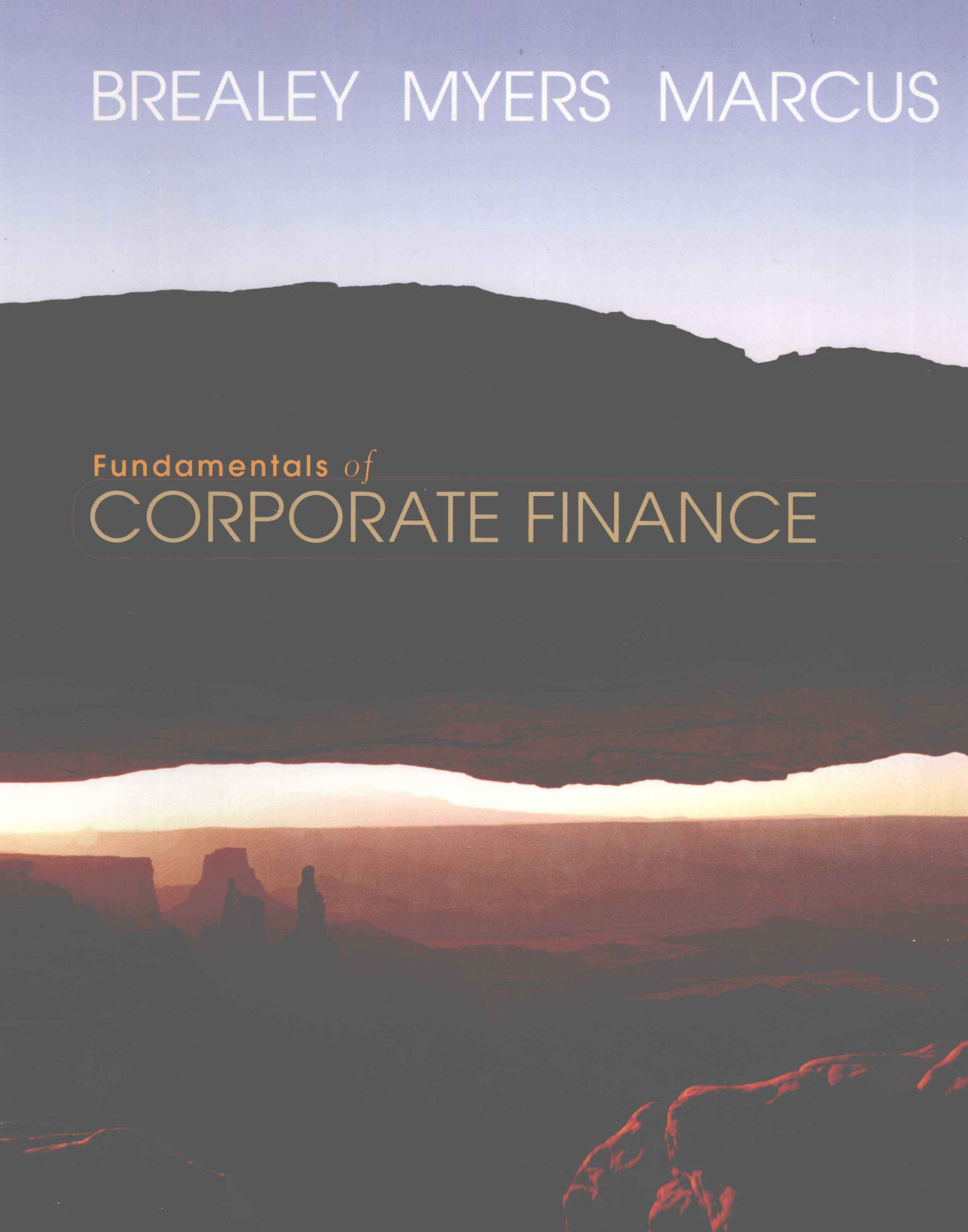

BREALEY MYERS MARCUS
Fundamentals of
CORPORATE FINANCE

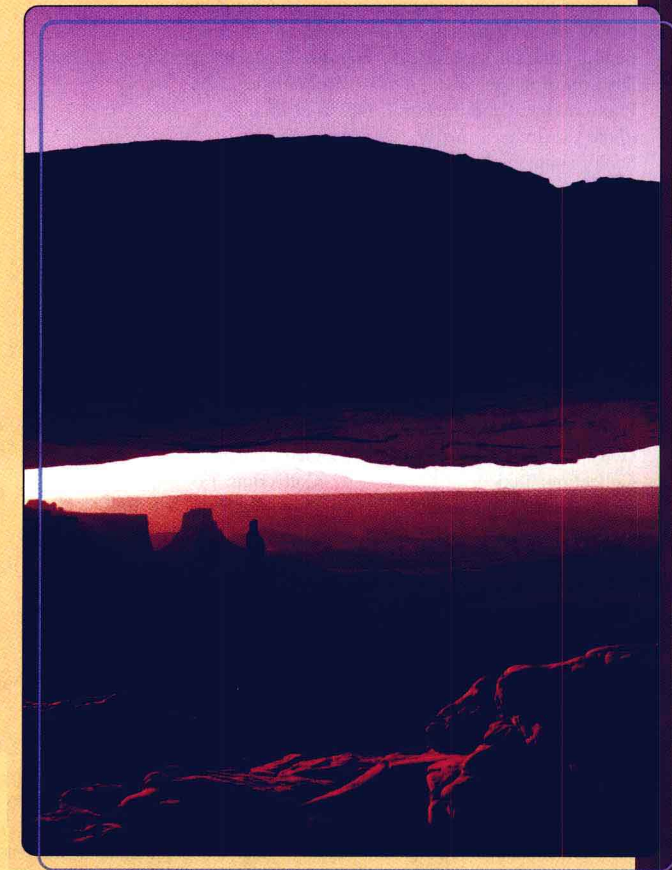
Fourth Edition

# Fundamentals of Corporate Finance

**Richard A. Brealey**
London Business School

**Stewart C. Myers**
Sloan School of Management
Massachusetts Institute of Technology

**Alan J. Marcus**
Wallace E. Carroll School of Management
Boston College



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FUNDAMENTALS OF CORPORATE FINANCE
Published by McGraw-Hill/Irwin, a business unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY, 10020. 
Some ancillaries, including electronic and print components, may not be available to customers outside the United States.

This book is printed on acid-free paper.

5 6 7 8 9 0 DOW/DOW 0 9 8 7 6 5

ISBN 0-07-255752-4

Publisher: *Stephen M. Patterson*
Senior developmental editor: *Sarah Ebel*
Executive marketing manager: *Rhonda Seelinger*
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Cover design: *Keith J. McPherson*
Interior design: *Maureen McCutcheon*
Cover Image: *© Getty Images, Richard Price*
Typeface: *10.5/12 Times Roman*
Compositor: *ElectraGraphics, Inc.*
Printer: *R. R. Donnelley, Willard*

Interior icon credits:

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**Library of Congress Cataloging-in-Publication Data**

Brealey, Richard A.
Fundamentals of corporate finance / Richard A. Brealey, Stewart C. Myers, Alan J. Marcus.—4th ed.
p. cm. — (McGraw-Hill/Irwin series in finance, insurance, and real estate)
Includes index.
ISBN 0-07-255752-4 (alk. paper) — ISBN 0-07-121558-1 (international : alk. paper)
1. Corporations—Finance. I. Myers, Stewart C. II. Marcus, Alan J. III. Title. IV. Series.
HG4026.B6668 2004
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# Fundamentals of Corporate Finance

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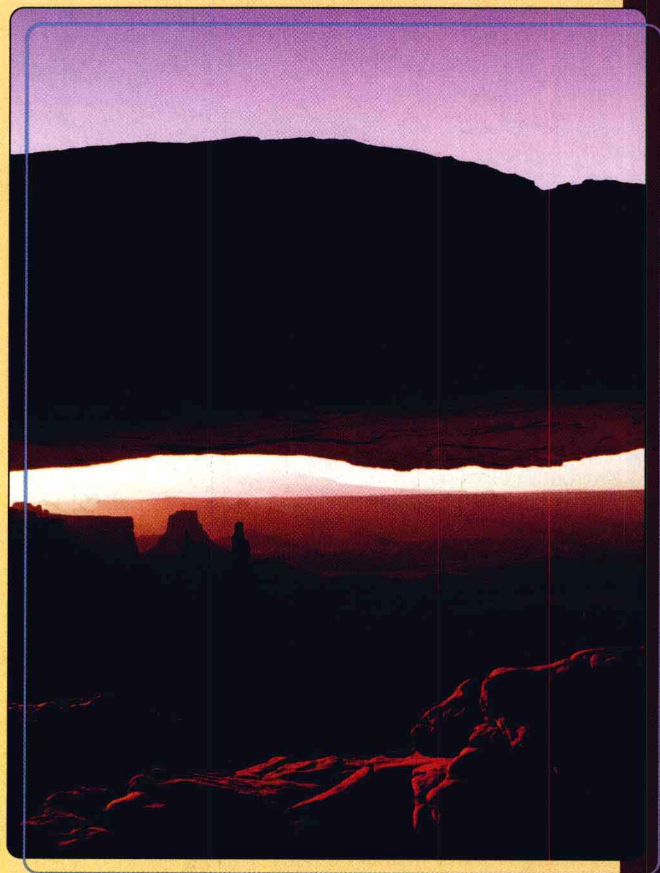

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# About the Authors

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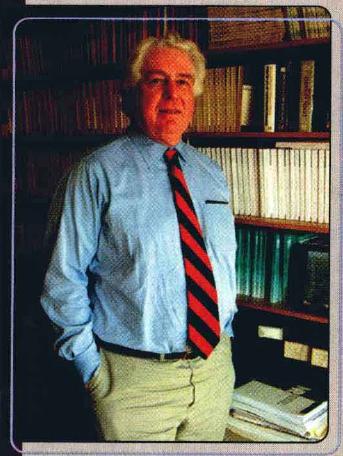
Professor of Finance at the London Business School. He is the former president of the European Finance Association and a former director of the American Finance Association. He is a fellow of the British Academy and has served as a special adviser to the Governor of the Bank of England and director of a number of financial institutions. Professor Brealey is also the author (with Professor Myers) of this book's sister text, *Principles of Corporate Finance.*



## Stewart C. Myers

Gordon Y Billard Professor of Finance at MIT's Sloan School of Management. He is past president of the American Finance Association and a research associate of the National Bureau of Economic Research. His research has focused on financing decisions, valuation methods, the cost of capital, and financial aspects of government regulation of business. Dr. Myers is a director of The Brattle Group, Inc., and is active as a financial consultant. He is also the author (with Professor Brealey) of this book's sister text, *Principles of Corporate Finance.*

## Alan J. Marcus

Professor of Finance in the Wallace E. Carroll School of Management at Boston College. His main research interests are in derivatives and securities markets. He is coauthor (with Zvi Bodie and Alex Kane) of the texts *Investments* and *Essentials of Investments.* Professor Marcus has recently been a Visiting Professor at MIT's Sloan School of Management and has served as a Research Fellow at the National Bureau of Economic Research. Professor Marcus also spent 2 years at Freddie Mac, where he helped to develop mortgage pricing and credit risk models. He currently serves on the Research Foundation Advisory Board of the Association for Investment Management and Research (AIMR).

# Preface

This book is about corporate finance. It focuses on how companies invest in real assets and how they raise the money to pay for these investments.

Financial management is important, interesting, and challenging. It is *important* because today's capital investment decisions may determine the businesses that the firm is in 10, 20, or more years ahead. Also, a firm's success or failure depends in large part on its ability to find the capital that it needs.

Finance is *interesting* for several reasons. Financial decisions often involve huge sums of money. Large investment projects or acquisitions may involve billions of dollars. Also, the financial community is international and fast moving, with colorful heroes and a sprinkling of unpleasant villains.

Finance is *challenging.* Financial decisions are rarely cut and dried, and the financial markets in which companies operate are changing rapidly. Good managers can cope with routine problems, but only the best managers can respond to change. To handle new problems, you need more than rules of thumb; you need to understand why companies and financial markets behave as they do and when common practice may not be best practice. Once you have a consistent framework for making financial decisions, complex problems become more manageable.

This book provides that framework. It is not an encyclopedia of finance. It focuses instead on setting out the basic *principles* of financial management and applying them to the main decisions faced by the financial manager. It explains why the firm's owners would like the manager to increase firm value and shows how managers value investments that may pay off at different points of time or have different degrees of risk. It also describes the main features of financial markets and discusses why companies may prefer a particular source of finance.

Some texts shy away from modern finance, sticking instead with more traditional, procedural, or institutional approaches. These are supposed to be easier or more practical. We disagree emphatically. The concepts of modern finance, properly explained, make the subject simpler, not more difficult. They are also more practical. The tools of financial management are easier to grasp and use effectively when presented in a consistent conceptual framework. Modern finance provides that framework.

Modern financial management is not "rocket science." It is a set of ideas that can be made clear by words, graphs, and numerical examples. The ideas provide the "why" behind the tools that good financial managers use to make investment and financing decisions.

We wrote this book to make financial management clear, useful, interesting, and fun for the beginning student. We set out to show that modern finance and good financial practice go together, even for the financial novice.

## Fundamentals and Principles of Corporate Finance

This book is derived in part from its sister text *Principles of Corporate Finance.* The spirit of the two books is similar. Both apply modern finance to give students a working ability to make financial decisions. However, there are also substantial differences between the two books.

First, we provide much more detailed discussion of the principles and mechanics of the time value of money. This material underlies almost all of this text, and we spend a lengthy chapter providing extensive practice with this key concept.

Second, we use numerical examples in this text to a greater degree than in *Principles.* Each chapter presents several detailed numerical examples to help the reader become familiar and comfortable with the material.

Third, we have streamlined the treatment of most topics. Whereas *Principles* has 35 chapters, *Fundamentals* has only 26. The relative brevity of *Fundamentals* necessitates a broader-brush coverage of some topics, but we feel that this is an advantage for a beginning audience.

Fourth, we assume little in the way of background knowledge. While most users will have had an introductory accounting course, we review the concepts of accounting that are important to the financial manager in Chapter 3.

*Principles* is known for its relaxed and informal writing style, and we continue this tradition in *Fundamentals.* In addition, we use as little mathematical notation as possible. Even when we present an equation, we usually write it in words rather than symbols. This approach has two advantages. It is less intimidating, and it focuses attention on the underlying concept rather than the formula.

## Organizational Design

*Fundamentals* is organized in nine parts.

**Part 1 (Introduction)** provides essential background material. In the first chapter we discuss how businesses are organized, the role of the financial manager, and the financial markets in which the manager operates. We explain how shareholders want managers to take actions that increase the value of their investment and we describe some of the mechanisms that help to align the interests of managers and shareholders. Of course the task of increasing shareholder value does not justify corrupt and unscrupulous behavior. We therefore discuss some of the ethical issues that confront managers.

Chapter 2 surveys and sets out the functions of financial markets and institutions. It shows how financial managers use these markets and institutions, and explains how markets provide useful signals to managers concerning the viability of potential investment projects.

A large corporation is a team effort, and so companies produce financial statements to help the players monitor their progress. Chapter 3 provides a brief overview of these financial statements and introduces two key distinctions—between market and book values and between cash flows and profits. This chapter also discusses some of the shortcomings in accounting practice that became apparent in the scandals of 2000–2002. The chapter concludes with a summary of federal taxes.

**Part 2 (Value)** is concerned with valuation. In Chapter 4 we introduce the concept of the time value of money, and, since most readers will be more familiar with their own financial affairs than with the big leagues of finance, we motivate our discussion by looking first at some personal financial decisions. We show how to value long-lived streams of cash flows and work through the valuation of perpetuities and annuities. Chapter 4 also contains a short concluding section on inflation and the distinction between real and nominal returns.

Chapters 5 and 6 introduce the basic features of bonds and stocks and give students a chance to apply the ideas of Chapter 4 to the valuation of these securities. We show how to find the value of a bond given its yield and we show how prices of bonds fluctuate as interest rates change. We look at what determines stock prices and how stock valuation formulas can be used to infer the return that investors expect. Finally, we see how investment opportunities are reflected in the stock price and why analysts focus on the price-earnings multiple. Chapter 6 also introduces the concept of market efficiency. This concept is crucial to interpreting a stock's valuation; it also provides a framework for the later treatment of the issues that arise when firms issue securities or make decisions concerning dividends or capital structure.

The remaining chapters of Part 2 are concerned with the company's investment decision. In Chapter 7 we introduce the concept of net present value and show how to calculate the NPV of a simple investment project. We also look at other measures of an investment's attractiveness—the internal rate of return rule and payback rule. We then turn to more complex investment proposals, including choices between alternative projects, machine replacement decisions, and decisions of when to invest. Finally, we show how the profitability index can be used to choose between investment projects when capital is scarce.

The first step in any NPV calculation is to decide what to discount. Therefore, in Chapter 8 we work through a realistic example of a capital budgeting analysis, showing how the manager needs to recognize the investment in working capital and how taxes and depreciation affect cash flows.

We start Chapter 9 by looking at how companies organize the investment process and ensure everyone works toward a common goal. We then go on to look at various techniques to help managers identify the key assumptions in their estimates, such as sensitivity analysis, scenario analysis, and break-even analysis. We also show how managers can use the notion of economic value added to assess projects. We conclude the chapter by describing how managers try to build future flexibility into projects so that they can capitalize on good luck and mitigate the consequences of bad luck.

**Part 3 (Risk)** is concerned with the cost of capital. Chapter 10 starts with a historical survey of returns on bonds and stocks and goes on to distinguish between the unique risk and market risk of individual stocks. Chapter 11 shows how to measure market risk and discusses the relationship between risk and expected return. Chapter 12 introduces the weighted-average cost of capital and provides a practical illustration of how to estimate it.

**Part 4 (Financing)** begins our discussion of the financing decision. Chapter 13 looks at the role of shareholders in large corporations and compares corporate governance in the USA and elsewhere. It also provides an overview of the securities that firms issue and their relative importance as sources of finance. In Chapter 14 we look at how firms issue securities and we follow a firm from its first need for venture capital, through its initial public offering, to its continuing need to raise debt or equity.

**Part 5 (Debt and Dividend Policy)** focuses on the two classic long-term financing decisions. How much the firm should borrow is addressed in Chapter 15, and how it should set its dividend policy is addressed in Chapter 16. In each case we start with Modigliani and Miller's (MM's) observation that in well-functioning markets the decision should not matter, but we use this observation to help the reader understand why financial managers in practice do pay attention to these decisions.

**Part 6 (Financial Planning)** starts with financial statement analysis in Chapter 17 and shows how analysts summarize the large volume of accounting information by calculating some key financial ratios. Long-term financial planning is discussed in Chapter 18, where we look at how the financial manager considers the combined effects of investment and financing decisions on the firm as a whole. We also show how measures of internal and sustainable growth help managers check that the firm's planned growth is consistent with its financing plans. Chapter 19 is an introduction to working capital management. It also shows how managers ensure that the firm will have enough cash to pay its bills over the coming year and describes the principal sources of short-term borrowing.

**Part 7 (Short-Term Financial Decisions)** is concerned with two important short-term problems. Chapter 20 explains the mechanics of cash collection and disbursement and shows how firms invest idle cash. It also looks at the general problem of managing inventories and shows how the decision to stock up on cash is similar to the decision to stock up on inventories of raw materials or finished goods. The parallel between the task of inventory management and cash management enables us to cover these topics with less repetition than in most other texts. In Chapter 21 we describe the basic steps of credit management and we summarize bankruptcy procedures when customers cannot pay their bills.

**Part 8 (Special Topics)** covers several important but somewhat more advanced topics—mergers (Chapter 22), international financial management (Chapter 23), options (Chapter 24), and risk management (Chapter 25). Some of these topics are touched on in earlier chapters. For example, we introduce the idea of options in Chapter 9, when we show how companies build flexibility into capital projects. However, Chapter 24 generalizes this material, explains at an elementary level how options are valued, and provides some examples of why the financial manager needs to be concerned about options. International finance is also not confined to Chapter 23. As one might expect from a book that is written by an international group of authors, examples from different countries and financial systems are scattered throughout the book. However, Chapter 23 tackles the specific problems that arise when a corporation is confronted by different currencies.

**Part 9 (Conclusion)** contains a concluding chapter (Chapter 26), in which we review the most important ideas covered in the text. We also introduce some interesting questions that either were unanswered in the text or are still puzzles to the finance profession. Thus the last chapter is an introduction to future finance courses as well as a conclusion to this one.

## Routes through the Book

There are about as many effective ways to organize a course in corporate finance as there are teachers. For this reason, we have ensured that the text is modular, so that topics can be introduced in different sequences.

We like to discuss the principles of valuation before plunging into detailed financial statement analysis or issues of financial planning. Nevertheless, we recognize that many instructors will prefer to move directly from Chapter 3 (Accounting and Finance) to Chapter 17 (Financial Statement Analysis) in order to provide a gentler transition from the typical prerequisite accounting course. We have made sure that Part 6 (Financial Planning) can easily follow Part 1.

Similarly, we like to discuss working capital after the student is familiar with the basic principles of valuation and financing, but we recognize that here also many instructors prefer to reverse our order. There should be no difficulty in taking Part 7 out of order.

When we discuss project valuation in Part 2, we stress that the opportunity cost of capital depends on project risk. But we do not discuss how to measure risk or how return and risk are linked until Part 3. This ordering can easily be modified. For example, the chapters on risk and return can be introduced before, after, or midway through the material on project valuation.

## Changes in the Fourth Edition

This fourth edition of *Fundamentals* includes many changes. The most obvious change will be the increased attention paid to Internet resources. We open each chapter with a list of several websites that the student will find helpful. Inside each chapter are typically two Internet Insider boxes that highlight interesting websites and suggest how they can be used to answer some simple questions.

We also have enhanced the analytic tools available with the text. There are more spreadsheet boxes integrated into each chapter. While the boxes may be skipped without harm, they give interested students a valuable introduction to financial modeling. We show how spreadsheets can be used in time value and security valuation problems as well as in long- and short-term planning applications. In addition, each chapter contains end-of-chapter student exercises using the Educational Version of Standard & Poor's Market Insight. This Web-based resource, which is available with the U.S. edition of the text, contains a wealth of current and past financial statement data plus stock price history as well as more descriptive material for a universe of more than 500 firms to allow students to engage in sophisticated company and industry analysis.

We have of course also rewritten, rearranged, and introduced new material to improve readability and update coverage. Here are some of the changes we have made.

Chapter 2 is a new chapter that introduces students to the financial environment. It shows how financial managers interact with financial markets and institutions, and shows how markets may provide managers with information about the opportunity cost of funds used to finance a project.

Chapter 3 (Accounting and Finance) includes a discussion of the accounting scandals of the last few years.

Chapters 4 and 5 (covering time value and bond pricing) have been updated and rearranged to improve logical flow. In addition, several spreadsheet applications have been added as enrichment material.

Chapter 6 (Valuing Stocks) now also contains much of the material previously appearing in a separate chapter on market efficiency. The discussion includes a new section on the dot.com bubble and behavioral finance. The placement of market efficiency with stock valuation enriches the discussion of each topic.

Chapter 7 on investment criteria has been streamlined and reorganized. It also contains a new concluding section summarizing and organizing the salient features of each criterion discussed in the chapter.

We have integrated economic value added into Chapter 9 (Project Analysis). We show how EVA can be used to evaluate projects, emphasizing the opportunity cost of the capital employed in the project. We also have added an introduction to real options to this chapter.

Chapter 10 on risk and return has been updated with new data sources, extending the historical evidence on risk and risk premia to earlier data as well as to international data.

Parts 6 and 7 on long-term and short-term financial planning contain significant new material. Chapter 17 (Financial Statement Analysis) contains several new sections, including a discussion of economic value added and examples and discussions of industry variations in financial ratios. Chapter 18 (Financial Planning) has a new introduction that provides context for the role of financial planning models; the chapter also contains an enhanced financial planning spreadsheet model. Chapter 20 (Cash and Inventory Management) has additional treatment of just-in-time inventory policy.

Part 8 also has been updated. Chapter 22 on mergers contains additional discussion of synergies (and failed synergies) in mergers. Chapter 23 (International Financial Management) contains a new discussion of exchange rate hedging. We have introduced a brief introduction to Black-Scholes option valuation (and a Black-Scholes spreadsheet) in Chapter 24 (Options) and have shown how real options play a role in capital budgeting.

# New and Enhanced Pedagogy

A great deal of effort has gone into expanding and enhancing the features in *Fundamentals of Corporate Finance.*

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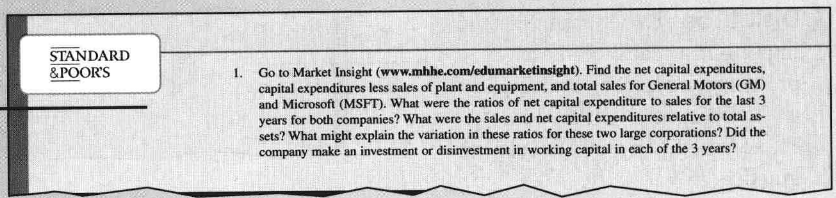
**S&P Problems** Now included in each chapter are problems directly incorporating the Educational Version of Market Insight, a service based on Standard and Poor's renowned Compustat database.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1. Go to Market Insight (**www.mhhe.com/edumarketinsight**). Find the net capital expenditures, capital expenditures less sales of plant and equipment, and total sales for General Motors (GM) and Microsoft (MSFT). What were the ratios of net capital expenditure to sales for the last 3 years for both companies? What were the sales and net capital expenditures relative to total assets? What might explain the variation in these ratios for these two large corporations? Did the company make an investment or disinvestment in working capital in each of the 3 years?

**Internet Insider Boxes** Each chapter includes boxes that highlight particular websites and provide students with simple activities to enhance their experience by using the Internet.


Internet Insider

### Stock Exchanges

The major stock exchanges have wonderful websites. Look first at the NYSE on *www.nyse.com*. Browse through this website. For example, look first at how the trading floor works and make sure you understand how stocks are bought and sold. Click on *Market Trac Broadband* and click on the DJIA ticker tape, which shows trades for the stocks in the Dow Jones Industrial Average. You can stop the tape at any point and click on the ticker symbol. You will then see a map showing where on the floor the stock is traded and some data about the stock. Check that you know how the dividend yield and price/earnings (P/E) ratio were calculated. Go back to the main page and click on *Market Information*.

Here is another place where you can get quotes, dividend yields, P/E ratios, etc. Have a look at *Quick Facts* (Which are the largest companies traded on the NYSE? What proportion of a company's shares are on average traded each year?) and *Share Ownership* (What factors have been affecting individual share ownership?).

Now log in to *www.nasdaq.com*. *About Nasdaq* explains how the market works and the role of the market maker. Make sure that you understand why the NYSE is described as an auction market, whereas Nasdaq is a dealer market. Browse through the *Market Activity* pages and load the Nasdaq ticker tape.

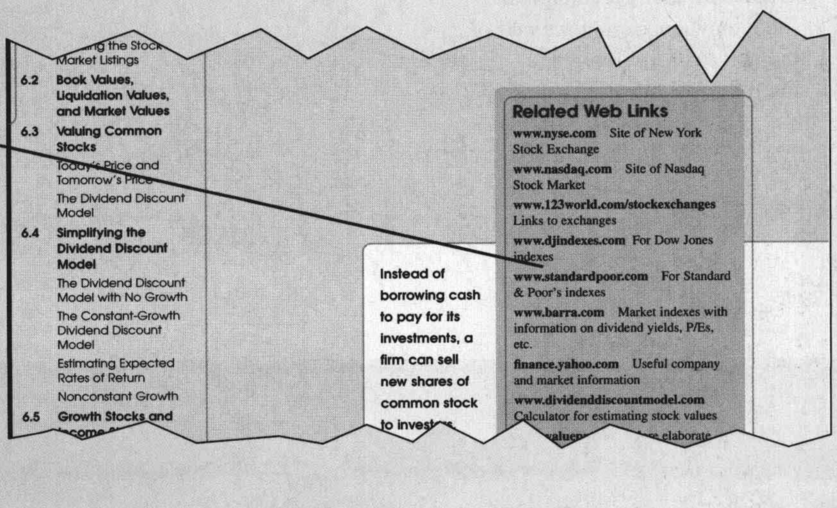
**Make Some Trades**

And you thought all stock exchanges traded stock! Check out the Hollywood Stock Exchange on *www.hsx.com*. Buy shares of your favorite actors, movies, and music artists and watch their values rise or fall based on the success of their careers and personal life. Stocks soar with a number one film at the box office and plummet with a stay at the Betty Ford clinic. Join and play for free. It's 90 percent fun, but it will also get you used to some stock market jargon.

Real st… values are established with "votes," just like …



**Related Web Links** Web citations listed at the beginning of many chapters immediately direct students to the best sources of financial information on the Internet. Since some changes in Web addresses are inevitable, a current list is maintained at the text's Online Learning Center (*www.mhhe.com/bmm4e*).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**6.2 Book Values, Liquidation Values, and Market Values**

**6.3 Valuing Common Stocks**

Today's Price and Tomorrow's Price

The Dividend Discount Model

**6.4 Simplifying the Dividend Discount Model**

The Dividend Discount Model with No Growth

The Constant-Growth Dividend Discount Model

Estimating Expected Rates of Return

Nonconstant Growth

**6.5 Growth Stocks and Income …**

**Instead of borrowing cash to pay for its investments, a firm can sell new shares of common stock to inves…**

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**www.nasdaq.com** Site of Nasdaq Stock Market

**www.123world.com/stockexchanges** Links to exchanges

**www.djindexes.com** For Dow Jones indexes

**www.standardpoor.com** For Standard & Poor's indexes

**www.barra.com** Market indexes with information on dividend yields, P/Es, etc.

**finance.yahoo.com** Useful company and market information

**www.dividenddiscountmodel.com** Calculator for estimating stock values

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**Disk Icon** To better understand important spreadsheet-based problems, disk icons indicate problems specially linked to Excel-based software for further practice.

c. How ... can fixed costs ... before accounting profits turn negative?

Excel

5. **Sensitivity Analysis.** Emperor's Clothes Fashions can invest $5 million in a new plant for producing invisible makeup. The plant has an expected life of 5 years, and expected sales are 6 million jars of makeup a year. Fixed costs are $2 million a year, and variable costs are $1 per jar. The product will be priced at $2 per jar. The plant will be depreciated straight-line over 5 years to a salvage value of zero. The opportunity cost of capital is 10 percent, and the tax rate is 40 percent.
   a. What is project NPV under these base-case assumptions?
   b. What is NPV if variable costs turn out to be $1.20 per jar?

om/bmm4e

**Spreadsheet Solutions** Spreadsheet Solutions boxes provide the student with detailed examples of how to use Excel spreadsheets when applying financial concepts.

Spreadsheet Solutions

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | Calculating IRR by using a spreadsheet | | | | |
| 2 | | | | | | |
| 3 | Year | Cash Flow | | | | Formula |
| 4 | 0 | -350,000 | | IRR = | 0.1296 | =IRR(B4:B7) |
| 5 | 1 | 16,000 | | | | |
| 6 | 2 | 16,000 | | | | |
| 7 | 3 | 466,000 | | | | |

Calculating internal rate of return in Excel is as easy as listing the project cash flows. For example, to calculate the IRR of the office-block project, you could simply type in its cash flows as in the following spreadsheet, and then calculate IRR as we do in cell E4. As always, the interest rate is returned as a decimal.

**Global Index** The Global Index now appears at the end of the text to easily reference international material.

## Global Index