and other productive assets, debt instruments or equity of other entities, and the making of loans to other enterprises.

Financing Activities

The financing activities of an enterprise involve the sale of a company's own preferred and common stock, bonds, mortgages, notes, and other short- or long-term borrowings. Cash outflows classified as financing activities include the repayment of short- and long-term debt, the reacquisition of treasury stock, and the payment of cash dividends.

Example 18-6. The following information pertains to Liverpool Sugar Corporation during 20x1.

1. The company had \$1,004,000 in cash receipts from the sale of goods. Cash payments to acquire materials for the manufacture of goods totaled \$469,000, its payments on accounts and notes payable amounted to \$12,000, and it paid \$136,000 in federal and state taxes.
2. The company sold all of its stock investment in Redondo Food Corporation, an unrelated entity, for \$100,000. It then bought a new plant and equipment for \$676,000.
3. In 20x1, the company sold \$300,000 of its 10%, ten-year bonds. It also issued another \$50,000,000 in preferred stock in return for land and buildings. The company paid a cash dividend of \$36,000.
4. The company had a \$198,000 cash balance at the beginning of the year.

The statement cash flows for the company would be presented as follows:

Liverpool Sugar Corporation
Statement of Cash Flows
for the Year Ended December 31, 20x1

Cash flows from operating activities:	
Cash received from customers	\$1,004,000
Cash payment for acquisition of materials	(469,000)
Cash payment for interest	(12,000)
Cash payment for taxes	<u>(136,000)</u>
Net cash provided by operating activities	\$ 387,000
Cash flows from investing activities:	
Cash paid to purchase plant and equipment	\$(676,000)
Sale of long-term investment	<u>1,000</u>
Net cash used in investing activities	(675,000)
Cash flows from financing activities:	
Cash received from sale of bonds	\$ 300,000
Cash paid for dividends	<u>(36,000)</u>
Net cash used in financing activities	<u>264,000</u>
Net decrease in cash and cash equivalents\$	(24,000)
Cash and cash equivalents at the beginning of the year.	<u>98,000</u>
Cash and cash equivalents at the end of the year	<u>\$ 74,000</u>

Note that the issuance of the preferred stock in exchange for the land and buildings is a noncash transaction that would be disclosed in supplementary form at the end of the statement of cash flows.

Conclusion

The traditional accounting statements--balance sheet, income statement and the required statement of cash flows--have been and will continue to be the most important tools for both management and outsiders for use in gauging the financial condition of a business. As a later chapter will show, additional insights in the performance of the business can be gained by using financial ratio analysis.

Chapter 18 Review Questions

1. The basic financial statements include a balance sheet, income statement, and statement of activities. True or False?

2. The primary purpose of the balance sheet is to reflect
 - A. The fair value of the firm's assets at some moment in time.
 - B. The status of the firm's assets in case of forced liquidation of the firm.
 - C. Assets, liabilities, and equity.
 - D. The firm's potential for growth in stock values in the stock market.

3. A financial statement includes all of the following items: operating activities, financial activities and investing activities. What financial statement is this?
 - A. Statement of cash flows.
 - B. Balance sheet.
 - C. Income statement.
 - D. Statement of retained earnings.

Chapter 18 Review Answers

1. The basic financial statements include a balance sheet, income statement, and statement of activities. True or False?

True is incorrect. The basic statements are the balance sheet, income statement, and statement of cash flows.

False is correct. Under GAAP, the basic required statements are the balance sheet, income statement, and statement of cash flows. A statement of cash flows is now a required part of a full set of financial statements of all business entities (both publicly held and privately held).

2. The primary purpose of the balance sheet is to reflect

- A. Incorrect. The measurement attributes of assets include but are not limited to fair value.
- B. Incorrect. Financial statements reflect the going concern assumption. Hence, they usually do not report forced liquidation values.
- C. **Correct.** The balance sheet presents three major financial accounting elements: assets, liabilities, and equity. Assets are probable future economic benefits resulting from past transactions or events. Liabilities are probable future sacrifices of economic benefits arising from present obligations as a result of past transactions or events. Equity is the residual interest in the assets after deduction of liabilities.
- D. Incorrect. The future value of a company's stock is more dependent upon future operations and investors' expectations than on the data found in the balance sheet.

3. A financial statement includes all of the following items: operating activities, financial activities and investing activities. What financial statement is this?

- A. **Correct.** A statement of cash flows is a required financial statement. Its primary purpose is to provide information about cash receipts and payments by reporting the cash effects of an enterprise's operating, investing, and financing activities. Because the statement or a separate schedule reconciles net income and net operating cash flow, depreciation, a noncash expense, is included in the presentation.
- B. Incorrect. The balance sheet does not include periodic net income or depreciation expense.
- C. Incorrect. The income statement does not have captions for operating and financing activities.
- D. Incorrect. Retained earnings does not include captions for operating and investing activities, depreciation, and net income.

Chapter 19:

Accounting Conventions and Recording Financial Data

Learning Objectives

After studying this chapter, you will be able to:

- Define the double entry system and the accounting equation.
 - Apply transaction analysis to simple business transaction in terms of the accounting model: $\text{Assets} = \text{Liabilities} + \text{Equity}$.
 - List and explain the entries entered into the journal.
 - Recognize the use and application of ledgers.
-

Financial decisions are usually formulated on the basis of information generated by the accounting system of the firm. Proper interpretation of the data requires an understanding of the concepts and rules underlying such systems, the convention adopted in recording information, and the limitation inherent in the information presented.

The transactions of most businesses are numerous and complex, affecting many different items appearing on the financial statements. Therefore, a formal system of classification and recording is required for timely financial reporting and managerial needs. The aim of this chapter is to introduce the formal classification system of financial information commonly called *double-entry accounting*. By acquiring background information about this system, you will be able to more clearly understand the basic structure of the financial statements that were discussed in the previous chapter.

Double Entry and The Accounting Equation

Double entry accounting is a system in which each business transaction affects and is recorded in two or more accounts with equal debits and credits.

The Accounting Equation

An entity's financial position is reflected by the relationship between its assets and its liabilities and equity.

The accounting equation reflects these elements by expressing the equality of assets to creditors' claims and owners' equity as follows:

$$\text{ASSETS (A)} = \text{LIABILITIES (L)} + \text{EQUITY (E)}$$

The equation in effect says that a company's assets are subject to the rights of debt holders and owners.

The accounting equation is the basis for double entry accounting, which means that each transaction has a dual effect. A transaction affects either both sides of the equation by the same amount or one side of the equation only, by increasing and decreasing it by identical amounts and thus netting zero.

Example 19-1. Foster Architectural Company has assets of \$700,000, and obligations of \$300,000, and owner's equity of \$400,000. The accounting equation is

$$\begin{array}{rcl} \text{ASSETS} & = & \text{LIABILITIES} + \text{EQUITY} \\ \$700,000 & = & \$300,000 + \$400,000 \end{array}$$

If at the end of the reporting period, the firm derived net income of \$80,000, the accounting equation becomes

$$\begin{array}{rcl} \text{ASSETS} & = & \text{LIABILITIES} + \text{EQUITY} \\ \$780,000 & = & \$300,000 + \$480,000 \end{array}$$

If \$60,000 was then used to pay creditors, the accounting equation becomes

$$\begin{array}{rcl} \text{ASSETS} & = & \text{LIABILITIES} + \text{EQUITY} \\ \$720,000 & = & \$240,000 + \$480,000 \end{array}$$

In the next example, we will illustrate how the transactions of a business are recorded and what effect they have on the accounting equation.

Example 19-2. Lloyd Thomas, a consultant, experienced the following events in the month of January 20X1:

1. Started his consulting practice with a cash investment of \$10,000 and office equipment worth \$5,000
2. Purchased office supplies of \$800 by paying cash
3. Bought a laptop computer for \$500 on account from Office Depot
4. Paid \$400 in salary to his staff
5. Received an electric bill for \$300
6. Earned professional fees of \$20,000, of which \$12,000 was owed
7. Paid \$300 to Office Depot
8. Withdrew \$100 from the firm for personal use
9. Received \$1,000 from one of the clients who owed him money

The transactions will now be analyzed.

Transaction 1. Thomas started his engineer consulting practice by investing \$10,000 in cash and \$5,000 in office equipment. The *assets* Cash and Office Equipment are increased, and the *equity* is also increased for the total investment of the owner.

	<u>Asset</u>	=	<u>Liabilities</u>	+	<u>Equity</u>
Cash	Office Equipment (OE)				L. Thomas Equity (E)
\$10,000	\$5,000				\$15,000

Transaction 2. Acquired office supplies for cash, \$800.

The asset Office Supplies goes up by \$800 with a corresponding reduction in the asset Cash. This is an example of one asset being used to acquire another one.

<u>Assets</u>			=	<u>Liabilities</u>	+	<u>Equity</u>
Cash	(OE)	Office Supplies (OS)				
\$10,000	\$5,000					\$15,000
<u>-800</u>	<u> </u>	<u>+800</u>				<u> </u>
\$9,000	\$5,000	\$800				\$15,000

Transaction 3. Purchased a laptop computer on account, \$500.

An *asset*, Office Equipment, is being acquired on credit, thereby creating a *liability* for future payment called Accounts Payable. Accounts Payable is defined as the amount owed to suppliers.

<u>Assets</u>			=	<u>Liabilities</u>	+	<u>Equity</u>
Cash	OE	OS		Accounts Payable (AP)		
\$9,200	\$5,000	\$800				\$15,000
<u> </u>	<u>+500</u>	<u> </u>		<u>+\$500</u>		<u> </u>
\$9,200	\$5,500	\$800		\$500		\$15,000

Transaction 4. Paid salary, \$400.

Cash and equity are both being reduced because of the wage expense. Equity is reduced because expenses of the business decrease the equity of the owner.

Assets			=	Liabilities	+	Equity
Cash	OE	OS		AP		
\$9,200	\$5,500	\$800		\$500		\$15,000
<u>-400</u>	<u> </u>	<u> </u>		<u> </u>		<u>-400</u>
\$8,800	\$5,500	\$800		\$500		\$14,600

Transaction 5. Received an electric bill for \$300 (not paid). Liabilities are increased by \$300 since the firm owes the utility money for electricity supplied. Equity is reduced for the expense.

Assets			=	Liabilities	+	Equity
Cash	OE	OS		AP		
\$8,800	\$5,500	\$800		500		\$14,600
<u> </u>	<u> </u>	<u> </u>		<u>+300</u>		<u>-300</u>
\$8,800	\$5,000	\$800		\$500		\$14,300

Transaction 6. Earned fees of \$20,000, of which \$12,000 was received in cash and \$8,000 was owed by clients.

Cash goes up by \$12,000 and the Accounts Receivable (amounts owed to the business from customers) is created. Professional fees earned is revenue to the business and hence increases the owner's equity. Thus, equity is increased by \$20,000.

Assets				=	Liabilities	+	Equity
Cash	OE	OS	AR		AP		
\$8,800	\$5,500	\$800			\$800		\$14,300
<u>+12,000</u>	<u> </u>	<u> </u>	<u>+\$8,000</u>		<u> </u>		<u>+20,000</u>
\$20,800	\$5,500	\$800	\$8,000		\$800		\$34,300

Transaction 7. Paid \$300 to Office Depot (in partial payment of the amount owed to them).

The payment lowers the asset Cash and reduces the liability Accounts Payable.

Assets				=	Liabilities	+	Equity
Cash	OE	OS	AR		AP		
\$20,800	\$5,500	\$800	\$8,000		\$800		\$34,300

<u>-300</u>	<u> </u>	<u> </u>	<u> </u>	<u>-300</u>	<u> </u>
\$20,500	\$5,500	\$800	\$8,000	\$500	\$34,300

Transaction 8. Withdrew \$100 for personal use.

Cash is reduced and so is equity. The personal withdrawal is, in effect, a disinvestment in the business and hence reduces equity. It is not an expense in running the business.

<u>Assets</u>				=	<u>Liabilities</u>	+	<u>Equity</u>
<u>Cash</u>	<u>OE</u>	<u>OS</u>	<u>AR</u>		<u>AP</u>		
\$20,800	\$5,500	\$800	\$8,000		\$500		\$34,300
<u>-100</u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u>-100</u>
\$20,400	\$5,500	\$800	\$8,000		\$500		\$34,200

Transaction 9. Received \$1,000 from clients who owed him money.

This increases Cash and reduces Accounts Receivable since the client now owes the business less money. One asset is being substituted for another one.

<u>Assets</u>				=	<u>Liabilities</u>	+	<u>Equity</u>
<u>Cash</u>	<u>OE</u>	<u>OS</u>	<u>AR</u>		<u>AP</u>		
\$20,400	\$5,500	\$800	\$8,000		\$500		\$34,300
<u>+1000</u>	<u> </u>	<u> </u>	<u>-1,000</u>		<u> </u>		<u>-100</u>
\$21,400	\$5,500	\$800	\$7,000		\$500		\$34,200

Transaction 10. Worth (determined by an inventory count) of office supplies on hand at month's end, \$600.

Since the worth of office supplies originally acquired was \$800 and \$600 is left on hand, the business used \$200 in supplies. This reduces the asset Office Supplies and correspondingly reduces equity. The supplies used up represent office supplies expense.

<u>Assets</u>				=	<u>Liabilities</u>	+	<u>Equity</u>
<u>Cash</u>	<u>OE</u>	<u>OS</u>	<u>AR</u>		<u>AP</u>		
\$21,400	\$5,500	\$800	\$7,000		\$500		\$34,200
<u> </u>	<u> </u>	<u>-200</u>	<u> </u>		<u> </u>		<u>-200</u>
\$21,400	\$5,500	\$800	\$7,000		\$500		\$34,000

SUMMARY OF TRANSACTIONS

January 20X1

Assets				=	L	+	Equity	
Cash	OE	OS	AR		AP			
\$10,000	\$5,000						\$15,000	
<u>-800</u>		<u>+800</u>						
9,200	5,000	800					15,000	
	<u>+500</u>				<u>+\$500</u>			
9,200	5,500	800			500		15,000	
<u>-400</u>							<u>-400</u>	Wage Expense
8,800	5,500	800			500		14,600	
					<u>+300</u>		<u>-300</u>	Utility Expense.
8,800	5,500	800			800		14,300	
<u>+12,000</u>			<u>\$8,000</u>				<u>+20,000</u>	Prof. Fee Revenue
20,800	5,500	800	8,000		800		34,300	
<u>-300</u>					<u>-300</u>			
20,500	5,500	800	8,000		500		34,300	
<u>-100</u>							<u>-100</u>	Drawing
20,400	5,500	800	8,000		500		34,200	
<u>+1,000</u>			<u>-1,000</u>					
21,400	5,500		7,000		500		34,200	
		<u>-200</u>					<u>-200</u>	Off. Supplies Exp.
<u>21,400</u>	<u>5,500</u>	<u>\$600</u>	<u>\$7,000</u>	=	<u>500</u>		<u>34,000</u>	
	<u>\$34,500</u>			=			<u>\$34,500</u>	

The Account

To prepare an equation $\text{Assets} = \text{Liabilities} + \text{Stockholders' Equity}$ for each transaction would be extremely time consuming. Further, information about a specific item (e.g., accounts receivable) would be lost through this process. Rather, there should be an *account* established for each type of item. At the end of the reporting period, the financial statements can then be prepared based upon the balances in these accounts.

The basic component of the formal accounting system is the *account*. A separate account exists for each item shown on the financial statements. Thus, balance sheet accounts consists of assets, liabilities, and equity. Income statement accounts are either expenses or revenue. The increases, decreases, and balance are shown for each account.

In other words, the purpose of the account is to provide a capsule summary of all transactions which have caused an increase or decrease and to reflect the account balance at any given point in time.

Ledger

All accounts are maintained in a book called the *ledger*. The ledger of a firm, for example, would be the group of accounts which summarize the financial operations of the company and is the basis for the preparation of the balance sheet and income statement. It is also useful for decision making since it provides the manager with the balance in a given account at a particular time.

A Chart of Accounts

The ledger is usually accompanied by a table of contents called a *chart of accounts*. The chart of accounts is a listing of the titles and numbers of all accounts in the ledger. Listed first are the balance sheet accounts --assets, liabilities, and stockholders' equity, in that order. The income statement accounts --revenue and expenses -- follow. Its numbering system permits easy reference to accounts.

The account numbering system as it pertains to a typical company is as follows:

Series	Account Classification
001-199	Asset
200-299	Liabilities
300-399	Revenue
400-499	Expenses
500-599	Stockholders' Equities

Particular accounts can then be given unique, identifying account numbers within the series, as in the following examples from the Assets Series:

Account No	Assets
001	Cash on hand
002	Marketable securities
003	Accounts receivable
004	Inventories
005	Investments
006	Land
007	Buildings
008	Equipment

Accounts may take many forms, but the simplest is called a T-account. The reason for this name is obvious as shown below:

Account Title	
debit (left side)	credit (right side)

Every account has three major parts:

1. A title, which is the name of the item recorded in the account
2. A space for recording increases (monetary) in the amount of the item
3. A space for recording decreases (monetary) in the amount of the item.

The left and right sides of the account are called *debit* and *credit*, respectively (often abbreviated as "Dr" for debit and "Cr" for credit). Amounts entered on the left side of an account, regardless of the account title, are called *debits* to the account, and the account is said to be *debited*. Amounts entered on the right side of an account are called *credits*, and the account is said to be *credited*. You must note that the items debit and credit are *not* synonymous with the words increase and decrease. The system of debits and credits as related to increases and decreases in each of the five categories of accounts, assets, liabilities, revenue, expenses, and equity is explained later in the chapter.

To illustrate the account, we'll look at the Cash account (within the Asset classification), where receipts of cash during a period of time have been listed vertically on the debit side and the cash payments for the same period have been listed similarly on the credit side of the account. A memorandum total of the cash receipts for the period to date, \$55,000 in the illustration, may be noted below the last debit whenever the information is desired.

<i>Cash</i>	
10,000	25,000
<u>45,000</u>	21,000
	<u>7,500</u>
<u>55,000</u>	<u>53,500</u>
<u>1,500</u>	

The total of the cash payments, \$53,500 in the illustration, may be noted on the credit side in a similar manner. Subtraction of the smaller sum from the larger, \$55,000 - \$53,500, yields the amount of cash on hand, which is called the balance of the account. The cash account in the illustration has a *balance* of \$1,500, (which may be inserted as shown), which identifies it as a *debit balance*.

The System of Debits and Credits

In this section we will briefly explain how accounts are increased or decreased through the use of debits and credits, the basic foundation of *double-entry* accounting where at least two entries, a debit and a credit, are made for each transaction.

The following guide shows how to increase or decrease accounts using debits and credits.

<i>Asset</i>		<i>Liabilities</i>	
+	-	-	+
Debit for increase	Credit for decrease	Debit for decrease	Credit for increase

<i>Revenue</i>		<i>Expenses</i>	
-	+	-	+
Debit for decrease	Credit for increase	Debit for increase	Credit for decrease

<i>Equity</i>	
+	-
Debit for decrease	Credit for increase

For example, borrowing money increases assets (+ debit for assets) and increases liabilities (+ credit for liabilities).

These same relationships are illustrated below:

Type of Account	Normal Balance	To Increase	To Decrease
Asset	Debit	Debit	Credit
Liability	Credit	Credit	Debit
Revenue	Credit	Credit	Debit
Expenses	Debit	Debit	Credit
Equity	Credit	Credit	Debit

The illustrated system of debits and credits is the standard method followed by persons keeping records on the double-entry system. The system of rules is analogous to a set of traffic rules whereby everyone (at least everyone in this country) agrees to drive on the right side of the road. Obviously, the system would work if we reversed everything. However, you will see shortly that there is a very logical and unique system in the present structure.

The "How and Why" of Debits and Credits

Recall the fundamental accounting equation:

$$\text{ASSETS (A)} = \text{LIABILITIES (L)} + \text{EQUITY (E)}$$

In addition to this equation there is another fundamental accounting concept or rule:

Debits must always equal Credits

This means that whenever a financial transaction is recorded in the accounting record one account (or accounts) must be debited and another account (or account) must be credited to obtain an equal amount. It was noted earlier that all accounts have two sides, a debit side and a credit side. The purpose is to record increases on one side and decreases on the other.

Journals

For simplicity, the entries used in the previous section were made directly in the general ledger accounts. However, this process does not furnish the data required about a given transaction nor is listing of transactions in chronological order possible on T-accounts. These deficiencies are overcome through the use of a *journal*. The journal is the book of original entry in which transactions are entered on a daily basis in chronological order. This process is called *journalizing*.

The data are then transferred from the journal to the ledger by debiting and crediting the particular accounts involved. This process is called *posting*. Ledgers serve a *summarizing* function in the accounting process. The P.R. (Posting Reference) column is used for the ledger account number after the posting from the journal to the ledger takes place. This provides a cross reference between journal and ledger. There exist different types of journals that may be grouped into the categories of (1) general journals and (2) specialized journals. The latter is used when there are many repetitive transactions (e.g., sales or payroll).

Conclusion

We discussed some basic accounting conventions. A formal system of classification and recording--*double-entry bookkeeping*--was briefly covered. Note, however, that recording procedures are done using accounting software such as *Quick Books* and *Peachtree Accounting*. By acquiring background information about this formal system, you will be able to more clearly understand the basic structure of the financial statements that were discussed in the previous chapter.

Chapter 19 Review Questions

1. The term "double-entry system" refers to
 - A. The use of real and nominal accounts.
 - B. The recording of each transaction in two parts.
 - C. The use of two journals.
 - D. The use of a journal and a ledger.

2. A chart of accounts is
 - A. A flowchart of all transactions.
 - B. An accounting procedures manual.
 - C. A journal.
 - D. A list of names of all account titles.

Chapter 19 Review Answers

1. The term "double-entry system" refers to

- A. Incorrect. The distinction between real and nominal accounts is based on the relative permanence of accounts rather than the double entry, self-balancing attribute of accounting systems.
- B. **Correct.** In the double-entry system, each transaction is composed of two parts, debits and credits. The debits must equal the credits, and the sum of all debits for all transactions in a double entry system must equal the sum of all credits.
- C. Incorrect. Many journals may be used, e.g., general journal, sales journal, cash receipts journal, and cash payments journal.
- D. Incorrect. Even though journals and ledgers are parts of all double entry systems, they have nothing to do with the term "double entry."

2. A chart of accounts is

- A. Incorrect. Actual transactions are not flowcharted. Flowcharts of accounting procedures are developed by auditors and systems analysts (but are not called charts of accounts).
- B. Incorrect. An accounting procedures manual explains how to use the chart of accounts, e.g., whether to make adjusting entries, reversing entries, etc.
- C. Incorrect. A journal contains the initial recording of the transactions that affect the accounts contained in the chart of accounts.
- D. **Correct.** A chart of accounts is a listing of all account titles used within an accounting system. Business transactions affecting these accounts are initially recorded by journal entries and then posted to the individual accounts maintained in the ledger.

Chapter 20:

Assessing Financial Health and Fitness

Learning Objectives

After studying this chapter, you will be able to:

- Evaluate different financial ratios.
 - Demonstrate how to work with financial ratios.
 - Apply industry comparison ratios and trend analysis.
-

Managers need to be able to analyze the company's financial statements in order to evaluate its financial health and operating performance. What has been the trend in profitability and return on investment? Will the business be able to pay its bills? How are the receivables and the inventory turning over? The chapter presents various financial statement analysis tools that are useful in evaluating the company's current and future financial conditions. These techniques include horizontal, vertical, and ratio analysis.

The analysis of financial statements reveals important information to management, creditors, and present and prospective investors. Financial statement analysis attempts to answer the following basic questions:

1. How well is the business doing?
2. What are its strengths?
3. What are its weaknesses?
4. How does it fare in the industry?
5. Is the business improving or deteriorating?

A complete set of financial statements, as explained in the previous chapter, will include the balance sheet, income statement, and statement of cash flows. The first two are vital in financial statement analysis. We will discuss the various financial statement analysis tools that you will use in evaluating the firm's present and future financial condition. These tools include horizontal, vertical, and ratio analysis, which give relative measures of the performance and financial condition of the company.

What and Why of the Financial Statement Analysis

The analysis of financial statements means different things to different people. It is of interest to creditors, present and prospective investors, and the firm's own management.

A *creditor* is primarily interested in the firm's debt-paying ability. A short-term creditor, such as a vendor or supplier is ultimately concerned with the firm's ability to pay its bills and therefore wants to be assured that the firm is liquid. A long-term creditor such as a bank or bondholder, on the other hand, is interested in the firm's ability to repay interest and principal on borrowed funds.

An *investor* is interested in the present and future level of return (earnings) and risk (liquidity, debt, and activity). You, as an investor, evaluate a firm's stock based on an examination of its financial statements. This evaluation considers overall financial health, economic and political conditions, industry factors, and future outlook of the company. The analysis attempts to ascertain whether the stock is overpriced, underpriced, or priced in proportion to its market value. A stock is valuable to you only if you can predict the future financial performance of the business. Financial statement analysis gives you much of the data you will need to forecast earnings and dividends.

Management must relate the analysis to all of the questions raised by creditors and investors, since these interested parties must be satisfied for the firm to obtain capital as needed.

Horizontal and Vertical Analysis

Comparison of two or more years' financial data is known as *horizontal analysis*. Horizontal analysis concentrates on the trend in the accounts in dollar *and* percentage terms over the years. It is typically presented in comparative financial statements (see ALPHA, Inc. financial data in Figures 20-1 and 20-2). In annual reports, comparative financial data are usually shown for five years.

Through horizontal analysis you can pinpoint areas of wide divergence requiring investigation. For example, in the income statement shown in Figure 20-3, the significant rise in sales returns taken with the reduction in sales for 2X11-2X12 should cause concern. You might compare these results with those of competitors.

Figures 20-1

ALPHA, Inc.

Comparative Balance Sheet (In Thousands of Dollars)

December 31, 2X12, 2X11, 2X10

			Increase/ Decrease.		% Increase/ Decrease		
	2X12	2X11	2X10	2X12-2X11	2X11-2X10	2X12-2X11	2X11-2X10
ASSETS							
Current Assets:							
Cash	\$28	\$36	\$36	(8.00)	0.00	-22.2%	0.0%
Marketable Securities	22	15	7	7.00	8.00	46.7%	114.3%
Accounts Receivable	20	16	10	5.00	6.00	31.3%	60.0%
Inventory	53	46	49	7.00	(3.00)	15.2%	-6.1%
Total Current Assets	124	113	102	11.00	11.00	9.7%	10.8%
Plant And Equip.	103	91	83	12.00	8.00	13.2%	9.6%
Total Assets	227	204	185	23.00	19.00	11.3%	10.3%
LIABILITIES							
Current Liabilities	56	50	51	6.00	(1.00)	12.0%	-2.0%
Long-term debt	83	74	69	9.00	5.00	12.2%	7.2%
Total Liabilities	139	124	120	15.00	4.00	12.1%	3.3%
STOCKHOLDERS' EQUITY							
Common Stock, \$10 par, 4,600 shares	46	46	46	0.00	0.00	0.0%	0.0%
Retained Earnings	42	34	19	8.00	15.00	23.5%	78.9%
Total Stockholders' Equity	88	80	65	8.00	15.00	10.0%	23.1%
Total Liability and Stockholders' Equity	\$227	\$204	\$185	\$23.00	\$19.00	11.3%	10.3%

Figures 20-2
ALPHA, Inc.

Comparative Income Statement (In Thousands of Dollars)

For the Years Ended December 31, 2X12, 2X11, 2X10

	2X12	2X11	2X10	Increase/ Decrease		% Increase/ Decrease	
				2X12-2X11	2X11-2X10	2X12-2X11	2X11-2X10
Sales	\$98.3	\$120.0	\$56.6	(\$21.7)	\$63.4	-18.1%	112.0%
Sales Return & Allowances	18.0	10.0	4.0	8.0	6.0	80.0%	150.0%
Net Sales	80.3	110.0	52.6	(29.7)	57.4	-27.0%	109.1%
Cost of Goods Sold	52.0	63.0	28.0	(11.0)	35.0	-17.5%	125.0%
Gross Profit	28.3	47.0	24.6	(18.7)	22.4	-39.8%	91.1%
Operating Expenses							
Selling Expenses	12.0	13.0	11.0	(1.0)	2.0	-7.7%	18.2%
General Expenses	5.0	8.0	3.0	(3.0)	5.0	-37.5%	166.7%
Total Operating Expenses	\$17.0	\$21.0	\$14.0	(\$4.0)	\$7.0	-19.0%	50.0%
Income from Operations	\$11.3	\$26.0	\$10.6	(\$14.7)	\$15.4	-56.5%	145.3%
Non-Operating Income	4.0	1.0	2.0	3.0	(1.0)	300.0%	-50.0%
Income before Interest & Taxes	15.3	27.0	12.6	(11.7)	14.4	-43.3%	114.3%
Interest Expense	2.0	2.0	1.0	0.0	1.0	0.0%	100.0%
Income before Taxes	13.3	25.0	11.6	(11.7)	13.4	-46.8%	115.5%
Income Taxes (40%)	5.3	10.0	4.6	(4.7)	5.4	-46.8%	115.5%
Net Income	\$8.0	\$15.0	\$7.0	(\$7.0)	\$8.0	-46.8%	115.5%

It is essential to present both the dollar amount of change and the percentage of change since the use of one without the other may result in erroneous conclusions. The interest expense from 20X11-2X12 went up by 100.0%, but this represented only \$1,000 and may not need further investigation. In a similar vein, a large number change might cause a small percentage change and not be of any great importance. Key changes and trends can also be highlighted by the use of *common-size statements*. A common size statement is one that shows the separate items appearing on it in percentage term. Preparation of common-size statements is known as *vertical analysis*. In vertical analysis, a material financial statement item is used as a base value, and all other accounts on the financial statement are compared to it. In the balance sheet, for example, total assets equal 100%. Each asset is stated as a percentage of total assets. Similarly, total liabilities and stockholders' equity is assigned 100% with a given liability or equity account stated as a percentage of the total liabilities and stockholders' equity, respectively. Figure 20-3 shows a common-size income statement based on the data provided in Figure 20-2.

Placing all assets in common-size form clearly shows the relative importance of the current assets as compared to the noncurrent assets. It also shows that significant changes have taken place in the composition of the current assets over the last year. Notice, for example, that receivables have increased in relative importance and that cash

has declined in relative importance. The deterioration in the cash position may be a result of inability to collect from customers.

For the income statement, 100% is assigned to net sales with all other revenue and expense accounts related to it. It is possible to see at a glance how each dollar of sales is distributed between the various costs, expenses, and profits. For example, notice from Figure 20-3 that 64.8 cents of every dollar of sales was needed to cover cost of goods sold in 2X12, as compared to only 57.3 cents in the prior year; also notice that only 9.9 cents out of every dollar of sales remained for profits in 2X12--down from 13.6 cents in the prior year.

Figure 20-3
Income Statement and Common Size Analysis
ALPHA, Inc.
(In Thousands of Dollars)

For the Years Ended December 31, 2X12 & 2X11

	2X12		2X11	
	Amount	%	Amount	%
Sales	\$98.30	122.40%	\$120.00	109.10%
Sales Return & Allowances	18.00	22.40%	10.00	9.10%
Net Sales	80.30	100.00%	110.00	100.00%
Cost of Goods Sold	52.00	64.80%	63.00	57.30%
Gross Profit	28.30	35.20%	47.00	42.70%
Operating Expenses				
Selling Expenses	12.00	14.90%	13.00	11.80%
General Expenses	5.00	6.20%	8.00	7.30%
Total Operating Expenses	\$17.00	21.20%	\$21.00	19.10%
Income from Operations	\$11.30	14.10%	\$26.00	23.60%
Non-Operating Income	4.00	5.00%	1.00	0.90%
Income before Interest & Taxes	15.30	19.10%	27.00	24.50%
Interest Expense	2.00	2.50%	2.00	1.80%
Income before Taxes	13.30	16.60%	25.00	22.70%
Income Taxes (40%)	5.30	6.60%	10.00	9.10%
Net Income	\$8.00	9.90%	\$15.00	13.60%

You should also compare the vertical percentages of the business to those of the competition and to the industry norms. Then you can determine how the company fares in the industry.

Working with Financial Ratios

Horizontal and vertical analysis compares one figure to another within the same category. It is also vital to compare two figures applicable to different categories. This is accomplished by ratio analysis. In this section, you will learn how to calculate the various financial ratios and how to interpret them. The results of the ratio analysis will allow you:

1. To appraise the position of a business,
2. To identify trouble spots that need attention, and
3. To provide the basis for making projections and forecasts about the course of future operations.

Think of ratios as measures of the relative health or sickness of a business. Just as a doctor takes readings of a patient's temperature, blood pressure, heart rate, etc., you will take readings of a business's liquidity, profitability, leverage, efficiency in using assets, and market value. Where the doctor compares the readings to generally accepted guidelines such as a temperature of 98.6 degrees as normal, you make some comparisons to the norms.

To obtain useful conclusions from the ratios, you must make two comparisons:

Industry comparison This will allow you to answer the question "how does a business fare in the industry?" You must compare the company's ratios to those of competing companies in the industry or with industry standards (averages). You can obtain industry norms from financial services such as *Value Line*, *Dun and Bradstreet*, and *Standard and Poor's*. Numerous online services such as *Yahoo Finance* and *MSN Money Central*, to name a few, provide these data.

Trend analysis To see how the business is doing over time, you will compare a given ratio for one company over several years to see the direction of financial health or operational performance.

Financial ratios can be grouped into the following types: liquidity, asset utilization (activity), solvency (leverage and debt service), profitability, and market value.

Liquidity

Liquidity is the firm's ability to satisfy maturing short-term debt. Liquidity is crucial to carrying out the business, especially during periods of adversity. It relates to the short term, typically a period of one year or less. Poor liquidity might lead to higher cost of financing and inability to pay bills and dividends. The three basic measures of liquidity are (a) net working capital, (b) the current ratio, and (c) the quick (acid-test) ratio.

Throughout our discussion, keep referring to Figures 20-1 and 22-2 to make sure you understand where the numbers come from.

Net working capital equals current assets minus current liabilities. Net working capital for 2X12 is:

$$\begin{aligned}\text{Net working capital} &= \text{current assets} - \text{current liabilities} \\ &= \$124 - \$56 \\ &= \$68\end{aligned}$$

In 2X11, net working capital was \$63. The rise over the year is favorable.

The *current ratio* equals current assets divided by current liabilities. The ratio reflects the company's ability to satisfy current debt from current assets.

$$\text{Current ratio} = \left(\frac{\text{Current assets}}{\text{Current liabilities}} \right)$$

For 2X12, the current ratio is:

$$\left(\frac{\$124}{\$56} \right) = 2.21$$

In 2X11, the current ratio was 2.26. The ratio's decline over the year points to a slight reduction in liquidity.

A more stringent liquidity test can be found in the *quick (acid-test) ratio*. Inventory and prepaid expenses are excluded from the total of current assets, leaving only the more liquid (or quick) assets to be divided by current liabilities.

$$\text{Acid-test ratio} = \frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}}$$

The quick ratio for 2X12 is:

$$\left(\frac{\$28 + \$21 + \$22}{\$56} \right) = 1.27$$

In 2X11, the ratio was 1.34. A small reduction in the ratio over the period points to less liquidity.

The overall liquidity trend shows a slight deterioration as reflected in the lower current and quick ratios, although it is better than the industry norms (see Figure 20-4 for industry averages). But a mitigating factor is the increase in net working capital.

Asset Utilization

Asset utilization (activity, turnover) ratios reflect the way in which a company uses its assets to obtain revenue and profit. One example is how well receivables are turning into cash. The higher the ratio, the more efficiently the business manages its assets.

Accounts receivable ratios comprise the accounts receivable turnover and the average collection period.

The *accounts receivable turnover* provides the number of times accounts receivable are collected in the year. It is derived by dividing net credit sales by average accounts receivable.

You can calculate average accounts receivable by the average accounts receivable balance during a period.

$$\text{Accounts receivable turnover} = \frac{\text{net credit sales}}{\text{average accounts receivable}}$$

For 2X12, the average accounts receivable is:

$$\frac{\$21 + \$16}{2} = \$18.5$$

The accounts receivable turnover for 2X12 is:

$$\frac{\$80.3}{\$18.5} = 4.34$$

In 2X11, the turnover was 8.46. There is a sharp reduction in the turnover rate pointing to a collection problem.

The *average collection period* is the length of time it takes to collect receivables. It represents the number of days receivables are held.

$$\text{Average collection period} = \frac{365 \text{ days}}{\text{accounts receivable turnover}}$$

In 2X12, the collection period is:

$$\frac{365}{4.34} = 84.1 \text{ days}$$

It takes this firm about 84 days to convert receivables to cash. In 2X11, the collection period was 43.1 days. The significant lengthening of the collection period may be a cause for some concern. The long collection period may be a result of the presence of many doubtful accounts, or it may be a result of poor credit management.

Inventory ratios are useful especially when a buildup in inventory exists. Inventory ties up cash. Holding large amounts of inventory can result in lost opportunities for profit as well as increased storage costs. Before you extend credit or lend money, you should examine the firm's *inventory turnover* and *average age of inventory*.

$$\text{Inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$

The inventory turnover for 2X12 is:

$$\frac{\$52}{\$49.5} = 1.05$$

For 2X11, the turnover was 1.33.

$$\text{Average age of inventory} = \frac{365}{\text{inventory turnover}}$$

In 2X12, the average age is:

$$\frac{365}{1.05} = 347.6 \text{ days}$$

In the previous year, the average age was 274.4 days.

The reduction in the turnover and increase in inventory age points to a longer holding of inventory. You should ask why the inventory is not selling as quickly.

The *operating cycle* is the number of days it takes to convert inventory and receivables to cash.

$$\text{Operating cycle} = \text{average collection period} + \text{average age of inventory}$$

In 2X12, the operating cycle is:

$$84.1 \text{ days} + 347.6 \text{ days} = 431.7 \text{ days}$$

In the previous year, the operating cycle was 317.5 days. An unfavorable direction is indicated because additional funds are tied up in noncash assets. Cash is being collected more slowly.

By calculating the *total asset turnover*, you can find out whether the company is efficiently employing its total assets to obtain sales revenue. A low ratio may indicate too high an investment in assets in comparison to the sales revenue generated.

$$\text{Total asset turnover} = \frac{\text{net sales}}{\text{average total assets}}$$

In 2X12, the ratio is:

$$\frac{\$80.3}{(\$204 + \$227) / 2} = \frac{\$80.3}{\$215.5} = 0.37$$

In 2X11, the ratio was .57 (\$110/\$194.5). There has been a sharp reduction in asset utilization.

ALPHA, Inc. has suffered a sharp deterioration in activity ratios, pointing to a need for improved credit and inventory management, although the 2X12 ratios are not far out of line with the industry averages (See Figure 20-4). It appears that problems are inefficient collection and obsolescence of inventory.

Solvency (Leverage and Debt Service)

Solvency is the company's ability to satisfy long-term debt as it becomes due. You should be concerned about the long-term financial and operating structure of any firm in which you might be interested. Another important consideration is the size of debt in the firm's capital structure, which is referred to as *financial leverage*. (Capital structure is the mix of the *long term* sources of funds used by the firm).

Solvency also depends on earning power; in the long run a company will not satisfy its debts unless it earns profit. A leveraged capital structure subjects the company to fixed interest charges, which contributes to earnings instability. Excessive debt may also make it difficult for the firm to borrow funds at reasonable rates during tight money markets.

The *debt ratio* reveals the amount of money a company owes to its creditors. Excessive debt means greater risk to the investor. (Note that equity holders come after creditors in bankruptcy.) *Note:* How much debt is too much? The rule of thumb is: The debt portion should be less than 50%. All of bankruptcies arise from a company's inability to meet its debt obligations, according to **BankruptcyData.com**).

The debt ratio is:

$$\text{Debt ratio} = \frac{\text{Total liabilities}}{\text{Total assets}}$$

In 2X12, the ratio is:

$$\frac{\$139}{\$227} = 0.61$$

The *debt-equity ratio* will show you if the firm has a great amount of debt in its capital structure. Large debts mean that the borrower has to pay significant periodic interest and principal. Also, a heavily indebted firm takes a greater risk of running out of cash in difficult times. The interpretation of this ratio depends on several variables, including the ratios of other firms in the industry, the degree of access to additional debt financing, and stability of operations.

$$\text{Debt-equity ratio} = \frac{\text{Total liabilities}}{\text{Stockholders' equity}}$$

In 2X12, the ratio is:

$$\frac{\$139}{\$88} = 1.58$$

In the previous year, the ratio was 1.55. the trend is relatively static.

Times interest earned (interest coverage ratio) tells you how many times the firm's before-tax earnings would cover interest. It is a safety margin indicator in that it reflects how much of a reduction in earnings a company can tolerate.

$$\text{Times interest earned} = \frac{\text{Income before interest and taxes}}{\text{interest expense}}$$

For 2X12, the ratio is:

$$\frac{\$15.3}{\$2.0} = 7.65$$

In 2X11, interest was covered 13.5 times. The reduction in coverage during the period is a bad sign. It means that less earnings are available to satisfy interest charges.

You must also note liabilities that have not yet been reported in the balance sheet by closely examining footnote disclosure. For example, you should find out about lawsuits, non-capitalized leases, and future guarantees.

As shown in Figure 20-4, the company's overall solvency is poor, relative to the industry averages although it has remained fairly constant. There has been no significant change in its ability to satisfy long-term debt. Note that significantly less profit is available to cover interest payments.

Profitability

A company's ability to earn a good profit and return on investment is an indicator of its financial well-being and the efficiency with which it is managed. Poor earnings have detrimental effects on market price of stock and dividends. Total dollar net income has little meaning unless it is compared to the input in getting that profit.

The *gross profit margin* shows the percentage of each dollar remaining once the company has paid for goods acquired. A high margin reflects good earning potential.

$$\text{Gross profit margin} = \frac{\text{gross profit}}{\text{net sales}}$$

In 2X12, the ratio is:

$$\frac{\$28.3}{\$80.3} = 0.35$$

The ratio was .43 in 2X11. The reduction shows that the company now receives less profit on each dollar sales. Perhaps higher relative cost of merchandise sold is at fault.

Profit margin shows the earnings generated from revenue and is a key indicator of operating performance. It gives you an idea of the firm's pricing, cost structure, and production efficiency.

$$\text{Profit margin} = \frac{\text{net income}}{\text{net sales}}$$

The ratio in 2X12 is:

$$\frac{\$8}{\$80.3} = 0.10$$

For the previous year, profit margin was .14. The decline in the ratio shows a downward trend in earning power. (Note that these percentages are available in the common size income statement as given in Figure 20-3).

Return on investment is a prime indicator because it allows you to evaluate the profit you will earn if you invest in the business. Two key ratios are the *return on total assets* and the *return on equity*.

The return on total assets shows whether management is efficient in using available resources to get profit.

$$\text{Return on total assets} = \frac{\text{net income}}{\text{average total assets}}$$

In 2X12, the return is:

$$\frac{\$8}{(\$227 + \$204) / 2} = 0.037$$

In 2X11, the return was .077. There has been a deterioration in the productivity of assets in generating earnings.

The *return on equity* (ROE) reflects the rate of return earned on the stockholders' investment.

$$\text{Return on common equity} = \frac{\text{net income available to stock holder}}{\text{average stockholders' equity}}$$

The return in 2X12 is:

$$\frac{\$8}{(\$88 + \$80) / 2} = 0.095$$

In 2X11, the return was .207. There has been a significant drop in return to the owners.

The overall profitability of the company has decreased considerably, causing a decline in both the return on assets and return on equity. Perhaps lower earnings were due in part to higher costs of short-term financing arising from the decline in liquidity and activity ratios. Moreover, as turnover rates in assets go down, profit will similarly decline because of a lack of sales and higher costs of carrying higher current asset balances. As indicated in Figure 20-4, industry comparisons reveal that the company is faring very poorly in the industry.

Market Value

Market value ratios relate the company's stock price to its earnings (or book value) per share. Also included are dividend-related ratios.

Earnings per share (EPS) is the ratio most widely watched by investors. EPS shows the net income per common share owned. You must reduce net income by the preferred dividends to obtain the net income available to common stockholders. Where preferred stock is not in the capital structure, you determine EPS by dividing net income by common shares outstanding. EPS is a gauge of corporate operating performance and of expected future dividends.

$$\text{EPS} = \frac{\text{net income} - \text{preferred dividend}}{\text{common shares outstanding}}$$

EPS in 2X12 is:

$$\frac{\$8,000}{4,600 \text{ shares}} = \$1.74$$

For 2X11, EPS was \$3.26. The sharp reduction over the year should cause alarm among investors. As you can see in Figure 20-4, the industry average EPS in 2X12 is much higher than that of ALPHA, Inc. (\$4.51 per share vs. \$1.74 per share).

The *price/earnings (P/E) ratio*, also called *earnings multiple*, reflects the company's relationship to its stockholders. The P/E ratio represents the amount investors are willing to pay for each dollar of the firm's earnings. A high multiple (cost per dollar of earnings) is favored since it shows that investors view the firm positively. On the other hand, investors looking for value would prefer a relatively lower multiple (cost per dollar of earnings) as compared with companies of similar risk and return.

$$\text{Price/earnings ratio} = \frac{\text{market price per share}}{\text{earnings per share}}$$

Assume a market price per share of \$12 on December 31, 2X12, and \$26 on December 31, 2X11. The P/E ratios are:

$$2X11: \frac{\$12}{\$1.74} = 6.9$$

$$2X12: \frac{\$26}{\$3.26} = 7.98$$

From the lower P/E multiple, you can infer that the stock market now has a lower opinion of the business. However, some investors argue that a low P/E ratio can mean that the stock is undervalued. Nevertheless, the decline over the year in stock price was 54% (\$14/\$26), which should cause deep investor concern.

Book value per share equals the net assets available to common stockholders divided by shares outstanding. By comparing it to market price per share you can get another view of how investors feel about the business.

The book value per share in 2X12 is:

$$\begin{aligned} \text{Book value per share} &= \frac{\text{Total stockholders' equity} - \text{preferred stock}}{\text{common shares outstanding}} \\ &= \frac{\$88,000 - 0}{4,600} = \$19.13 \end{aligned}$$

In 2X11, book value per share was \$17.39.

The increased book value per share is a favorable sign, because it indicates that each share now has a higher book value. However, in 2X12, market price is much less than book value, which means that the stock market does not value the security highly. In 2X11, market price did exceed book value, but there is now some doubt in the minds of stockholders concerning the company. However, some analysts may argue that the stock is underpriced.

The *price/book value ratio* shows the market value of the company in comparison to its historical accounting value. A company with old assets may have a high ratio whereas one with new assets may have a low ratio. Hence, you should note the changes in the ratio in an effort to appraise the corporate assets.

The ratio equals:

$$\text{Price/book value} = \frac{\text{Market price per share}}{\text{Book value per share}}$$

In 2X12, the ratio is:

$$\frac{\$12}{\$19.13} = 0.63$$

In 2X11, the ratio was 1.5. The significant drop in the ratio may indicate a lower opinion of the company in the eyes of investors. Market price of stock may have dropped because of a deterioration in liquidity, activity, and profitability ratios. The major indicators of a company's performance are intertwined (i.e., one affects the other) so that problems in one area may spill over into another. This appears to have happened to the company in our example.

Dividend ratios help you determine the current income from an investment. Two relevant ratios are:

$$\text{Dividend yield} = \frac{\text{dividends per share}}{\text{market price per share}}$$

$$\text{Dividend payout} = \frac{\text{dividends per share}}{\text{earnings per share}}$$

There is no such thing as a "right" payout ratio. Stockholders look unfavorably upon reduced dividends because it is a sign of possible deteriorating financial health. However, companies with ample opportunities for growth at high rates of return on assets tend to have low payout ratios.

An Overall Evaluation – Summary of Financial Ratios

As indicated in the chapter, a single ratio or a single group of ratios is not adequate for assessing all aspects of the firm's financial condition. Figure 20-4 summarizes the 2X11 and 2X12 ratios calculated in the previous sections, along with the industry average ratios for 2X12. The figure also shows the formula used to calculate each ratio. The last three columns of the figure contains subjective assessments of ALPHA's financial condition, based on trend analysis and 2X12 comparisons to the industry norms. (5-year ratios are generally needed for trend analysis to be more meaningful, however.)

Figure 20-4
ALPHA, Inc.

Summary of Financial Ratios - Trend and Industry Comparisons

Ratios	Definitions	2X11	2X12	Industry ^a	Evaluation ^b		
					Ind	Trend	Overall
LIQUIDITY							
Net working capital	Current assets - current liabilities	63	68	56	good	good	good
Current Ratio	Current assets/current liabilities	2.26	2.21	2.05	OK	OK	OK
Quick (Acid-test) ratio	(Cash + marketable securities + accounts receivable)/current liabilities	1.34	1.27	1.11	OK	OK	OK
ASSET UTILIZATION							
Accounts receivable turnover	Net credit sales/average accounts receivable	8.46	4.34	5.5	OK	poor	poor
Average collection period	365 days/accounts receivable turnover (days)	43.1	84.1	66.4	OK	poor	poor
Inventory turnover	Cost of goods sold/average inventory	1.33	1.05	1.2	OK	poor	poor
Average age of inventory	365 days/inventory turnover (days)	274.4	347.6	N/A	N/A	poor	poor
Operating cycle	Average collection period + average age of inventory (days)	317.5	431.7	N/A	N/A	poor	poor
Total asset turnover	Net sales/average total assets	0.57	0.37	0.44	OK	poor	poor
SOLVENCY							
Debt ratio	Total liabilities/total assets	0.61	0.61	N/A	N/A	OK	OK
Debt-equity ratio	Total liabilities/stockholders' equity	1.55	1.58	1.3	poor	poor	poor
Times interest earned	Income before interest and taxes/interest expense (times)	13.5	7.65	10	OK	poor	poor
PROFITABILITY							
Gross profit margin	Gross profit/net sales	0.43	0.35	0.48	poor	poor	poor
Profit margin	Net income/net sales	0.14	0.1	0.15	poor	poor	poor
Return on total assets	Net income/average total assets	0.077	0.037	0.1	poor	poor	poor
Return on equity(ROE)	Earnings available to common stockholders/ avg. stockholders' equity	0.207	0.095	0.27	poor	poor	poor
MARKET VALUE							

Figure 20-4
ALPHA, Inc.

Summary of Financial Ratios - Trend and Industry Comparisons

Ratios	Definitions	2X11	2X12	Industry ^a	Evaluation ^b		
					Ind	Trend	Overall
Earnings per share(EPS)	(Net income -preferred dividend)/common shares outstanding	3.26	1.74	4.51	poor	poor	poor
Price/earnings (P/E) ratio	Market price per share/EPS	7.98	6.9	7.12	OK	poor	poor
Book value per share	(Total stockholders' eqty - Preferred stock)/ common shrs outstanding	17.39	19.13	N/A	N/A	good	good
Price/book value ratio	Market price per share/book value per share	1.5	0.63	N/A	N/A	poor	poor
Dividend yield	Dividends per share/market price per share						
Dividend payout	Dividends per share/EPS						

(a) Obtained from sources not included in this chapter

(b) Represent subjective evaluation

By appraising the trend in the company's ratios from 2X11 to 2X12, we see from the drop in the current and quick ratios that there has been a slight detraction in short-term liquidity, although they have been above the industry averages. But working capital has improved. A material deterioration in the activity ratios has occurred, indicating that improved credit and inventory policies are required. They are not terribly alarming, however, because these ratios are not way out of line with industry averages. Also, total utilization of assets, as indicated by the total asset turnover, shows a deteriorating trend.

Leverage (amount of debt) has been constant. However, there is less profit available to satisfy interest charges. ALPHA's profitability has deteriorated over the year. In 2X12, it is consistently below the industry average in every measure of profitability. In consequence, the return on the owner's investment and the return on total assets has gone down. The earnings decrease may be partly due to the firm's high cost of short-term financing and partly due to operating inefficiency. The higher costs may be due to receivable and inventory difficulties that forced a decline in the liquidity and activity ratios. Furthermore, as receivables and inventory turnover less, profit will fall off from a lack of sales and the costs of carrying more in current asset balances.

The firm's market value, as measured by the price/earnings (P/E) ratio, is respectable as compared with the industry. But it shows a declining trend.

In summary, it appears that the company is doing satisfactorily in the industry in many categories. The 2X11-2X12 period, however, seems to indicate that the company is heading for financial trouble in terms of earnings, activity, and short-term liquidity. The business needs to concentrate on increasing operating efficiency and asset utilization.

Conclusion

Financial statement analysis is an attempt to work with reported financial figures in order to determine a company's financial strengths and weaknesses. Most analysts favor certain ratios and ignore others. Each ratio should be compared to industry norms and analyzed in light of past trends. Financial analysis also calls for an awareness of the impact of inflation and deflation on reported income. Ratio analysis provides useful information regarding the efficiency of operations and the stability of financial condition. Nevertheless, it has several inherent limitations, such as firms using different accounting and operating policies, multiple lines of businesses, and different sources of information. Each of these factors impairs the comparability of financial statement amounts and the ratios derived from them.

Chapter 20 Review Questions

1. In assessing the financial prospects for a firm, financial analysts use various techniques. An example of vertical, common-size analysis is
 - A. An assessment of vertical integration.
 - B. Advertising expense for the current year is 2% of sales.
 - C. A comparison in financial ratio form between two or more firms in the same industry.
 - D. Advertising expense is 2% greater compared with the previous year.

2. A firm's average collection period is equal to
 - A. The length of time it takes to collect receivables
 - B. The inventory conversion period.
 - C. The cash conversion cycle.
 - D. The inventory divided by average daily sales.

3. What type of ratio is profit margin ratio?
 - A. Activity ratio.
 - B. Profitability ratio.
 - C. Liquidity ratio.
 - D. Leverage ratio.

4. The times-interest-earned ratio is primarily an indication of
 - A. Liquidity.
 - B. Asset management.
 - C. Debt-paying capacity (Solvency).
 - D. Profitability.

5. A company has 100,000 outstanding common shares with a market value of 20 per share. Dividends of 2 per share were paid in the current year, and the enterprise has a dividend-payout ratio of 40%. The price-to-earnings ratio of the company is
 - A. 2.5
 - B. 10

- C. 4
- D. 50

6. Horn Company paid out one-half of last year's earnings in dividends. Horn's earnings increased by 20%, and the amount of its dividends increased by 15% in the current year. Horn's dividend payout ratio for the current year was

- A. 50%
- B. 57.5%
- C. 47.9%
- D. 78%

7. Financial ratio analysis has no limitation when it comes to comparing financial fitness among firms. True or False?

Chapter 20 Review Answers

1. In assessing the financial prospects for a firm, financial analysts use various techniques. An example of vertical, common-size analysis is

- A. Incorrect. Vertical integration occurs when a corporation owns one or more of its suppliers or customers. It requires knowledge of synergy and competition issues.
- B. **Correct.** Vertical, common-size analysis compares the components within a set of financial statements. A base amount is assigned a value of 100%. For example, total assets on a common-size income statement are valued at 100%. Common-size statements permit evaluation of the efficiency of various aspects of operations. An analyst who states that advertising expense is 2% of sales is using vertical, common-size analysis.
- C. Incorrect. Vertical, common-size analysis restates financial statements amounts as percentages.
- D. Incorrect. A statement that advertising expense is 2% greater than in the previous year results from horizontal analysis.

2. A firm's average collection period is equal to

- A. **Correct.** The average collection period may be stated as the accounts receivable balance divided by average credit sales per day or as days in the year divided by the receivables turnover. It is the average time required to convert the enterprise's receivables into cash.
- B. Incorrect. The inventory conversion period (days of inventory) is the average time required to convert materials into finished goods and then to sell them. This process typically occurs before the receivables collection period, and the amount of time in one period does not necessarily bear any relationship to the other.
- C. Incorrect. The cash conversion cycle equals the inventory conversion period, plus the receivables collection period, minus the payables deferral period (average time between resource purchases and payment of cash for them). It estimates the time between when the enterprise makes payments and when it receives cash inflows.
- D. Incorrect. The inventory divided by the sales per day is the inventory conversion period (days of inventory).

3. What type of ratio is profit margin ratio?

- A. Incorrect. Activity ratios measure management's efficiency in using specific resources.
- B. **Correct.** Profit margin is a profitability ratio. Profit margin = (net income) / (net sales).
- C. Incorrect. Liquidity ratios indicate the ability of a company to meet short-term obligations.
- D. Incorrect. Leverage or equity ratios concern the relationship of debt to equity ratios concern the relationship of debt to equity and measure the impact of the debt on profitability and risk.

4. The times-interest-earned ratio is primarily an indication of

- A. Incorrect. Liquidity ratios, e.g., the current ratio, indicate the relationship of current assets to current liabilities.
- B. Incorrect. Asset management ratios indicate how effectively the enterprise is using its assets.
- C. **Correct.** The times-interest-earned ratio equals $(\text{Income from operations}) / (\text{Interest Expense})$. It measures the extent to which operating profit can decline before the enterprise is unable to meet its annual interest cost. Thus, it is a measure of debt-paying capacity (solvency).
- D. Incorrect. Profitability ratios measure operating results.

5. A company has 100,000 outstanding common shares with a market value of 20 per share. Dividends of 2 per share were paid in the current year, and the enterprise has a dividend-payout ratio of 40%. The price-to-earnings ratio of the company is

- A. Incorrect. 2.5 equals EPS divided-by dividends per share.
- B. Incorrect. 10 equals share price divided by dividends per share.
- C. **Correct.** The P-E ratio equals the share price divided by EPS. If the dividends per share equaled 2 and the dividend-payout ratio was 40%, EPS must have been 5 ($2/0.4$). Accordingly, the P-E ratio is 4 ($20 \text{ share price}/5 \text{ EPS}$).
- D. Incorrect. 50 equals price per share divided by the dividend-payout percentage.

6. Horn Company paid out one-half of last year's earnings in dividends. Horn's earnings increased by 20%, and the amount of its dividends increased by 15% in the current year. Horn's dividend payout ratio for the current year was

- A. Incorrect. 50% is the prior-year payout ratio.
- B. Incorrect. 57.5% is 115% of the prior-year payout ratio.
- C. **Correct.** The prior-year dividend payout ratio was 50%. Hence, if prior-year net income was X, the total dividend payout would have been 50%X. If earnings increase by 20%, current year income will be 120%X. If dividends increase by 15%, the total dividends paid out will be 57.5%X ($115\% \times 50\%X$), and the new dividend payout ratio will be 47.9% ($57.5\%X \div 120\%X$).
- D. Incorrect. 78% equals 65% of 120%.

7. Financial ratio analysis has no limitation when it comes to comparing financial fitness among firms. True or False?

True is incorrect. Ratio analysis provides useful information regarding the efficiency of operations and the stability of financial condition. Nevertheless, it has several inherent limitations, such as firms using different accounting and operating policies, multiple lines of businesses, and different sources of information. Each of these factors impairs the comparability of financial statement amounts and the ratios derived from them.

False is correct. Financial ratios, for example, calculated based on different sources of information, can lead to misleading interpretations.

Glossary

Accelerated depreciation A depreciation method wherein the depreciation charges decrease with time.

Accounting profit Net income or earnings figures shown on the income statement.

Accounting equation An expression of the equivalency in dollar amounts of assets and liabilities and equity in *double-entry accounting*, often stated as $\text{Assets} = \text{Liabilities} + \text{Owners' Equity}$.

Accounts receivable turnover Annual credit sales divided by average accounts receivable.

Accumulated Taxable Income The firm's taxable income less dividends paid and accrued during the year, and less an accumulated earnings credit.

Accrual basis accounting Recognition of revenue when earned and expenses when incurred.

After-tax cash flow The net cash flow (cash revenue less cash expenses) after taxes have been subtracted. It is the cash flow generated from operations.

Amortization The spreading out of costs over a period of time.

Amortized loan A loan that is paid off in periodic equal installments and includes varying portions of principal and interest during its term.

Analysis of variances (variance analysis) An analysis and investigation of causes for variances between standard costs and actual costs. A variance is considered favorable if actual costs are less than standard costs; it is unfavorable if actual costs exceed standard costs. Unfavorable variances are the ones that need further investigation for their causes, so corrective action may be taken.

Annual report A glossary magazine-style report that companies must send to shareholders annually. It includes the company's financial statements.

Annuity A series of equal periodic payments or receipts.

Annuity due An annuity where payments or receipts occur at the beginning of the period.

Asset turnover The sales divided by average total assets, revealing the efficiency of assets in generating revenue.

Assets The resources owned by the firm.

Balance sheet equation See Accounting Equation.

Balance sheet A table that shows the status of a company's assets, liabilities, and owners' equity as of a given date.

Bankers' Acceptances A draft (order to pay) drawn on a specific bank by a seller of goods in order to obtain payment for goods that have been shipped (sold) to a customer. The customer maintains an account with that specific bank.

Bank Wire. A private wire service used and supported by approximately 250 banks in the United States for transferring funds, exchanging credit information, or effecting securities transactions.

Bond A form of interest-bearing note payable, or simply a corporate long term IOU.

Book value per share The worth of each share of stock per the books based on historical cost.

Break-even analysis A branch of cost-volume-profit (CVP) analysis that determines the break-even sales, which is the level of sales where total costs equal total revenue. At the break-even point, there is no profit or loss.

Break-even point The level of sales where total costs equal total revenue.

Budget A quantitative plan of activities and programs expressed in terms of assets, liabilities, revenues, and expenses. See also Master Budget.

Capital budget A budget or plan of proposed acquisitions and replacements of long-term assets and their financing. A capital budget is developed using a variety of capital budgeting techniques such as the discount cash flow method.

Capital budgeting The process of making long-term planning decisions for capital investments.

Capital structure Composition of common stock, preferred stock, retained earnings, and long-term debt maintained by the business entity in financing its assets.

Capital rationing The selection of the mix of acceptable projects that provides the highest overall net present value of future cash flows when a company has a limit on the budget for capital spending.

Cash budget A budget for cash planning and control that presents anticipated cash inflow and cash outflow for a specified time period. The cash budget helps the owner keep cash balances in reasonable relationship to needs. It assists in avoiding idle cash and possible cash shortages. The cash budget shows beginning cash, cash receipts, cash payments, and ending cash.

Cash flow (1) Cash receipts minus cash disbursements from a given operation or asset for a given period. Cash flow and cash inflow are often used interchangeably. (2) The monetary value of the expected benefits and costs of a project. It may be in the form of cash savings in operating costs or the difference between additional dollars received and additional dollars paid out for a given period.

Cash flow statement A statement showing from what sources cash has come into the business and on what the cash has been spent. Cash flow is broken down into operating, investing, and financing activities.

Cash basis accounting Method of recognizing revenue and expenses when cash received or paid.

Chart of accounts A list of account names and numbers found in the general ledger and arranged in the order in which they customarily appear in the financial statements.

Chief Financial Officer (CFO) Executive who directs all financial aspects of the business.

Collection period The number of days it takes to collect accounts receivable. It equals 365 days divided by the accounts receivable turnover. The collection period should be compared to the terms of sale.

Commercial Paper. Short-term unsecured promissory notes sold by large businesses in order to raise cash. Unlike most other money market instruments, commercial paper has no developed secondary market.

Common costs A cost shared by different departments, products, or jobs. Also called *joint costs* or *indirect costs*.

Compensating Balance A balance of a given amount that the firm maintains in its demand deposit account. It may be required by either a formal or informal agreement with the firm's commercial bank. Such balances are usually required by the bank (1) on the unused portion of a loan commitment, (2) on the unpaid portion of an outstanding loan, or (3) in exchange for certain services provided by the bank, such as check-clearing or credit information. These balances raise the effective rate of interest paid on borrowed funds.

Compounding. The process of determining the future value of a payment or series of payments when applying the concept of compound interest.

Compound Interest. The situation in which interest paid on the investment during the first period is added to the principal and, during the second period, interest is earned on the original principal plus the interest earned during the first period.

Concentration Bank. A bank where the firm maintains a major disbursing account.

Comprehensive budget See master budget.

Constraining (limiting) factor The item or factor that restricts or limits production or sale of a given product. Virtually all firms suffer from one or more constraining factors. Examples of constraining factors include limited machine-hours, labor-hours and shortage of materials and skilled labor. Other limiting factors may be cubic feet of display or warehouse space, or working capital.

Contribution margin (CM) The difference between sales and the variable costs of the product or service, also called marginal income. It is the amount of money available to cover fixed costs and generate profits.

Contribution margin (CM) ratio The contribution margin (cm) as a percentage of sales.

Contribution (margin) income statement An income statement that organizes the cost by behavior. It shows the relationship of variable costs and fixed costs, regardless of the functions a given cost item is associated with.

Contribution approach to pricing An approach to pricing a special order. This situation occurs because a company often receives a non-routine, special order for its products at lower prices than usual. In normal times, the company may refuse such an order since it will not yield a satisfactory profit. If times are bad or when there is idle capacity, an order should be accepted if the incremental revenue exceeds the incremental costs involved.

Controller Chief accounting executive of an organization. The controller is in charge of the Accounting Department. The principal functions of the controller are: (1) planning for control; (2) financial reporting and interpreting; (3) tax

administration; (4) management audits and development of accounting systems; (5) internal audits.

Conversion costs The sum of the costs of direct labor and factory overhead.

Cost center The unit within the organization in which the manager is responsible only for costs. A cost center has no control over sales or over the generating of revenue. An example is the production department of a manufacturing company. The performance of the cost center is evaluated by comparing actual costs to budgeted costs.

Cost of capital The minimum rate of return that is necessary to keep the market value (or stock price) of a firm.

Cost behavior analysis An analysis of mixed costs. Mixed costs must be separated into the variable and fixed elements in order to be included in a variety of business planning analyses such as cost-volume-profit (CVP) analysis.

Cost control The steps taken by management to assure that the cost objectives set down in the planning stage are attained, and to assure that all segments of the organization function in a manner consistent with its policies. For effective cost control, most organizations use standard cost systems, in which the actual costs are compared against standard costs for performance evaluation and the deviations are investigated for remedial actions. Cost control is also concerned with feedback that might change any or all of the future plans, the production method, or both.

Cost-volume formula A cost function in the form of $y = a + bx$. For example, the cost-volume formula for factory overhead is $y = \$200 + \$10x$ where y = estimated factory overhead and x = direct labor hours, which means that the factory overhead is estimated to be \$200 fixed, plus \$10 per hour of direct labor. Cost analysts use the formula for cost prediction and flexible budgeting purposes.

Cost-volume-profit (CVP) analysis An analysis that deals with how profits and costs change with a change in volume. It looks at the effects on profits of changes in such factors as variable costs, fixed costs, selling prices, volume, and mix of products sold.

Credit entry Transaction recorded on the right hand side of an account.

Current ratio Current assets divided by current liabilities.

Debit entry Transaction recorded on the left hand side of an account.

Debt-equity ratio Total liabilities divided by total stockholders' equity.

Departmental rate A predetermined factory overhead rate for each production department.

Depreciation The procedure of spreading out the acquisition cost of fixed assets (such as machinery and equipment) to each of the time periods which they are utilized.

Direct materials budget A budget that shows how much material will be required for production and how much material must be bought to meet this production requirement. The purchase depends on both expected usage of materials and inventory levels.

Direct labor budget A schedule for expected labor cost. Expected labor cost is dependent upon expected production volume (production budget). Labor requirements are based on production volume multiplied by direct

labor hours per unit. Direct labor hours needed for production is then multiplied by direct labor cost per hour to derive budgeted direct labor costs.

Discounted cash flow (DCF) techniques Methods of selecting and ranking investment proposals such as the net present value (NPV) and internal rate of return (IRR) methods where time value of money is taken into account.

Discretionary (fixed) costs The fixed costs that change because of managerial decisions, also called *management (fixed) costs* or *programmed (fixed) costs*. Examples of this type of fixed costs are advertising, training, and research and development.

Double entry bookkeeping A method of accounting that recognizes the duality of a transaction such that any a change in one account also causes a change in another account.

Earnings A synonym for net income or profit after taxes.

Earnings per share (EPS) Net income after taxes available to common shareholders on a per share basis.

Economic profit The same as cash inflows

Equity The difference between the assets of an entity and its liabilities. Also called *net worth*, *owners' equity*, or *stockholders' equity*.

Facilities investment budget A budget plan prepared for individual facility expenditure projects. The time span of this budget depends upon the project. Capital expenditures to be budgeted include replacement, acquisition, or construction of plants and major equipment. See also Capital Budgeting.

Factoring of Accounts Receivable. The outright sale of a firm's accounts to another party (the factor) without recourse. The factor, in turn, bears the risk of collection.

Factory overhead budget A schedule of all expected manufacturing costs except for direct material and direct labor. Factory overhead items include indirect material, indirect labor, factory rent, and factory insurance.

Financial leverage A portion of a firm's assets financed with debt instead of equity.

Financial Accounting Standards Board (FASB) The seven-member board which currently has the authority to formulate and issue pronouncements of *generally accepted accounting principles*.

Fixed cost A cost that remains the same each period in the short run regardless of activity. Examples are rent, interest, insurance, and property taxes.

Fixed budget See Static Budget.

Flexible budget formula See Cost-Volume Formula.

Flexible budget A budget based on cost-volume relationships and developed for the actual level of activity. It is an extremely useful tool for comparing the actual cost incurred to the cost allowable for the activity level achieved.

Fundamental equation of accounting See Accounting Equation.

General ledger A grouping of the accounts in which the transactions of an entity are recorded.

Generally Accepted Accounting Principles (GAAP) Rules, regulations, standards, conventions, and pronouncements used as a basis for financial reporting, and in the preparation of financial statements.

Gross profit margin The ratio of gross profit to net sales. A high gross profit margin is a positive sign since it shows the business is earning an attractive return over the cost of its merchandise sold.

Illiquid 1. Lacking enough liquid assets, like cash and marketable securities, to cover short-term obligations. 2. Current liabilities exceed current assets.

Income statement A table that details a company's revenue, expenses, and profit or loss for a given period.

Industry norm A typical ratio for the industry based on averaging companies' values.

Insolvency The failure of a company to meet its obligations as they become due. An analysis of insolvency concentrates on the operating and capital structure of the business. The proportion of long-term debt in the capital structure must also be considered.

Internal rate of return (IRR) The rate of return on a proposal that equates the initial investment with the present value of future cash inflows.

Inventory turnover The number of times inventory is sold during the year. It equals cost of goods sold divided by the average dollar balance. Average inventory equals the beginning and ending balances divided by two.

Investment center A responsibility center within an organization that has control over revenue, cost and investment funds. It is a profit center whose performance is evaluated on the basis of the return earned on invested capital.

Joint products The products that have a relatively significant sales value when two or more types of products are produced simultaneously from the same input by a joint process. For example, gasoline, fuel oil, kerosene, and paraffin are the joint products that are produced from crude oil.

Joint costs All the common manufacturing costs incurred prior to the point, referred to as the split-off point, where the joint products are identified as individual products.

Journal A book in which all business transactions are recorded in chronological order.

Just-In-Time (JIT) A demand-pull system where demand for customer output (not plans for using input resources) triggers production. Production activities are "pulled", not "pushed," into action.

Labor efficiency variance The difference between the amount of labor time that should have been used and the labor that were actually used, multiplied by the standard rate.

Labor rate variance A deviation from standard in the average hourly rate paid to workers.

Least-squares method The method that fits a line in such a way that the sum of squared distances from the data

points to the line is minimized.

Ledger Book in which all accounts of the business are maintained.

Liabilities Obligations of the firm to outside creditors such as lenders and bondholders.

Liquidity The ability of current assets to meet current liabilities when due.

Mail Float Funds tied up during the time that elapses from the moment a customer mails his remittance check until the firm begins to process it.

Management by exception A management concept or policy by which management devotes its time to investigating only those situations in which actual results differ significantly from planned results. The idea is that management should spend its valuable time concentrating on the more important items (such as the shaping of the company's future strategic course).

Master (comprehensive) budget A plan of activities expressed in monetary terms of the assets, equities, revenues, and costs which will be involved in carrying out the plans. It is a set of projected or planned financial statements.

Materials quantity (usage) variance The difference between the actual quantity of materials used in production and the standard quantity of materials allowed for actual production, multiplied by the standard price per unit.

Materials price variance The difference between what is paid for a given quantity of materials and what should have been paid, multiplied by actual quantity of materials used.

Mixed costs The costs that vary with changes in volume but, unlike variable costs, do not vary in direct proportion, also called *semi variable costs*.

Modified Accelerated Cost Recovery System (MACRS) The system used in computing annual depreciation for assets acquired in 1987.

Net present value (NPV) The difference between the present value of cash inflows generated by the project and the amount of the initial investment.

Notes to the financial statements Important information supplementing the financial statements.

Operating cycle The average time period between buying inventory and receiving cash proceeds from its eventual sale. It is determined by adding the number of days inventory is held and the collection period for accounts receivable.

Operating leverage The degree to which the firm chooses to lock in fixed costs other than financing costs.

Operational (operating) budget A budget that embraces the impacts of operating decisions. It contains forecasts of sales, net income, the cost of goods sold, selling and administrative expenses, and other expenses.

Opportunity cost The revenue forfeited by rejecting an alternative use of time or facilities.

Ordinary annuity An annuity where payments or receipts occur at the end of the period.

Out-of-pocket cost The actual cash outlays made during the period for payroll, advertising, and other operating expenses. Depreciation is not an out-of-pocket cost, since it involves no current cash expenditure.

Owners' equity The value of the firm to its owners. It is the difference between assets and liabilities. See also Equity.

Payback period The number of years it takes to recover your initial investment. The payback period equals the initial investment divided by the annual cash inflow.

Predetermined overhead rates An overhead rate, based on budgeted factory overhead cost and budgeted activity that is established before a period begins.

Preferred stock An equity instrument that promises to pay its holders a fixed dividend.

Present value The current worth of future sums of money.

Pro forma income statement A budgeted income statement.

Pro forma balance sheet A budgeted balance sheet.

Product mix See Sales Mix.

Production budget A schedule for expected units to be produced. It sets forth the units expected to be manufactured to satisfy budgeted sales and inventory requirements. Expected production volume is determined by adding desired ending inventory to planned sales and then subtracting beginning inventory.

Profit planning A process of developing a profit plan which outlines the planned sales revenues and expenses and the net income or loss for a time period. Profit planning requires preparation of a master budget and various analyses for risk and "what-if" scenarios. Tools for profit planning include the cost-volume-profit (CVP) analysis and budgeting.

Profit margin The ratio of net income to net sales. It reveals the entity's ability to generate profit at a given sales level. The ratio gives the owner an indicator of the operating efficiency and pricing strategy of the business.

Profit-volume chart A chart that determines how profits vary with changes in volume.

Profitability index The ratio of the total present value of future cash inflows to the initial investment.

Projected (budgeted) income statement A summary of various component projections of revenues and expenses for the budget period. It indicates the expected net income for the period.

Projected (budgeted) balance sheet A schedule for expected assets, liabilities, and stockholders' equity. It projects a company's financial position as of the end of the budgeting year. Reasons for preparing a budgeted balance sheet follow: (1) discloses unfavorable financial condition that management may want to avoid; (2) serves as a final check on the mathematical accuracy of all other budgets; and (3) highlights future resources and obligations.

Quick ratio Also called *acid-test ratio*, the most liquid current assets (cash, marketable securities, accounts

receivable) divided by current liabilities.

Rate of return on investment (ROI) 1. For the company as a whole, net income after taxes divided by invested capital. 2. For the segment of an organization, net operating income divided by operating assets. 3. For capital budgeting purposes, also called *simple, accounting, or unadjusted rate of return*, expected future net income divided by initial (or average) investment.

Relevant cost The expected future cost that will differ between the alternatives being considered.

Residual income (RI) The operating income which an investment center is able to earn above some minimum return on its assets. It equals operating income less the minimum rate of return times total assets.

Responsibility accounting The collection, summarization, and reporting of financial information about various decision centers (responsibility centers) throughout an organization; also called activity accounting or profitability accounting.

Responsibility center A unit in the organization which has control over costs, revenues, or investment funds. For accounting purposes, responsibility centers are classified as cost centers, revenue centers, profit centers, and investment centers, depending on what each center is responsible for.

Retained earnings The amount of income realized and retained since the inception of the entity less dividends paid out to shareholders.

Return The reward for making an investment in the form of earnings and appreciation in value.

Risk 1. Variability about income, returns, or other financial variable. 2. The possibility of losing value.

Risk-return trade-off A comparison of the expected return from an investment with the risk associated with it. The higher the risk undertaken, the more ample the return. Conversely, the lower the risk, the more modest the return.

Rule of OPM The use of other people's money (OPM) to magnify potential returns from the business. It is hoped that the investment through leverage will earn a rate of return greater than the costs of borrowing. Also called *trading on the equity*.

Sales mix The relative proportions of the product sold.

Sales budget An operating plan for a period expressed in terms of sales volume and selling prices for each class of product or service. Preparation of a sales budget is the starting point in budgeting since sales volume influences nearly all other items.

Sales forecasting A projection or prediction of future sales. It is the foundation for the quantification of the entire business plan and a master budget. Sales forecasts serve as a basis for planning.

Scatter diagram A plot of data points in a X-Y graph.

Segmented reporting The process of reporting activities of various segments of an organization such as divisions, departments, product lines, services, sales territories, or customers.

Spontaneous Financing The trade credit and other accounts payable that arise "spontaneously" in the firm's day-to-day operations.

Spreadsheet A working paper having numbers in rows and columns.

Standard labor rate The standard rate for direct labor that would include not only base wages earned but also an allowance for fringe benefits and other labor-related costs.

Standard cost system A system by which production activities are recorded at standard costs and variances from actual costs are isolated.

Standard materials price The standard price per unit for direct materials. It reflects the final, delivered cost of the materials, net of any discounts taken.

Standard hours allowed The standard time that should have been used to manufacture actual units of output during a period. It is obtained by multiplying actual units of production by the standard labor time.

Standard A quantitative expression of a performance objective, such as standard hours of labor allowed for actual production or a standard purchase price of materials per unit. Sometimes the terms standard and budget are used interchangeably.

Standard quantity allowed The standard amount of materials that should have been used to manufacture units of output during a period. It is obtained by multiplying actual units of production by the standard material quantity per unit.

Standard costs Production or operating costs that are carefully predetermined. A standard cost is a target cost that should be attained.

Static (fixed) budget A budget based on the anticipated output level rather than on the actual attained output level.

Term Loans. Loans that have maturities of one to ten years and are repaid in periodic installments over the life of the loan. Term loans are usually secured by a chattel mortgage on equipment or a mortgage on real property.

The Du Pont formula The breakdown of return on investment (ROI) into profit margin and asset turnover.

Time value of money The value of money at different time periods. As a rule, one dollar today is worth more than one dollar tomorrow. The time value of money is a critical consideration in financial decisions.

Treasurer Financial officer in a firm who deals with money problems.

Turnover The number of times an asset, such as inventory, turns over during an accounting period.

Variance In cost analysis, the deviation between the actual cost and the standard cost.

Venture Capitalists Investors interested in supplying capital to particularly high-risk situations, such as start-ups or firms denied conventional financing.

Working Capital A concept traditionally defined as a firm's investment in current assets. Net working capital refers to the difference between current assets and current liabilities