

SECOND EDITION

**ANALYTICAL TECHNIQUES  
FOR  
FINANCIAL MANAGEMENT**

Jerome S. Osteryoung

Daniel E. McCarty

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# **ANALYTICAL TECHNIQUES FOR FINANCIAL MANAGEMENT**

**Jerome S. Osteryoung**

*Florida State University*

**Daniel E. McCarty**

*Florida Atlantic University*

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# PREFACE

This book is written for those who are interested in the application of fundamental theory and analytical techniques of financial management. It is specifically designed to meet the needs of the person who must make or participate in financial management decisions. As such, the text does not attempt to present all topics in financial management; rather, it focuses upon those key concepts and their applications relevant to decision making in both academic and business environments.

*Analytical Techniques for Financial Management* provides the flexibility that permits its use in a variety of settings. It can serve as a handy reference for undergraduate and graduate finance case courses. It can also be used in seminars and executive training programs that emphasize the application of financial theory to problem solving. And it should also serve as a valuable reference to financial managers at all levels of the organization.

*Techniques* does presuppose that the user is familiar with basic algebra, statistics, economics, and accounting. Thus, the text is written at a somewhat more advanced level than are other books of this type, covering topics normally found in competing books in more depth as well as topics that are not covered elsewhere. This increased coverage is a direct result of our discussions with practitioners and researchers who indicated a desire to have a more complete exposition of quantitative analytical techniques.

In this second edition of *Techniques*, clarification and simplification of topics are the major changes. In Chapter 1, the relationship between net present value and

wealth maximization is emphasized. Payment proportion and present value analysis has been applied to receivables in Chapter 6. Capital budgeting has been changed as has the lease chapter (Chapter 10) to reflect the recent tax law modifications. A new chapter, Chapter 11, has been added and includes a discussion of bond refunding.

In writing the second edition of this book, we had the help of a great number of people to whom we owe appreciation and acknowledgment. First, we thank our students of current and past years for their encouragement, patience, and insights. Their comments and suggestions have certainly improved the contents of *Techniques*. Karen Fortin of the University of Miami has made major contributions to the material by her devotion and skill as an editor. In addition, we appreciate and thank her for comments and suggestions that materially improved the text as well as for providing the questions and problems at the end of each chapter. A special thank you goes to Janice Pollard at the University of Louisville for typing and retyping the many drafts of the first edition. Her skill and patience greatly reduced the problems associated with both the first and second editions. George E. Pinches read the entire manuscript of both editions and made many suggestions, some accepted, some not; for his contributions, we express our appreciation and thank him for his help.

We thank all but absolve them from any responsibility as such must be claimed by the authors.

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**PART**

# **One**

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**INTRODUCTION**



# CHAPTER 1

## An Overview of Financial Management

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Most business firms are similar in that they are economic units concerned with forecasting, planning, directing, and controlling their current and future operations to attain their objectives, which are either explicitly stated or implicitly assumed. Furthermore, business firms generally share a common organizational structure, usually along functional areas, such as personnel, production, marketing, accounting, and finance. This division allows specialization of efforts and implies a more efficient (least cost) means to accomplish firm objectives. Although it is impossible to isolate these functional areas of a firm perfectly because, of necessity, they must all overlap and interact with one another, the benefits of specialization are best obtained when an optimal level of isolation exists. This book, then, is concerned with just one area, the finance function, treated as an isolated area of activity but conscious of its interface with all other areas of business activity.

The finance function is common to all firms, and the objective of this text is to develop, illustrate, and explain analytical techniques that are useful in making decisions in the finance area. These analytical techniques are applicable to all firms, regardless of size, product areas and legal form.

This chapter first defines the functional area of the firm called finance; next, it discusses the activities normally included in this functional area; and, third, it presents several concepts that provide the necessary foundation for all the analytical techniques.

## THE CONCERN OF FINANCIAL MANAGEMENT

Prior to the 1950s, the finance function in a firm generally meant only raising money to operate the firm. Today, the raising of funds still constitutes a part of the finance function, but it is only one aspect of the broader area of financial management. Currently, the finance function is concerned with managerial decisions that give rise to cash flows or money movements not only into but also out of the firm. The finance function viewed in this manner suggests activities that are much broader in scope than just the comparison of costs of alternative sources of funds. The cash used to purchase marketable securities, equipment, advertising, and so on is just as much a concern of finance as deciding whether or not funds should be obtained by selling bonds or common stock. When the finance function is viewed in this extended manner, it becomes apparent that it is an integral part of total firm management dealing with production, marketing, and other functional areas of the firm. Consequently, financial management is defined as an organized body of knowledge concerned with choosing alternative sources of funds with different costs and allocating these funds to alternative uses with different returns. The optimal use of funds requires comparisons of the benefits of alternative uses and the costs of alternative sources of funds.

## THE FINANCIAL MANAGEMENT FUNCTIONS

If financial management stresses comparisons of the benefits from using cash and the costs of sources of funds, it seems appropriate to consider what is meant by uses and sources of funds. The area concerned with the use of funds is called the investment decision; the selection of alternative sources of funds is the financing decision.

### The Investment Decision

In general, the firm can make two types of investment decisions: it can invest in current assets such as cash, marketable securities, accounts receivable, and inventories, or it can invest in long-term assets such as property, plant, and equipment. That is, the firm makes decisions concerning short-term and long-term assets. The decisions taking the form of deciding on the dollar amounts of cash, marketable securities, accounts receivable, and inventories are the short-term asset decisions and are considered in Chapters 5 and 6 as working capital management. The investment decisions that involve long-lived or long-term asset selection are referred to as capital budgeting decisions and are the subject material of Chapters 7 and 8. The capital budgeting decision is concerned with the evaluation of a new plant, competing plant location sites, competing production methods, and equipment evaluations, for example.

## The Financing Decision

An investment decision implies an expenditure; and, of course, expenditures require money, cash or funds. The questions then arise as to how this money is to be obtained, at what cost, and under what conditions? Furthermore, should assets be financed with short-term or long-term funds? In addition, what mix or composition of short-term funds, common stock, preferred stock, bonds, long-term loans, and funds provided from operations should the firm use to obtain assets? These and related questions are categorized as financing decisions; Chapters 9 through 14 are concerned with an examination of these questions.

## FOUNDATION CONCEPTS IN FINANCIAL MANAGEMENT

Since financial management is concerned with the wise selection of sources and the profitable uses of funds when investment and financing decisions are made, it seems appropriate to discuss, early in the text, concepts that underlie these decisions. Most managerial decisions involve the following factors: (1) profitability, (2) marginal analysis, (3) cash flows, (4) time value of money, and (5) risk. The remaining pages of this chapter explain and investigate these key concepts. These concepts permeate the entire text and are central to the decision making of both the financial manager and the nonfinancial manager.

### The Profitability Concept

A key component of the decision-making process is the resulting impact on income, earnings or profits implied by the decision. In the usually understood sense, earnings are residual dollar values, covering a period of time (month, quarter or year), and result from subtracting a cost from sales or from some other profit measure. For example, Table 1-1 contains a firm's income statement for 1985 and indicates several definitions of earnings.

The following definitions, illustrated in Table 1-1, are encountered and used frequently throughout this book:

1. Gross profit = sales less cost of goods sold.
2. Net operating income = gross profit less selling and administrative expenses.
3. Earnings before taxes (EBT) = net operating income plus other revenue received (e.g., dividends, interest, rentals and sale of assets) less other expenses paid (e.g., interest on debt and amortization of bond discount and expense).
4. Earnings after taxes (EAT) or net income = earnings before taxes less taxes.

**Table 1-1 SQUARE CONTAINER CORPORATION Income Statement**  
**Actual for the Year Ending December 31, 1985 and Estimated for the Year**  
**Ending December 31, 1986**

	<i>Actual</i>	<i>Estimated</i>
Sales	\$100,000	\$130,000
Cost of goods sold	<u>80,000</u>	<u>104,000</u>
Gross profit	20,000	26,000
Operating expenses (selling and and administrative)	<u>10,000</u>	<u>14,000</u>
Net operating income	10,000	12,000
Other expenses	<u>2,000</u>	<u>2,000</u>
Earnings before taxes	8,000	10,000
Taxes @ 40%	<u>3,200</u>	<u>4,000</u>
Earnings after taxes (or net income)	<u>\$ 4,800</u>	<u>\$ 6,000</u>

Although these definitions are provided as illustrative, they are not all inclusive. Other variations or definitions of earnings are developed in the text to examine specific results of the decision-making process.

One variation requires expressing one or more of these definitions of earnings as a percentage of some other item on the income statement, such as sales, or as a percentage of a balance sheet item (e.g., total assets). If gross profits (\$20,000) are divided by sales (\$100,000), a gross profit margin of 20% results. Likewise, dividing earnings after taxes (\$4,800) by a firm's total assets, assumed for this example to be \$65,000, produces a rate of return on assets of 7.4%.

However, the major use of earnings is to provide a criterion for decision making. Earnings after taxes (EAT) is often used as the key definition, since it is the "bottom line" and generally understood by just about everyone. Suppose that cost of goods sold can be reduced by substituting a plastic for a metal part in a firm's manufacturing operation. If sales remain constant, gross profit must rise, as would net operating income and earnings before taxes, as long as operating and other expenses do not change. Taxes will rise but so will earnings after taxes. Since earnings after taxes increase, the profitability criterion suggests substituting the plastic for the metal part.

The concept of profitability is one criterion to determine whether or not the financial manager is using funds wisely and making rational choices in selecting the various combination of sources of funds. Although the most usual operational objective of the firm is profit maximization,<sup>1</sup> maximization of cash available to the firm is also an objective. Cash flow as an objective of the firm and its relationship to

<sup>1</sup>See Chapter 12 for a complete development of the common stockholders' wealth maximization model and the factors that influence the current price of common stock.

profitability will be discussed shortly. Whether profitability or cash flow is used as a decision criterion, the concept of marginal analysis is basic to the decision-making process.

## Marginal Analysis

Financial decisions, such as the purchase of a new machine or a new plant, the negotiation of a new loan, and a revision in the company's credit terms, have marginal implications. These decisions all suggest change. "Increment" and "marginal" are words synonymous with change; consequently, decision making must mean incremental or marginal consequences. Decision making is always concerned with assessing marginal consequences.

An example may clarify this concept. The management of the Square Container Corporation is considering a \$4,000 expansion of its product advertising budget. As a result, sales and cost of goods sold during the next year are expected to increase from \$100,000 to \$130,000 and \$80,000 to \$104,000, respectively, as shown in Table 1-1. It is the change in total revenue and total costs that is important. Cost of goods sold, operating expenses and taxes are estimated to rise by \$24,000, \$4,000, and \$800, respectively, for an overall increase in total costs of \$28,800. Estimated revenue will rise by \$30,000. Thus, the increased advertising expenditure is expected to add \$28,800 to total cost and \$30,000 to total revenue. Since the marginal revenue, the addition to total revenue, is greater than marginal cost, the addition to total cost (EAT) must increase by \$1,200. In general, a firm will always undertake an action as long as marginal revenue is equal to or greater than the marginal cost resulting from that action, since earnings then must increase.

It is essential to note that marginal analysis is defined in terms of changes. Any revenue or cost variable that does *not* change is not relevant to the decision-making process. Referring to Table 1-1, note that the entry for other expenses does not change if the advertising expenditures are increased. The operating expenses change but only by the amount of the increased advertising outlays. The increase in cost of goods sold is due only to the increase in units of output. However, there are additional expenses in both categories that are fixed; that is, they will not change regardless of whether the advertising expenditures are increased or not. For example, management salaries and depreciation charges will not change and play no part in the decision.

## The Cash Flow Concept

A key distinction is made in financial analysis between profitability and cash flow or liquidity. Liquidity is defined in terms of a cash position or an ability to pay maturing obligations. Although the two are related, profitability does not necessarily mean liquidity, nor do earnings after taxes indicate accurately the cash posi-



Table 1-2 SQUARE CONTAINER CORPORATION Annual Depreciation, Earnings, and Net Cash Flow Calculations for a Project

(1) Year	(2) EBDT	(3) Depreciation	(4) = (2) - (3) EBT	(5) Taxes @ 40%	(6) = (4) - (5) EAT	(7) = (2) - (5) NCF
1	\$2,897	\$2,155	\$742	\$297	\$445	\$2,600
2	2,897	2,155	742	297	445	2,600
3	2,897	2,155	742	297	445	2,600
Total	<u>\$8,691</u>	<u>\$6,465*</u>	<u>\$2,226</u>	<u>\$891</u>	<u>\$1,335</u>	<u>\$7,800</u>

\*Does not equal \$6,466 because of rounding.