## corporate finance 11e

## Corporate Finance

## The McGraw-Hill/Irwin Series in Finance, Insurance, and Real Estate

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Consulting Editor

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# Corporate Finance 

## ELEVENTH EDITION

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## CORPORATE FINANCE, ELEVENTH EDITION

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## To our family and friends with love and gratitude.

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## Preface

The teaching and the practice of corporate finance are more challenging and exciting than ever before. The last decade has seen fundamental changes in financial markets and financial instruments. In the early years of the 21st century, we still see announcements in the financial press about takeovers, junk bonds, financial restructuring, initial public offerings, bankruptcies, and derivatives. In addition, there are the new recognitions of "real" options, private equity and venture capital, subprime mortgages, bailouts, and credit spreads. As we have learned in the recent global credit crisis and stock market collapse, the world's financial markets are more integrated than ever before. Both the theory and practice of corporate finance have been moving ahead with uncommon speed, and our teaching must keep pace.

These developments have placed new burdens on the teaching of corporate finance. On one hand, the changing world of finance makes it more difficult to keep materials up to date. On the other hand, the teacher must distinguish the permanent from the temporary and avoid the temptation to follow fads. Our solution to this problem is to emphasize the modern fundamentals of the theory of finance and make the theory come to life with contemporary examples. Increasingly, many of these examples are outside the United States.

All too often the beginning student views corporate finance as a collection of unrelated topics that are unified largely because they are bound together between the covers of one book. We want our book to embody and reflect the main principle of finance: Namely, that good financial decisions will add value to the firm and to shareholders and bad financial decisions will destroy value. The key to understanding how value is added or destroyed is cash flows. To add value, firms must generate more cash than they use. We hope this simple principle is manifest in all parts of this book.

## The Intended Audience of This Book

This book has been written for the introductory courses in corporate finance at the MBA level and for the intermediate courses in many undergraduate programs. Some instructors will find our text appropriate for the introductory course at the undergraduate level as well.

We assume that most students either will have taken, or will be concurrently enrolled in, courses in accounting, statistics, and economics. This exposure will help students understand some of the more difficult material. However, the book is self-contained, and a prior knowledge of these areas is not essential. The only mathematics prerequisite is basic algebra.

## New to Eleventh Edition

Each chapter has been updated and where relevant, "internationalized." We try to capture the excitement of corporate finance with current examples, chapter vignettes, and openers. Spreadsheets applications are spread throughout.

- CHAPTER 2 has been rewritten to better highlight the notion of cash flow and how it contrasts with accounting income.
- CHAPTER 6 has been reorganized to better emphasize some special cases of capital budgeting including cost cutting proposals and investments of unequal lives.
- CHAPTER 9 has updated the many new ways of stock market trading.
- CHAPTER 10 has updated material on historical risk and return and better motivated the equity risk premium.
- CHAPTER 13 has sharpened the discussion of how to use the CAPM for the cost of equity and WACC.
- CHAPTER 14 has updated and added to the discussion of behavioral finance and its challenge to the efficient market hypothesis.
- CHAPTER 15 expands on its description of equity and debt and has new material on the value of a call provision as well as the differences between book and market values.
- CHAPTER 19 AND 20 continue to build on the notion of a financial life cycle where capital structure decisions are driven by the varying needs for internal and external finance over a firm's life.


## Pedagogy

In this edition of Corporate Finance, we have updated and improved our features to present material in a way that makes it coherent and easy to understand. In addition, Corporate Finance is rich in valuable learning tools and support, to help students succeed in learning the fundamentals of financial management.

## Chapter Opening Vignettes

Each chapter begins with a contemporary vignette that highlights the concepts in the chapter and their relevance to real-world examples.


#### Abstract

With the S\&P 500 Index returning about 14 percent and the NASDAQ Composite Index up about 13 percent in 2014, stock market performance overall was very good In particular, investors in outpatient diagnostic imaging services company RadNet, Inc., had to be happy about the 411 percent gain in that stock, and investors in biopharmaceutical company Achillon Pharmaceuticals had to feel pretty good following that company's 269 percent gain. Of course, not all stocks increased in value during the year. Stock in


Transocean Ltd. fell 63 percent during the year, and stock in Avon Products dropped 44 percent.

These examples show that there were tremendous potential profits to be made during 2014, but there was also the risk of losing money-and lots of it. So what should you, as a stock market investor, expect when you invest your own money? In this chapter, we study more than eight decades of market history to find out

### 10.1 Returns

## DOLLAR RETURNS

Suppose the Video Concept Company has several thousand shares of stock outstanding and you are a shareholder. Further suppose that you purchased some of the shares of stock in the company at the beginning of the year; it is now year-end and you want to figure out how well you have done on your investment. The return you get on an investment in tocks, like that in bonds or any other investment, comes in two forms.

As the owner of stock in the Video Concept Company, you are a part owner of the
How did the market inance yahoo.com.
ompany. If the company is profitable, it generally could distribute some of its profits to the shareholders. Therefore, as the owner of shares of stock, you could receive some cash, called a dividend, during the year. This cash is the income component of your return. In addition to the dividends, the other part of your return is the capital gain-or, if it is negative, the capital loss (negative capital gain)-on the investment.

For example, suppose we are considering the cash flows of the investment in Figure 10.1 , showing that you purchased 100 shares of stock at the beginning of the year at a price of $\$ 37$ per share. Your total investment, then, was:

$$
C_{0}=\$ 37 \times 100=\$ 3,700
$$

## ExcelMaster Icons

Topics covered in the comprehensive ExcelMaster supplement (in Connect Finance) are indicated by an icon in the margin.

[^0]
## Figure 8.2

 Time to Maturity
us that a relatively small change in interest rates will lead to a substantial change in the bond's value. In comparison, the one-year bond's price is relatively insensitive to interest rate changes.

Intuitively, shorter-term bonds have less interest rate sensitivity because the $\$ 1,000$ face amount is received so quickly. For example, the present value of this amount isn't greatly affected by a small change in interest rates if the amount is received in, say, one year. However, even a small change in the interest rate, once compounded for, say, 30 years, can have a significant effect on present value. As a result, the present value of

## Figures and Tables

This text makes extensive use of real data and presents them in various figures and tables. Explanations in the narrative, examples, and end-of-chapter problems will refer to many of these exhibits.

## Examples

Separate called-out examples are integrated throughout the chapters. Each example illustrates an intuitive or mathematical application in a step-by-step format. There is enough detail in the explanations so students don't have to look elsewhere for additional information.

## EXAMPLE

9.5

Calculating the Required Return Pagemaster Enterprises, the company examined in Example 9.4, has $1,000,000$ shares of stock outstanding. The stock is selling at $\$ 10$. What is the equired return on the stock?

The payout ratio is the ratio of dividends/earnings. Because Pagemaster's retention ratio is 40 percent, the payout ratio, which is I - Retention ratio, is 60 percent. Recall both that Pagemaster just reported earnings of $\$ 2,000,000$ and that the firm's growth rate is .064 .
Earnings a year from now will be $\$ 2,128,000$ ( $=\$ 2,000,000 \times 1.064$ ), implying that dividends wil be $\$ 1,276,800(=.60 \times \$ 2,128,000)$. Dividends per share will be $\$ 1.28$ ( $=\$ 1,276,800 / 1,000,000)$. Given that $g=.064$, we calculate $R$ from (9.9) as follows:

$$
.192=\frac{\$ 1.28}{\$ 10.00}+.064
$$

## In Their Own Words

## ROBERT C. HIGGINS ON SUSTAINABLE

 GROWTHMost financial officers know intuitively that it takes money to make money. Rapid sales growth require money to make money. Rapid sales growth requires increased assets in the form of accounts receivable,
inventory, and fixed plant, which, in turn, require inventory, and foxed plant, which, in turn, require
money to pay for assets. They also know that if their money to pay for assets. They also know that if their
company does not have the money when needed, it can literally "grow broke." The sustainable growth equation states these intuitive truths explicitly.
Sustainable growth is often used by bankers and other external analysts to assess a company's creditworthiness. They are aided in this exercise by several sophisticated computer software packages that provide detailed analy ses of the company's past financial performance, includ ing its annual sustainable growth rate.
Bankers use this information in several ways. Quick comparison of a company's actual growth rate to its sustainable rate tells the banker what issues will be at the top or management's fnancial agenda. If actual grown's roblem will be where to the cash finance growth The banker thus can anticipate interest in loan products. Conversely, if sustainable growth consistently exceed actual, the banker had best be prepared to talk about
nvestment products because management's problem will be what to do with all the cash that keeps piling up n the till.
Bankers also find the sustainable growth equation useful for explaining to financially inexperienced small business owners and overly optimistic entrepreneurs that, for the long-run viability of their business, it is necessa
kip grown and pronabiy in proper balance.
esp con lionth money for fow instance, a loan applicant requested $\$ 100,000$ to pay off several insistent suppliers and promised to repay in a few months when he collected some accounts receivable that were coming due. A sustainable growth analysis revealed that the firm had been growing at four to six times its sustainable growth rate and that this pattern was likely to continue in the foreseeable future. This alerted the banker that impatient suppliers were only a symptom of the much more fundamental disease of overly rapid growth, and that a $\$ 100,000$ loan would likely prove to be only the down payment on a much larger, multiyear commitment.

SURCE: Robert C. Higgins is Professor of finance at the University of Washington. He pioneered the we of sustana bewth as a tool for financial analysis.

## "In Their Own Words" Boxes

Located throughout the chapters, this unique series consists of articles written by distinguished scholars or practitioners about key topics in the text. Boxes include essays by Edward I. Altman, Robert S. Hansen, Robert C. Higgins, Michael C. Jensen, Merton Miller, and Jay R. Ritter.

## Spreadsheet Applications

Now integrated into select chapters, Spreadsheet Applications boxes reintroduce students to Excel, demonstrating how to set up spreadsheets in order to analyze common financial problems-a vital part of every business student's education. (For even more spreadsheet example problems, check out ExcelMaster in Connect Finance).

This is the stockholders' share in the firm stated in accounting terms. The accounting value of stockholders' equity increases when retained earnings are added. This occurs when the firm retains part of its earnings instead of paying them out as dividends.

## The home page for the Financial

Accounting Standards
Board (FASB) is www.fasb.org.

## VALUE VERSUS COST

The accounting value of a firm's assets is frequently referred to as the carrying value or the book value of the assets. ${ }^{2}$ Under generally accepted accounting principles (GAAP), audited financial statements of firms in the United States carry the assets at cost. ${ }^{3}$ Thus the terms carrying value and book value are unfortunate. They specifically say "value," when in fact the accounting numbers are based on cost. This misleads many readers of financial statements to think that the firm's assets are recorded at true market values. Market value is the price at which willing buyers and sellers would trade the assets. It would be only a coincidence if accounting value and market value were the same. In fact, management's job is to create value for the firm that exceeds its cost.

Many people use the balance sheet, but the information each may wish to extract is not the same. A banker may look at a balance sheet for evidence of accounting liquidity and working capital. A supplier may also note the size of accounts payable and therefore the general promptness of payments. Many users of financial statements, including managers and investors, want to know the value of the firm, not its cost. This information is not found on the balance sheet. In fact, many of the true resources of the firm do not appear on the balance sheet: good management, proprietary assets, favorable economic conditions, and so on. Henceforth,

## Explanatory Website Links

These Web links are specifically selected to accompany text material and provide students and instructors with a quick reference to additional information on the Internet.
25.5 Interest Rate Futures Contracts

In this section we consider interest rate futures contracts. Our examples deal with futures contracts on Treasury bonds because of their high popularity. We first price Treasury bonds and Treasury bond forward contracts. Diffierences
are explored. Hedging examples are provided next.

## PRICING OF TREASURY BONDS

As mentioned earlier in the text, a Treasury bond pays semiannual interest over its life. In addition, the face value of the bond is paid at maturity. Consider a 20 -year, 8 percent coupon
bond that was issued on March 1 . The first payment is to occur in six months--that is, on September 1. The value of the bond can be determined as follows:

Pricing of Treasury Bond
$P_{T B}=\frac{\$ 40}{1+R_{1}}+\frac{\$ 40}{\left(1+R_{2}\right)^{2}}+\frac{\$ 40}{\left(1+R_{3}\right)^{3}}+\cdots+\frac{\$ 40}{\left(1+R_{39}\right)^{39}}+\frac{\$ 1,040}{\left(1+R_{40}\right)^{30}}(25.1)$
Because an 8 percent coupon bond pays interest of $\$ 80$ a year, the semiannual coupon is $\$ 40$. Principal and the semiannual coupon are both paid at maturity. As we mentioned in a previous chapter, the price of the Treasury bond, $P_{T T}$, is determined by discounting
each payment on the bond at the appropriate spot rate. Because the payments are semianeach payment on the bond at the appropriate spot rate. Because the payments are semian-
nual, each spot rate is expressed in semiannual terms. That is, imagine a horizontal term structure where the effective annual yield is 8 percent for all maturities. Because each spot $\overline{\text { Ordinarily, an unusual firm name in hisis textbook is a tip-off hat itis fictional. This, however. is a tues story. }}$

## Numbered Equations

Key equations are numbered and listed on the back endsheets for easy reference.

The end-of-chapter material reflects and builds upon the concepts learned from the chapter and study features.

## Summary and Conclusions

1. Firms hedge to reduce risk. This chapter showed a number of hedging strategies.
2. A forward contract is an agreement by two parties to sell an item for cash at a later date. date of delivery. Forward contracts are generally not traded on organized exchanges.
3. Futures contracts are also agreements for future delivery. They have certain advantages, such as liquidity, that forward contracts do not. An unusual feature of futures contracts is he mark-to-the-market convention. If the price of a futures contract falls on a particular day, every buyer of the contract must pay money to the clearinghouse. Every seller of the ontract receives money from the clearinghouse. Everything is reversed if the price rises

We divided hedges into two types. Short hedges and long hedges. An individual or firm hat sells a futures contract to reduce risk is instituting a short hedge. Short hedges are contract to reduce risk is instituting a long hedge. Long hedges are typically used by firms with contracts to sell finished goods at a fixed price.
4. An interest rate futures contract employs a bond as the deliverable instrument. Because of their popularity, we worked with Treasury bond futures contracts. We showed that reasury bond futures contracts can be priced using the same type of net present value
nalysis that is used to price Treasury bonds themselves. -
. . As with other commodities, a short hedge involves the edging with interest rate futures that are committed to buying mortgages or other bonds are likely to institute short hedges. A long hedge involves the purchase of a tutures contract. Firms that have agreed to sell mortgages or other bonds at a fixed price are likely to institute long hedges.
5. Duration measures the average maturity of all the cash flows in a bond. Bonds with high duration have high price variability. Firms frequently try to match the duration of their Swaremer
Swaps are agreements to exchange cash flows over time. The first major type is an interest another, say, coupons that float with LIBOR. The second major type is a currency swap, in which an agreement is struck to swap payments denominated in one currency for payments in another currency over time.

## Concept Questions

1. Hedging Strategies If a firm is selling futures contracts on lumber as a hedging strategy, what must be true about the firm's exposure to lumber prices?
Hedging Strategies If a firm is buying call options on pork belly futures as a hedging strategy, what must be true about the firm's exposure to pork belly prices?
Forwards and Futures What is the difference between a forward contract and a futures contract? Why do you think that futures contracts are much more common? Are there
circumstances under which you might prefer to use forwards instead of futures? Explain.

## Summary and Conclusions

The summary provides a quick review of key concepts in the chapter.

## Questions and Problems

Because solving problems is so critical to a student's learning, new questions and problems have been added, and existing questions and problems have been revised. All problems have also been thoroughly reviewed and checked for accuracy.

Problems have been grouped according to level of difficulty with the levels listed in the margin: Basic, Intermediate, and Challenge.

Additionally, we have tried to make the problems in the critical "concept" chapters, such as those on value, risk, and capital structure, especially challenging and interesting.

We provide answers to selected problems in Appendix B at the end of the book.

## Excel Master It! Problems

Included in the end-of-chapter material are problems directly incorporating Excel, and new tips and techniques taught in the chapter's ExcelMaster supplement.

## Excel Problems

Indicated by the Excel icon in the margin, these problems can be found at the end of almost all chapters. Located in Connect Finance for Corporate Finance IIe, Excel templates have been created for each of these problems, where students can use the data in the problem to work out the solution using Excel skills.

## End-of-Chapter Cases

Located at the end of almost every chapter, these mini cases focus on common company situations that embody important corporate finance topics. Each case presents a new scenario, data, and a dilemma.
Several questions at the end of each case require students to analyze and focus on all of the material they learned in that chapter.

## Excel Master It! Problem

Excel is a great tool for solving problems, but with many time value of money problems, you may still need to draw a time line. For example, consider a classic retirement problem. A friend is celebrating her birthday and wants to start saving for her anticipated retirement. She has the following years to retirement and retirement spending goals:

| Years until retirement | 30 |
| :--- | ---: |
| Amount to withdraw each year | $\$ 90,000$ |
| Years to withdraw in retirement | 20 |

## Mini Gase

## THE MBA DECISION

Ben Bates graduated from college six yeas ago with a finance undergraduate degree. Although he is satisfied with his current job, his goal is to become an investment banker. He feels that an MBA degree would allow him to achieve this goal. After examining schools, he has narrowed his choice to either Wilton University or Mount Perry College. Although internships are encourged by boln schoos, 10 get class credir for Ben currently works at the money management firm of Dewey and Louis. His annual salary at e firm is $\$ 65,000$ per year, and his salary is expected to increase at 3 percent per year until retirement. He is currently 28 years old and expects to work for 40 more years. His current job includes a fully paid health insurance plan, and his current average tax rate is 26 percent. Ben has a savings ccount with enough money to cover the entire cost of his MBA program.
The Ritter College of Business at Wilton University is one of the top MBA programs in he country. The MBA degree requires two years of full-time enrollment at the university. The lies are estimated to cost $\$ 3,000$ per year. Ben expects that after graduation from Wilton, he will receive a job offer for about $\$ 110,000$ per year, with a $\$ 20,000$ signing bonus. The salary at this job will increase at 4 percent per year. Because of the higher salary, his average income

## Comprehensive Teaching and Learning Package

Corporate Finance has many options in terms of the textbook, instructor supplements, student supplements, and multimedia products. Mix and match to create a package that is perfect for your course.

## connect McGraw-Hill Connect Finance

## LESS MANAGING. MORE TEACHING. GREATER LEARNING.

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Student study center The Connect Finance Student Study Center is the place for students to access additional resources.

## LEARNSMART ${ }^{\circ}$

Diagnostic and Adaptive Learning of Concepts: LearnSmart Students want to make the best use of their study time. The LearnSmart adaptive self-study technology within Connect Finance provides students with a seamless combination of practice, assessment, and remediation for every concept in the textbook. LearnSmart's intelligent software adapts to every student response and automatically delivers concepts that will advance the student's understanding while reducing the time devoted to the concepts already mastered. The result for every student is the fastest path to mastery of the chapter. LearnSmart:

- Applies an intelligent concept engine to identify the relationships between ideas and to serve new concepts to each student only when he or she is ready.
- Adapts automatically to each student, so students spend less time on the topics they understand and practice more on those they have yet to master.
- Provides continual reinforcement and remediation, but gives only as much guidance as students need.
- Integrates diagnostics as part of the learning experience.
- Enables you to assess which concepts students have efficiently learned on their own, thus freeing class time for more applications and discussion.


## SMARTBロロḰ

SmartBook ${ }^{\mathrm{TM}}$ uses McGraw-Hill Education's market-leading adaptive technology to provide an ultra-efficient reading and learning experience for students. Students have access to a "smart" eBook, customized to highlight the most important concepts in the chapter and those that the individual student is yet to master. As the student reads, the reading material constantly adapts to ensure the student is focused on the content he or she needs most to close knowledge gaps. Broken into separate modules that have students read, practice the material they just learned, and review material they have covered previously to improve knowledge retention, SmartBook is a next-generation study tool that is proven to improve student learning outcomes and understanding of the material.

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Prepared by Steven D. Dolvin, Butler University
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Here's a great format for a better testing process. The Test Bank has well over 100 questions per chapter that closely link with the text material and provide a variety of question formats (multiple-choice questions/problems and essay questions) and levels of difficulty (basic, intermediate, and challenge) to meet every instructor's testing needs. Problems are detailed enough to make them intuitive for students, and solutions are provided for the instructor.

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Customize our content for your course. This presentation has been thoroughly revised to include more lecture-oriented slides, as well as exhibits and examples both from the book and from outside sources. Applicable slides have Web links that take you directly to specific Internet sites, or a spreadsheet link to show an example in Excel. You can also go to the Notes Page function for more tips on presenting the slides. If you already have PowerPoint installed on your PC, you can edit, print, or rearrange the complete presentation to meet your specific needs.

## STUDENT SUPPORT

## - Narrated PowerPoint Examples

Each chapter's slides follow the chapter topics and provide steps and explanations showing how to solve key problems. Because each student learns differently, a quick click on each slide will "talk through" its contents with you!

## - Excel Templates

Corresponding to most end-of-chapter problems, each template allows the student to work through the problem using Excel. Each end-of-chapter problem with a template is indicated by an Excel icon in the margin beside it.

## - ExcelMaster

Developed by the authors for the RWJ franchise, this valuable and comprehensive supplement provides a tutorial for students in using Excel in finance, broken out by chapter sections.

## Options Available for Purchase \& Packaging

FINGAME ONLINE 5.0 ISBN-10: 0-07-721988-0 / ISBN-13: 978-0-07-721988-8

## By LeRoy Brooks, John Carroll University.

Just $\$ 15.00$ when packaged with this text. In this comprehensive simulation game, students control a hypothetical company over numerous periods of operation. As students make major financial and operating decisions for their company, they will develop and enhance skills in financial management and financial accounting statement analysis.

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[^0]:    Allocated Costs The Voetmann Consulting Corp. devotes one wing of its suite of offices to a
    ibrary requing a cash outfow of $\$ 100,000$ a year in upkeep. A proposesd capial budzeting proiect expected to generate revenue equal to 5 percent of the overall firm's sales. An executive at the firm project's share of the library's costs. is this appropriate for capital budgeting? project's share of the library's costs. Is this appropriate for capital budgeting?
    The answer is no. One must ask what the difference is between the cash flows of the entire firm with the project and the cash flows of the entire firm without the project. The firm will spend
    $\$ 100.000$ on library upkeep whether or not the proposed proiecti s accepted. Beause acceptance of the proposed proiect does not affect this cash flow, the cash flow should be ignored when calculating the NPV of the project For example, suppose the project has a positive NPV without the allocated costs but is rejected because of the allocated costs. In this case, the firm is losing potential value that
    it could have gained otherwise.
    6.2 The Baldwin Company: An Example $\underset{\substack{\text { Movel } \\ \text { coverage onter }}}{\text { Exize }}$ We next consider the example of a proposed investment in machinery and related items.
    Our example involves the Baldwin Company and colored bowling balls. Sur example involves the Baldwin Company and colored bowling balls.
    The Baldwin Company, orignally established 16 years ago to make leading producer of tennis orills, baseballs, footballs, and golf balls. Nine years ago, the company introduced "High Flite," its first line of high-performance golf balls. Baldwin management has sought opportunites in whatever businesses seem to have some potential
    for cash flow. Recently W.C. Meadows, vice president of the Baldwin Company. identified for cash flow. Recently W. C. Meadows, vice president of the Baldwin Company, identified
    another segment of the sports ball market that looked promising and that he felt was not another segment of the sports ball market that looked promising and that he felt was sor balls, and he believed many bowlers valued appearance and style above performance. He also believed that it would be difficult for competiors to take advantage of the opportunity because of boh Baldwin's cost advantages and its highly developed marketing skills As a result, the Baldwin Company investigated the marketing potential of brighty As a result, the Baldwid Company investigated the marketing potential of brighty
    colored bowling balls. Baldwin sent a questionnaire to consumers in three markets: Philadelphia, Los Angeles, and New Haven. The results of the three questionnaires were
    much better than expected and suppored the conclusion that the brightly colored bowling balls could achieve a 10 to 15 percent share of the market. Of course, some people at Baldwin complained about the cost of the test marketing, which was $\$ 250,000$. ( A
    shall see later, this is a sunk cost and should not be included in project evaluation.)
     produce bowling balls. The bowling balls would be manutactured in a building owned by the firm and located near Los Angeles. This building, which is vacant, and the land can be sold for $\$ 150,000$ after taxes.
    Working with his staff, Meadows is preparing an analysis of the proposed new prod-
    ct. He summarizes his assumptions as follows. The cost of the bow

