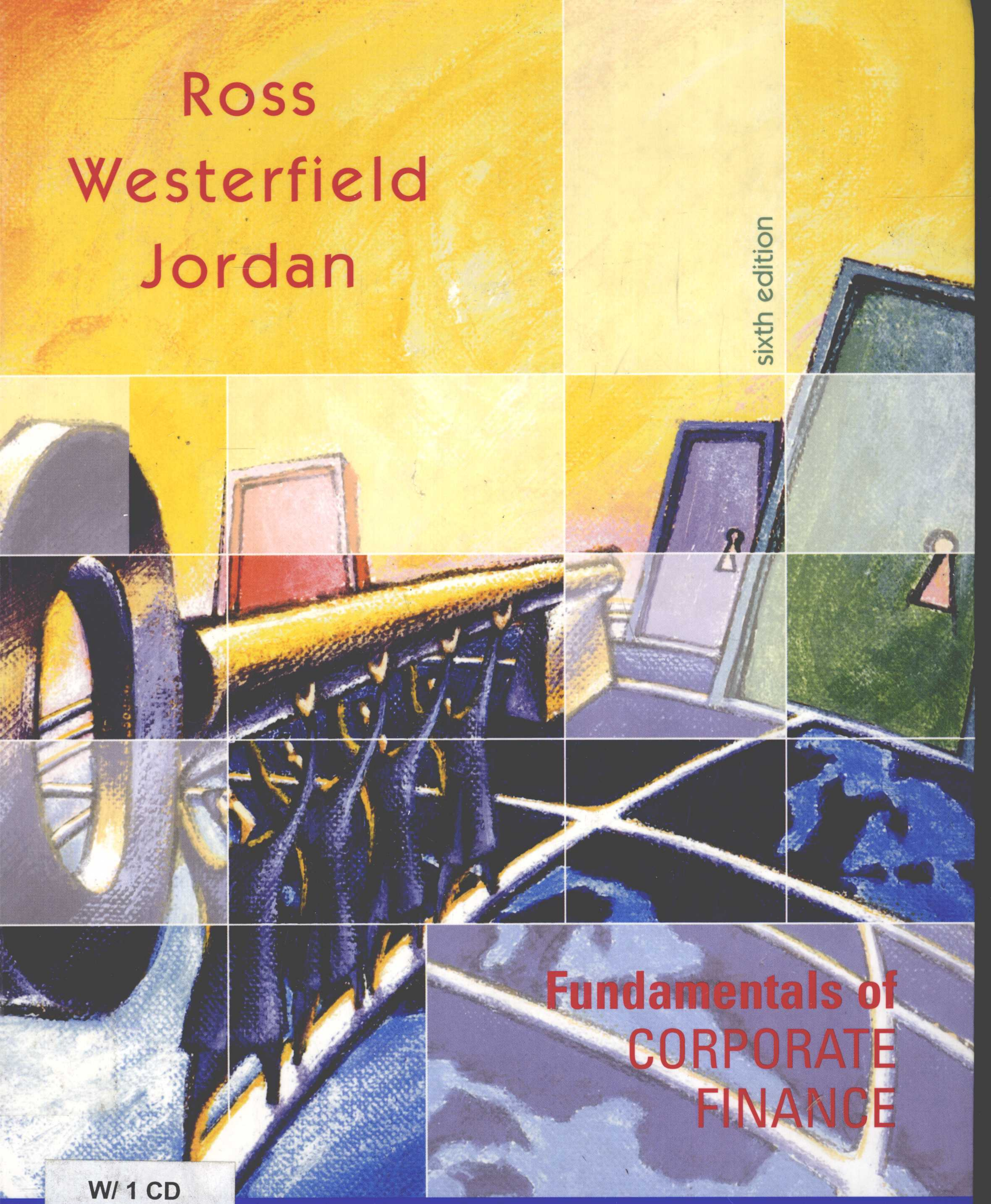
Ross
Westerfield
Jordan

sixth edition



Fundamentals of CORPORATE FINANCE

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Alternate Edition

Alternate Edition

Fundamentals of Corporate FINANCE

Sixth Edition

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McGraw-Hill Irwin

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Dedication

To our families and friends with love and gratitude.

S.A.R. R.W.W. B.D.J.

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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.

This book is printed on acid-free paper.

4 5 6 7 8 9 0 VNH/VNH 0 9 8 7 6 5 4 3

ISBN 0-07-246974-9 (standard edition)
ISBN 0-07-246982-X (alternate edition)
ISBN 0-07-246987-0 (annotated instructor's edition)

Executive editor: *Stephen M. Patterson*
Sponsoring editor: *Michele Janicek*
Developmental editor II: *Erin Riley*
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Interior design: *Maureen McCutcheon*
Cover and interior illustration: *Jacek Stachowski/SIS©*
Typeface: *10/12 Times Roman*
Compositor: *GAC / Indianapolis*
Printer: *Von Hoffmann Press, Inc.*

Library of Congress Cataloging-in-Publication Data: 2002100736

INTERNATIONAL EDITION ISBN 0-07-115102-8

http://www.mhhe.com

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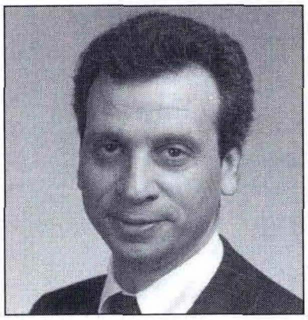

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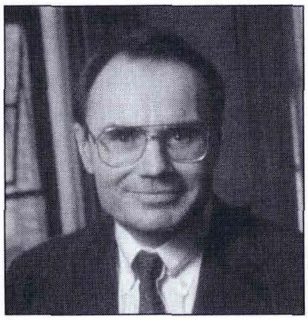
Stephen Ross is presently the Franco Modigliani Professor of Finance and Economics at the Sloan School of Management, Massachusetts Institute of Technology. One of the most widely published authors in finance and economics, Professor Ross is recognized for his work in developing the Arbitrage Pricing Theory and his substantial contributions to the discipline through his research in signaling, agency theory, option pricing, and the theory of the term structure of interest rates, among other topics. A past president of the American Finance Association, he currently serves as an associate editor of several academic and practitioner journals. He is a trustee of CalTech, a director of the College Retirement Equity Fund (CREF), and Freddie Mac. He is also the co-chairman of Roll and Ross Asset Management Corporation.



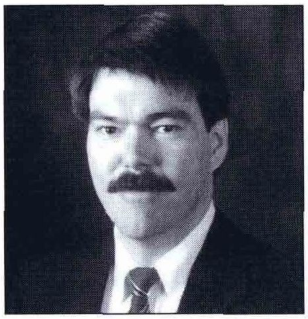
Randolph W. Westerfield

Marshall School of Business, Dean of the School of Business Administration and holder of the Robert R. Dockson Dean's Chair of Business Administration, University of Southern California

Randolph W. Westerfield is Dean of the University of Southern California School of Business Administration and holder of the Robert R. Dockson Dean's Chair of Business Administration.

He came to USC from The Wharton School, University of Pennsylvania, where he was the chairman of the finance department and member of the finance faculty for 20 years. He was the senior research associate at the Rodney L. White Center for Financial Research at Wharton. His areas of expertise include corporate financial policy, investment management and analysis, mergers and acquisitions, and stock market price behavior.

Professor Westerfield serves as a member of the Board of Directors of Health Management Associates (NYSE: HMA), William Lyon Homes, Inc. (NYSE: WLS), the Lord Foundation, and the AACSB International. He has been consultant to a number of corporations, including AT&T, Mobil Oil, and Pacific Enterprises, as well as to the United Nations, the U.S. Department of Justice and Labor, and the State of California.



Bradford D. Jordan

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Bradford D. Jordan is Professor of Finance and the National City Bank Professor at the University of Kentucky. He has a long-standing interest in both applied and theoretical issues in corporate finance and has extensive experience teaching all levels of corporate finance and financial management policy. Professor Jordan has published numerous articles on issues such as cost of capital, capital structure, and the behavior of security prices. He is a past president of the Southern Finance Association, and he is coauthor (with Charles J. Corrado) of *Fundamentals of Investments: Valuation and Management*, a leading investments text, also published by McGraw-Hill/Irwin.

PREFACE

from the Authors

When the three of us decided to write a book, we were united by one strongly held principle: Corporate finance should be developed in terms of a few integrated, powerful ideas. We believed that the subject was all too often presented as a collection of loosely related topics, unified primarily by virtue of being bound together in one book, and we thought there must be a better way.

One thing we knew for certain was that we didn't want to write a "me-too" book. So, with a lot of help, we took a hard look at what was truly important and useful. In doing so, we were led to eliminate topics of dubious relevance, downplay purely theoretical issues, and minimize the use of extensive and elaborate calculations to illustrate points that are either intuitively obvious or of limited practical use.

As a result of this process, three basic themes became our central focus in writing *Fundamentals of Corporate Finance:*

An Emphasis on Intuition We always try to separate and explain the principles at work on a common sense, intuitive level before launching into any specifics. The underlying ideas are discussed first in very general terms and then by way of examples that illustrate in more concrete terms how a financial manager might proceed in a given situation.

A Unified Valuation Approach We treat net present value (NPV) as the basic concept underlying corporate finance. Many texts stop well short of consistently integrating this important principle. The most basic and important notion, that NPV represents the excess of market value over cost, often is lost in an overly mechanical approach that emphasizes computation at the expense of comprehension. In contrast, every subject we cover is firmly rooted in valuation, and care is taken throughout to explain how particular decisions have valuation effects.

A Managerial Focus Students shouldn't lose sight of the fact that financial management concerns management. We emphasize the role of the financial manager as decision maker, and we stress the need for managerial input and judgment. We consciously avoid "black box" approaches to finance, and, where appropriate, the approximate, pragmatic nature of financial analysis is made explicit, possible pitfalls are described, and limitations are discussed.

In retrospect, looking back to our 1991 first edition IPO, we had the same hopes and fears as any entrepreneurs. How would we be received in the market? At the time, we had no idea that just 10 years later, we would be working on a sixth edition. We certainly never dreamed that in those years we would work with friends and colleagues from around the world to create country-specific Australian, Canadian, and South African editions, an International edition, Chinese, Polish, Portuguese, and Spanish language editions, and an entirely separate book, *Essentials of Corporate Finance,* now in its third edition.

Today, as we prepare to once more enter the market, our goal is to stick with the basic principles that have brought us this far. However, based on an enormous amount of feedback we have received from you and your colleagues, we have made this edition and its package even *more flexible* than previous editions. We offer flexibility in coverage, by continuing to offer a variety of editions, and flexibility in pedagogy, by providing a wide variety of features in the book to help students to learn about corporate finance. We also provide flexibility in package options by offering the most extensive collection of teaching, learning, and technology aids of any corporate finance text. Whether you use just the textbook, or the book in conjunction with other products, we believe you will find a combination with this edition that will meet your current as well as your changing needs.

Stephen A. Ross
Randolph W. Westerfield
Bradford D. Jordan

COVERAGE

This book was designed and developed explicitly for a first course in business or corporate finance, for both finance majors and non-majors alike. In terms of background or prerequisites, the book is nearly self-contained, assuming some familiarity with basic algebra and accounting concepts, while still reviewing important accounting principles very early on. The organization of this text has been developed to give instructors the flexibility they need.

As with the *previous edition* of the book, we are offering a Standard Edition with 22 chapters and an Alternate Edition with 26 chapters.

Considers the goals of the corporation, the corporate form of organization, the agency problem, and, briefly, financial markets.

Succinctly discusses cash flow versus accounting income, market value versus book value, taxes, and a review of financial *statements.*

Contains a thorough discussion of the sustainable growth rate as a planning tool.

First of two chapters covering time value of money, allowing for a building-block approach to this concept.

Contains an extensive discussion on NPV estimates.

Updated to reflect market returns and events through 2000.

Discusses the expected return/risk trade-off, and develops the security market line in a highly intuitive way that bypasses much of the usual portfolio theory and statistics.

New chapter! Introduces the important role of options in corporate finance by covering stock options, employee stock options, real options and their role in capital budgeting, and the many different types of options found in corporate securities.

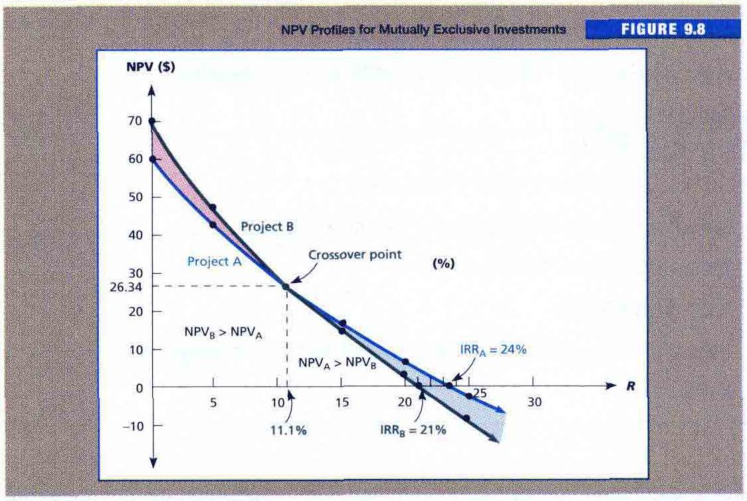
STANDARD AND ALTERNATE EDITIONS TABLE OF CONTENTS

PEDAGOGY

In addition to illustrating pertinent concepts and presenting up-to-date coverage, *Fundamentals of Corporate Finance* strives to present the material in a way that makes it coherent and easy to understand. To meet the varied needs of the intended audience, *Fundamentals of Corporate Finance* is rich in valuable learning tools and support.

Chapter-opening vignettes Vignettes drawn from real-world events introduce students to the chapter concepts. Questions about these vignettes are posed to the reader to ensure understanding of the concepts in the end-of-chapter material. For examples, see Chapter 5, page 129; Chapter 6, page 157.

Pedagogical use of color This learning tool continues to be an important feature of *Fundamentals of Corporate Finance.* In almost every chapter, color plays an extensive, nonschematic, and largely self-evident role. A guide to the functional use of color is found on the endsheets of both the Annotated Instructor's Edition (AIE) and student version. For examples of this technique, see Chapter 3, page 58; Chapter 9, page 295.



In Their Own Words boxes This series of boxes are the popular articles updated from previous editions written by a distinguished scholar or practitioner on key topics in the text. Boxes include essays by Merton Miller on capital structure, Fischer Black on dividends, and Roger Ibbotson on capital market history. A complete list of "In Their Own Words" boxes appears on page xxxii.

In Their Own Words . . .

Clifford W. Smith Jr. on Market Incentives for Ethical Behavior

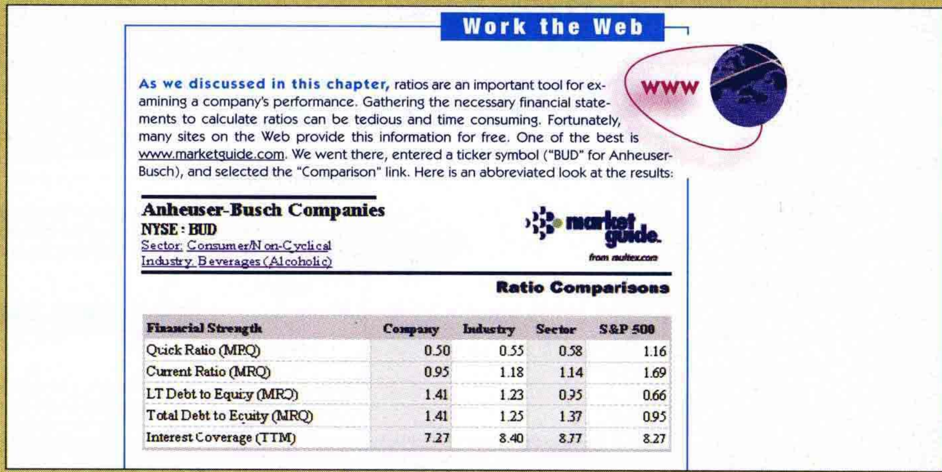
Ethics is a topic that has been receiving increased interest in the business community. Much of this discussion has been led by philosophers and has focused on moral principles. Rather than review these issues, I want to discuss a complementary (but often ignored) set of issues from an economist's viewpoint. Markets impose

financially healthy firms. Firms thus have incentives to adopt financial policies that help credibly bond against cheating. For example, if product quality is difficult to assess prior to purchase, customers doubt a firm's claims about product quality. Where quality is more uncertain, customers are only willing to pay lower prices. Such firms thus have particularly strong incentives to adopt financial policies that imply a lower probability of insolvency.

Third, the expected costs are higher if information about cheating is rapidly and widely distributed to potential future customers. Thus information services like *Consumer Reports,* which monitor and report on product quality, help deter cheating. By lowering the

New! Work the Web

These boxes in the chapter material show students how to research financial issues using the Web and how to use the information they find to make business decisions. See examples in Chapter 3, page 81; Chapter 8, page 262.



Work the Web

As we discussed in this chapter, ratios are an important tool for examining a company's performance. Gathering the necessary financial statements to calculate ratios can be tedious and time consuming. Fortunately, many sites on the Web provide this information for free. One of the best is www.marketguide.com. We went there, entered a ticker symbol ("BUD" for Anheuser-Busch), and selected the "Comparison" link. Here is an abbreviated look at the results:

Anheuser-Busch Companies
NYSE : BUD
Sector: Consumer/Non-Cyclical
Industry: Beverages (Alcoholic)

market guide. from multex.com

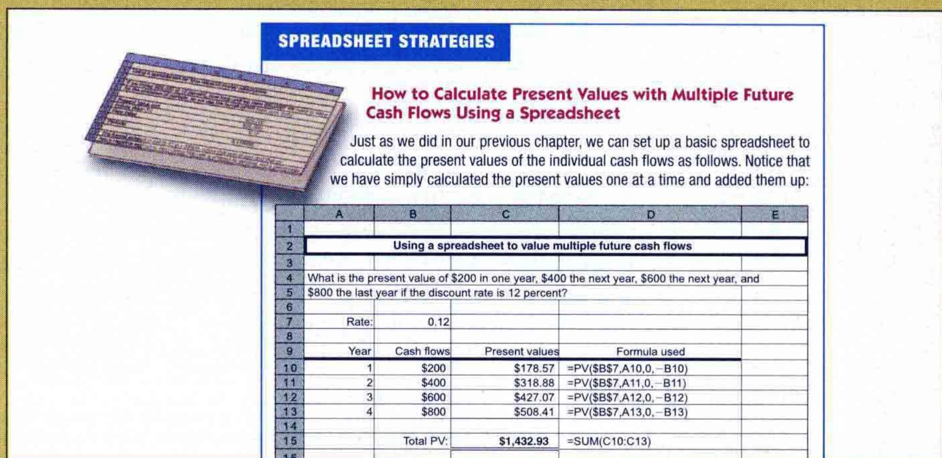
Ratio Comparisons

Financial Strength	Company	Industry	Sector	S&P 500
Quick Ratio (MRQ)	0.50	0.55	0.58	1.16
Current Ratio (MRQ)	0.95	1.18	1.14	1.69
LT Debt to Equity (MRQ)	1.41	1.23	0.95	0.66
Total Debt to Equity (MRQ)	1.41	1.25	1.37	0.95
Interest Coverage (TTM)	7.27	8.40	8.77	8.27

***Enhanced!* Real-world examples** Actual events are integrated throughout the text, tying chapter concepts to real life through illustration and reinforcing the relevance of the material. Some examples tie into the chapter opening vignette for added reinforcement. See example in Chapter 5, page 138.

Spreadsheet Strategies

This feature either introduces students to Excel™ or helps them brush up on their Excel™ spreadsheet skills, particularly as they relate to corporate finance. This feature appears in self-contained sections and shows students how to set up spreadsheets to analyze common financial problems—a vital part of every business student's education. For examples, see Chapter 6, page 164; Chapter 7, page 210.



SPREADSHEET STRATEGIES

How to Calculate Present Values with Multiple Future Cash Flows Using a Spreadsheet

Just as we did in our previous chapter, we can set up a basic spreadsheet to calculate the present values of the individual cash flows as follows. Notice that we have simply calculated the present values one at a time and added them up:

	A	B	C	D	E
1					
2	Using a spreadsheet to value multiple future cash flows				
3					
4	What is the present value of $200 in one year, $400 the next year, $600 the next year, and				
5	$800 the last year if the discount rate is 12 percent?				
6					
7	Rate:	0.12			
8					
9	Year	Cash flows	Present values	Formula used	
10	1	$200	$178.57	=PV(B7,A10,0,−B10)	
11	2	$400	$318.88	=PV(B7,A11,0,−B11)	
12	3	$600	$427.07	=PV(B7,A12,0,−B12)	
13	4	$800	$508.41	=PV(B7,A13,0,−B13)	
14					
15		Total PV:	$1,432.93	=SUM(C10:C13)	

New! Calculator Hints These brief calculator tutorials have been added in selected chapters to help students learn or brush up on their financial calculator skills. These complement the just-mentioned Spreadsheet Strategies. For examples, see Chapter 5, page 140; Chapter 6, page 168.

CALCULATOR HINTS

You solve present value problems on a financial calculator just like you do future value problems. For the example we just examined (the present value of $1,000 to be received in three years at 15 percent), you would do the following:

Enter	3	15			1,000
	N	%i	PMT	PV	FV
Solve for				−657.50	

Notice that the answer has a negative sign; as we discussed above, that's because it represents an outflow today in exchange for the $1,000 inflow later.

Concept Building Chapter sections are intentionally kept short to promote a step-by-step, building block approach to learning. Each section is then followed by a series of short concept questions that highlight the key ideas just presented. Students use these questions to make sure they can identify and understand the most important concepts as they read. See Chapter 1, page 12; Chapter 3, page 73 for examples.

Summary Tables These tables succinctly restate key principles, results, and equations. They appear whenever it is useful to emphasize and summarize a group of related concepts. For examples, see Chapter 2, page 38; Chapter 7, page 208.

Labeled Examples Separate numbered and titled examples are extensively integrated into the chapters as indicated below. These examples provide detailed applications and illustrations of the text material in a step-by-step format. Each example is completely self-contained so students don't have to search for additional information. Based on our classroom testing, these examples are among the most useful learning aids because they provide both detail and explanation. See Chapter 2, page 25; Chapter 4, page 116.

Building the Balance Sheet **EXAMPLE 2.1**

A firm has current assets of $100, net fixed assets of $500, short-term debt of $70, and long-term debt of $200. What does the balance sheet look like? What is shareholders' equity? What is net working capital?

In this case, total assets are $100 + 500 = $600 and total liabilities are $70 + 200 = $270, so shareholders' equity is the difference: $600 − 270 = $330. The balance sheet would thus look like:

Assets		Liabilities and Shareholders' Equity	
Current assets	$100	Current liabilities	$ 70
Net fixed assets	500	Long-term debt	200
		Shareholders' equity	330
Total assets	$600	Total liabilities and shareholders' equity	$600

Net working capital is the difference between current assets and current liabilities, or $100 − 70 = $30.

Key Terms Key Terms are printed in blue type and defined within the text the first time they appear. They also appear in the margins with definitions for easy location and identification by the student. See Chapter 1, page 6; Chapter 3, page 59 for examples.

***New!* Explanatory Web Links** These Web links are provided in the margins of the text. They are specifically selected to accompany text material and provide students and instructors with a quick way to check for additional information using the Internet. See Chapter 5, page 132; Chapter 7, page 218.

Want detailed information on the amount and terms of the debt issued by a particular firm? Check out their latest financial statements by searching SEC filings at www.sec.gov.

A *positive covenant* is a "thou shalt" type of covenant. It specifies an action that the company agrees to take or a condition the company must abide by. Here are some examples:

1. The company must maintain its working capital at or above some specified minimum level.
2. The company must periodically furnish audited financial statements to the lender.
3. The firm must maintain any collateral or security in good condition.

This is only a partial list of covenants; a particular indenture may feature many different ones.

Key Equations Called out in the text, key equations are identified by a blue equation number. The list in Appendix B shows the key equations by chapter, providing students with a convenient reference. For examples, see Chapter 5, page 131; Chapter 10, page 332.

Highlighted Concepts Throughout the text, important ideas are pulled out and presented in a highlighted box—signaling to students that this material is particularly relevant and critical for their understanding. See Chapter 4, page 114; Chapter 7, page 214.

The sustainable growth rate is a very useful planning number. What it illustrates is the explicit relationship between the firm's four major areas of concern: its operating efficiency as measured by profit margin, its asset use efficiency as measured by total asset turnover, its dividend policy as measured by the retention ratio, and its financial policy as measured by the debt-equity ratio.

Given values for all four of these, there is only one growth rate that can be achieved. This is an important point, so it bears restating:

If a firm does not wish to sell new equity and its profit margin, dividend policy, financial policy, and total asset turnover (or capital intensity) are all fixed, then there is only one possible growth rate.

As we described early in this chapter, one of the primary benefits of financial planning is that it ensures internal consistency among the firm's various goals. The concept of the sustainable growth rate captures this element nicely. Also, we now see how a financial planning model can be used to test the feasibility of a planned growth rate. If

Chapter Summary and Conclusions Every chapter ends with a concise, but thorough, summary of the important ideas—helping students review the key points and providing closure to the chapter. See Chapter 1, page 20; Chapter 5, page 150.

Chapter Review and Self-Test Problems Appearing after the Summary and Conclusion, each chapter includes a Chapter Review and Self-Test Problem section. These questions and answers allow students to test their abilities in solving key problems related to the chapter content and provide instant reinforcement. See Chapter 6, page 187; Chapter 10, page 340.

Chapter Review and Self-Test Problems

10.1 **Capital Budgeting for Project X** Based on the following information for Project X, should we undertake the venture? To answer, first prepare a pro forma income statement for each year. Next, calculate operating cash flow. Finish the problem by determining total cash flow and then calculating NPV assuming a 28 percent required return. Use a 34 percent tax rate throughout. For help, look back at our shark attractant and power mulcher examples.

Project X involves a new type of graphite composite in-line skate wheel. We think we can sell 6,000 units per year at a price of $1,000 each. Variable costs will run about $400 per unit, and the product should have a four-year life.

Fixed costs for the project will run $450,000 per year. Further, we will need to invest a total of $1,250,000 in manufacturing equipment. This equipment is seven-year MACRS property for tax purposes. In four years, the equipment will be worth about half of what we paid for it. We will have to invest $1,150,000 in net working capital at the start. After that, net working capital requirements will be 25 percent of sales.

10.2 **Calculating Operating Cash Flow** Mont Blanc Livestock Pens, Inc., has projected a sales volume of $1,650 for the second year of a proposed expansion project. Costs normally run 60 percent of sales, or about $990 in this case. The depreciation expense will be $100, and the tax rate is 35 percent. What is the operating cash flow? Calculate your answer using all of the approaches (including the top-down, bottom-up, and tax shield approaches) described in the chapter.

Concepts Review and Critical Thinking Questions This successful end-of-chapter section facilitates your students' knowledge of key principles, as well as intuitive understanding of the chapter concepts. A number of the questions relate to the chapter-opening vignette—reinforcing student critical-thinking skills and the learning of chapter material. For examples, see Chapter 1, page 20; Chapter 3, page 86.

Concepts Review and Critical Thinking Questions

1. **Current Ratio** What effect would the following actions have on a firm's current ratio? Assume that net working capital is positive.
   - **a.** Inventory is purchased.
   - **b.** A supplier is paid.
   - **c.** A short-term bank loan is repaid.
   - **d.** A long-term debt is paid off early.
   - **e.** A customer pays off a credit account.
   - **f.** Inventory is sold at cost.
   - **g.** Inventory is sold for a profit.
2. **Current Ratio and Quick Ratio** In recent years, Dixie Co. has greatly increased its current ratio. At the same time, the quick ratio has fallen. What has happened? Has the liquidity of the company improved?
3. **Current Ratio** Explain what it means for a firm to have a current ratio equal to .50. Would the firm be better off if the current ratio were 1.50? What if it were 15.0? Explain your answers.
4. **Financial Ratios** Fully explain the kind of information the following financial ratios provide about a firm:

End-of-Chapter Questions and Problems

We have found that many students learn better when they have plenty of opportunity to practice; therefore, we provide extensive end-of-chapter questions and problems. The end-of-chapter support greatly exceeds typical introductory textbooks. The questions and problems are segregated into three learning levels: Basic, Intermediate, and Challenge. All problems are fully annotated so that students and instructors can readily identify particular types. Answers to selected end-of-chapter material appear in Appendix C. See Chapter 6, page 191; Chapter 9, page 305.

Basic
(continued)

c. If you apply the NPV criterion, which investment will you choose? Why?
d. If you apply the IRR criterion, which investment will you choose? Why?
e. If you apply the profitability index criterion, which investment will you choose? Why?
f. Based on your answers in *(a)* through *(e)*, which project will you finally choose? Why?

18. **NPV and Discount Rates** An investment has an installed cost of $412,670. The cash flows over the four-year life of the investment are projected to be $212,817, $153,408, $102,389, and $72,308. If the discount rate is zero, what is the NPV? If the discount rate is infinite, what is the NPV? At what discount rate is the NPV just equal to zero? Sketch the NPV profile for this investment based on these three points.

Intermediate
(Questions 19–20)

19. **NPV and the Profitability Index** If we define the NPV index as the ratio of NPV to cost, what is the relationship between this index and the profitability index?

20. **Cash Flow Intuition** A project has an initial cost of I, has a required return of R, and pays C annually for N years.
   a. Find C in terms of I and N such that the project has a payback period just equal to its life.
   b. Find C in terms of I, N, and R such that this is a profitable project according to the NPV decision rule.
   c. Find C in terms of I, N, and R such that the project has a benefit-cost ratio of 2.

Challenge
(Questions 21–23)

21. **Payback and NPV** An investment under consideration has a payback of seven years and a cost of $320,000. If the required return is 12 percent, what is the worst-case NPV? The best-case NPV? Explain.

22. **Multiple IRRs** This problem is useful for testing the ability of financial calculators and computer software. Consider the following cash flows. How many different IRRs are there (hint: search between 20 percent and 70 percent)? When should we take this project?

New! What's on the Web?

These end-of-chapter activities show students how to use and learn from the vast amount of financial resources available on the Internet. See examples in Chapter 1, page 22; Chapter 4, page 126.

What's On the Web?

4.1 **Growth Rates** Go to quote.yahoo.com and enter the ticker symbol "IP" for International Paper. When you get the quote, follow the "Research" link. What is the projected sales growth for International Paper for next year? What is the projected earnings growth rate for next year? For the next five years? How do these earnings growth projections compare to the industry, sector, and S&P 500 index?

4.2 **Applying Percentage of Sales** Locate the most recent annual financial statements for Du Pont at www.dupont.com under the "Investor Center" link. Locate the annual report. Using the growth in sales for the most recent year as the projected sales growth for next year, construct a pro forma income statement and balance sheet.

4.3 **Growth Rates** You can find the home page for Caterpillar, Inc., at www.caterpillar.com. Go to the web page, select "Cat Stock," and find the most recent annual report. Using the information from the financial statements, what is the internal growth rate for Caterpillar? What is the sustainable growth rate?

New! S&P Market Insight Problems

Most chapters include two or three new end-of-chapter problems that require the use of the Educational Version of *Market Insight,* Standard & Poor's powerful and well-known Compustat® database. These problems provide an easy, online way for students to incorporate current, real-world data into their learning. See examples in Chapter 3, page 92; Chapter 4, page 125.

S&P Problems

STANDARD &POOR'S

1. **Equity Multiplier** Use the balance sheets for Amazon.com (AMZN), Bethlehem Steel (BS), American Electric Power (AEP), and Pfizer (PFE) to calculate the equity multiplier for each company over the most recent two years. Comment on any similarities or differences between the companies and explain how these might affect the equity multiplier.

2. **Inventory Turnover** Use the financial statements for Dell Computer Corporation (DELL) and Boeing Company (BA) to calculate the inventory turnover for each company over the past three years. Is there a difference in inventory turnover between the two companies? Is there a reason the inventory turnover is lower for Boeing? What does this tell you about comparing ratios across industries?

3. **SIC Codes** Find the SIC codes for Papa Johns' International (PZZA) and Darden Restaurants (DRI) on each company's home page. What is the SIC code for each of these companies? What does the business description say for each company? Are these companies comparable? What does this tell you about comparing ratios for companies based on SIC codes?

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