

This International Student Edition is for use outside of the U.S.

Bodie | Kane | Marcus

INVESTMENTS

TWELFTH EDITION

**Mc
Graw
Hill**

Investments

Financial Management

Block, Hirt, and Danielsen
Foundations of Financial Management
Seventeenth Edition

Brealey, Myers, and Allen
Principles of Corporate Finance
Thirteenth Edition

Brealey, Myers, and Allen
Principles of Corporate Finance, Concise
Second Edition

Brealey, Myers, and Marcus
Fundamentals of Corporate Finance
Tenth Edition

Brooks
FinGame Online 5.0

Bruner, Eades, and Schill
Case Studies in Finance: Managing for Corporate Value Creation
Eighth Edition

Cornett, Adair, and Nofsinger
Finance: Applications and Theory
Fifth Edition

Cornett, Adair, and Nofsinger
M: Finance
Fourth Edition

DeMello
Cases in Finance
Third Edition

Grinblatt (editor)
Stephen A. Ross, Mentor: Influence through Generations

Grinblatt and Titman
Financial Markets and Corporate Strategy
Second Edition

Higgins
Analysis for Financial Management
Twelfth Edition

Ross, Westerfield, Jaffe, and Jordan
Corporate Finance
Twelfth Edition

Ross, Westerfield, Jaffe, and Jordan
Corporate Finance: Core Principles and Applications
Sixth Edition

Ross, Westerfield, and Jordan
Essentials of Corporate Finance
Tenth Edition

Ross, Westerfield, and Jordan
Fundamentals of Corporate Finance
Twelfth Edition

Shefrin
Behavioral Corporate Finance: Decisions That Create Value
Second Edition

Investments

Bodie, Kane, and Marcus
Essentials of Investments
Eleventh Edition

Bodie, Kane, and Marcus
Investments
Twelfth Edition

Hirt and Block
Fundamentals of Investment Management
Tenth Edition

Jordan, Miller, and Dolvin
Fundamentals of Investments: Valuation and Management
Ninth Edition

Stewart, Piro, and Heisler
Running Money: Professional Portfolio Management
First Edition

Sundaram and Das
Derivatives: Principles and Practice
Second Edition

Financial Institutions and Markets

Rose and Hudgins
Bank Management and Financial Services
Ninth Edition

Rose and Marquis
Financial Institutions and Markets
Eleventh Edition

Saunders and Cornett
Financial Institutions Management: A Risk Management Approach
Saunders Edition

Saunders and Cornett
Financial Markets and Institutions
Seventh Edition

International Finance

Eun and Resnick
International Financial Management
Eighth Edition

Real Estate

Brueggeman and Fisher
Real Estate Finance and Investments
Sixteenth Edition

Ling and Archer
Real Estate Principles: A Value Approach
Sixth Edition

Financial Planning and Insurance

Allen, Melone, Rosenbloom, and Mahoney
Retirement Plans: 401(k)s, IRAs, and Other Deferred Compensation Approaches
Twelfth Edition

Altfest
Personal Financial Planning
Second Edition

Harrington and Niehaus
Risk Management and Insurance
Second Edition

Kapoor, Dlabay, Hughes, and Hart
Focus on Personal Finance: An Active Approach to Help You Achieve Financial Literacy
Sixth Edition

Kapoor, Dlabay, Hughes, and Hart
Personal Finance
Thirteenth Edition

Walker and Walker
Personal Finance: Building Your Future
Second Edition

Investments

T W E L F T H E D I T I O N

ZVI BODIE

Boston University

ALEX KANE

University of California, San Diego

ALAN J. MARCUS

Boston College





INVESTMENTS

Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2021 by McGraw-Hill Education. All rights reserved. Printed in the United States of America. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of McGraw-Hill Education, including, but not limited to, in any network or other electronic storage or transmission, or broadcast for distance learning.

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.

1 2 3 4 5 6 7 8 9 LWI 24 23 22 21 20

ISBN 978-1-260-57115-8

MHID 1-260-57115-7

Cover Image: ©*rmeo/Alamy RF*

All credits appearing on page or at the end of the book are considered to be an extension of the copyright page.

The Internet addresses listed in the text were accurate at the time of publication. The inclusion of a website does not indicate an endorsement by the authors or McGraw-Hill Education, and McGraw-Hill Education does not guarantee the accuracy of the information presented at these sites.

About the Authors

ZVI BODIE

Boston University

Zvi Bodie is Professor Emeritus at Boston University. He holds a PhD from the Massachusetts Institute of Technology and has served on the finance faculty at the Harvard Business School and MIT's Sloan School of Management. He has published widely in scholarly and professional journals on pension investment strategy and life-cycle asset-liability matching. In 2007 the Retirement Income Industry Association gave him its Lifetime Achievement Award for applied research.

ALEX KANE

University of California,
San Diego

Alex Kane holds a PhD from the Stern School of Business of New York University and has been Visiting Professor at the Faculty of Economics, University of Tokyo; Graduate School of Business, Harvard; Kennedy School of Government, Harvard; and Research Associate, National Bureau of Economic Research. An author of many articles in finance and management journals, Professor Kane's research is mainly in corporate finance, portfolio management, and capital markets.

ALAN J. MARCUS

Boston College

Alan Marcus is the Mario J. Gabelli Professor of Finance in the Carroll School of Management at Boston College. He received his PhD in economics from MIT. Professor Marcus has been a visiting professor at the Athens Laboratory of Business Administration and at MIT's Sloan School of Management and has served as a research associate at the National Bureau of Economic Research. Professor Marcus has published widely in the fields of capital markets and portfolio management. His consulting work has ranged from new-product development to provision of expert testimony in utility rate proceedings. He also spent two years at the Federal Home Loan Mortgage Corporation (Freddie Mac), where he developed models of mortgage pricing and credit risk. He currently serves on the Research Foundation Advisory Board of the CFA Institute.

Brief Contents

Preface xvi

PART I

Introduction 1

1

The Investment Environment 1

2

Asset Classes and Financial Instruments 29

3

How Securities Are Traded 59

4

Mutual Funds and Other Investment
Companies 93

PART II

Portfolio Theory and Practice 119

5

Risk, Return, and the Historical Record 119

6

Capital Allocation to Risky Assets 159

7

Efficient Diversification 193

8

Index Models 243

PART III

Equilibrium in Capital Markets 275

9

The Capital Asset Pricing Model 275

10

Arbitrage Pricing Theory and Multifactor
Models of Risk and Return 307

11

The Efficient Market Hypothesis 331

12

Behavioral Finance and Technical
Analysis 371

13

Empirical Evidence on Security Returns 395

PART IV

Fixed-Income Securities 425

14

Bond Prices and Yields 425

15

The Term Structure of Interest Rates 467

16

Managing Bond Portfolios 495

PART V

Security Analysis 537

- 17
Macroeconomic and Industry Analysis 537
- 18
Equity Valuation Models 569
- 19
Financial Statement Analysis 615

PART VI

Options, Futures, and Other
Derivatives 659

- 20
Options Markets: Introduction 659
- 21
Option Valuation 701
- 22
Futures Markets 749
- 23
Futures, Swaps, and Risk Management 777

PART VII

Applied Portfolio
Management 813

- 24
Portfolio Performance Evaluation 813
- 25
International Diversification 853
- 26
Hedge Funds 881
- 27
The Theory of Active Portfolio
Management 905
- 28
Investment Policy and the Framework of the
CFA Institute 929

REFERENCES TO CFA PROBLEMS 965

GLOSSARY G-1

NAME INDEX I-1

SUBJECT INDEX I-4

NOTATION, FORMULAS F-1

Contents

Preface xvi

PART I

Introduction 1

Chapter 1

The Investment Environment 1

- 1.1 Real Assets versus Financial Assets 2
- 1.2 Financial Assets 3
- 1.3 Financial Markets and the Economy 5
 - The Informational Role of Financial Markets / Consumption Timing / Allocation of Risk / Separation of Ownership and Management / Corporate Governance and Corporate Ethics*
- 1.4 The Investment Process 8
- 1.5 Markets Are Competitive 9
 - The Risk–Return Trade-Off / Efficient Markets*
- 1.6 The Players 11
 - Financial Intermediaries / Investment Bankers / Venture Capital and Private Equity / Fintech and Financial Innovation*
- 1.7 The Financial Crisis of 2008-2009 16
 - Antecedents of the Crisis / Changes in Housing Finance / Mortgage Derivatives / Credit Default Swaps / The Rise of Systemic Risk / The Shoe Drops / The Dodd-Frank Reform Act*
- 1.8 Outline of the Text 24
- End of Chapter Material 24–28

Chapter 2

Asset Classes and Financial Instruments 29

- 2.1 The Money Market 29
 - Treasury Bills / Certificates of Deposit / Commercial Paper / Bankers' Acceptances / Eurodollars / Repos and Reverses /*

Federal Funds / Brokers' Calls / The LIBOR Market / Yields on Money Market Instruments / Money Market Funds

2.2 The Bond Market 35

Treasury Notes and Bonds / Inflation-Protected Treasury Bonds / Federal Agency Debt / International Bonds / Municipal Bonds / Corporate Bonds / Mortgage and Asset-Backed Securities

2.3 Equity Securities 42

Common Stock as Ownership Shares / Characteristics of Common Stock / Stock Market Listings / Preferred Stock / Depositary Receipts

2.4 Stock and Bond Market Indexes 45

Stock Market Indexes / Dow Jones Industrial Average / The Standard & Poor's 500 Index / Other U.S. Market-Value Indexes / Equally Weighted Indexes / Foreign and International Stock Market Indexes / Bond Market Indicators

2.5 Derivative Markets 52

Options / Futures Contracts

End of Chapter Material 54–58

Chapter 3

How Securities Are Traded 59

3.1 How Firms Issue Securities 59

Privately Held Firms / Publicly Traded Companies / Shelf Registration / Initial Public Offerings

3.2 How Securities Are Traded 64

Types of Markets

Direct Search Markets / Brokered Markets / Dealer Markets / Auction Markets

Types of Orders

Market Orders / Price-Contingent Orders / Trading Mechanisms

Dealer Markets / Electronic Communication Networks (ECNs) / Specialist/DMM Markets

3.3 **The Rise of Electronic Trading** 68

3.4 **U.S. Markets** 70
NASDAQ / The New York Stock Exchange / ECNs

3.5 **New Trading Strategies** 72
Algorithmic Trading / High-Frequency Trading / Dark Pools / Bond Trading

3.6 **Globalization of Stock Markets** 75

3.7 **Trading Costs** 76

3.8 **Buying on Margin** 77

3.9 **Short Sales** 80

3.10 **Regulation of Securities Markets** 84
Self-Regulation / The Sarbanes-Oxley Act / Insider Trading

End of Chapter Material 88–92

Chapter 4

Mutual Funds and Other Investment Companies 93

4.1 **Investment Companies** 93

4.2 **Types of Investment Companies** 94
Unit Investment Trusts / Managed Investment Companies / Other Investment Organizations
Commingled Funds / Real Estate Investment Trusts (REITs) / Hedge Funds

4.3 **Mutual Funds** 97
Investment Policies
Money Market Funds / Equity Funds / Sector Funds / Bond Funds / International Funds / Balanced Funds / Asset Allocation and Flexible Funds / Index Funds
How Funds Are Sold

4.4 **Costs of Investing in Mutual Funds** 101
Fee Structure
Operating Expenses / Front-End Load / Back-End Load / 12b-1 Charges
Fees and Mutual Fund Returns

4.5 **Taxation of Mutual Fund Income** 104

4.6 **Exchange-Traded Funds** 105

4.7 **Mutual Fund Investment Performance: A First Look** 108

4.8 **Information on Mutual Funds** 111

End of Chapter Material 114–118

PART II

Portfolio Theory and Practice 119

Chapter 5

Risk, Return, and the Historical Record 119

5.1 **Measuring Returns over Different Holding Periods** 120
Annual Percentage Rates / Continuous Compounding

5.2 **Interest Rates and Inflation Rates** 123
Real and Nominal Rates of Interest / The Equilibrium Real Rate of Interest / Interest Rates and Inflation / Taxes and the Real Rate of Interest / Treasury Bills and Inflation, 1926–2018

5.3 **Risk and Risk Premiums** 127
Holding-Period Returns / Expected Return and Standard Deviation / Excess Returns and Risk Premiums

5.4 **Learning from Historical Returns** 131
Time Series versus Scenario Analysis / Expected Returns and the Arithmetic Average / The Geometric (Time-Weighted) Average Return / Estimating Variance and Standard Deviation / Mean and Standard Deviation Estimates from Higher-Frequency Observations / The Reward-to-Volatility (Sharpe) Ratio

5.5 **The Normal Distribution** 136

5.6 **Deviations from Normality and Tail Risk** 138
Value at Risk / Expected Shortfall / Lower Partial Standard Deviation and the Sortino Ratio / Relative Frequency of Large, Negative 3-Sigma Returns

5.7 **Historic Returns on Risky Portfolios** 141
A Global View of the Historical Record

5.8 **Normality and Long-Term Investments** 149
Short-Run versus Long-Run Risk / Forecasts for the Long Haul

End of Chapter Material 153–158

Chapter 6

Capital Allocation to Risky Assets 159

6.1 **Risk and Risk Aversion** 160
Risk, Speculation, and Gambling / Risk Aversion and Utility Values / Estimating Risk Aversion

6.2 **Capital Allocation across Risky and Risk-Free Portfolios** 165

6.3 **The Risk-Free Asset** 168

Contents

- 6.4 Portfolios of One Risky Asset and a Risk-Free Asset 168
- 6.5 Risk Tolerance and Asset Allocation 171
Non-Normal Returns
- 6.6 Passive Strategies: The Capital Market Line 177
End of Chapter Material 179–187
Appendix A: Risk Aversion, Expected Utility, and the St. Petersburg Paradox 188

Chapter 7

Efficient Diversification 193

- 7.1 Diversification and Portfolio Risk 194
- 7.2 Portfolios of Two Risky Assets 195
- 7.3 Asset Allocation with Stocks, Bonds, and Bills 203
Asset Allocation with Two Risky Asset Classes
- 7.4 The Markowitz Portfolio Optimization Model 208
Security Selection / Capital Allocation and the Separation Property / The Power of Diversification / Asset Allocation and Security Selection / Optimal Portfolios and Non-Normal Returns
- 7.5 Risk Pooling, Risk Sharing, and Time Diversification 217
Risk Sharing versus Risk Pooling / Time Diversification
End of Chapter Material 220–230
Appendix A: A Spreadsheet Model for Efficient Diversification 230
Appendix B: Review of Portfolio Statistics 235

Chapter 8

Index Models 243

- 8.1 A Single-Factor Security Market 244
The Input List of the Markowitz Model / Systematic versus Firm-Specific Risk
- 8.2 The Single-Index Model 246
The Regression Equation of the Single-Index Model / The Expected Return–Beta Relationship / Risk and Covariance in the Single-Index Model / The Set of Estimates Needed for the Single-Index Model / The Index Model and Diversification
- 8.3 Estimating the Single-Index Model 253
The Security Characteristic Line for Amazon / The Explanatory Power of Amazon’s SCL / The Estimate of Alpha / The Estimate of Beta / Firm-Specific Risk
Typical Results from Index Model Regressions
- 8.4 The Industry Version of the Index Model 257
Predicting Betas

- 8.5 Portfolio Construction Using the Single-Index Model 260

Alpha and Security Analysis / The Index Portfolio as an Investment Asset / The Single-Index Model Input List / The Optimal Risky Portfolio in the Single-Index Model / The Information Ratio / Summary of Optimization Procedure / An Example / Correlation and Covariance Matrix
Risk Premium Forecasts / The Optimal Risky Portfolio / Is the Index Model Inferior to the Full-Covariance Model?

End of Chapter Material 269–274

PART III

Equilibrium in Capital Markets 275

Chapter 9

The Capital Asset Pricing Model 275

- 9.1 The Capital Asset Pricing Model 275
The Market Portfolio / The Passive Strategy Is Efficient / The Risk Premium of the Market Portfolio / Expected Returns on Individual Securities / The Security Market Line / The CAPM and the Single-Index Market
- 9.2 Assumptions and Extensions of the CAPM 286
Identical Input Lists / Risk-Free Borrowing and the Zero-Beta Model / Labor Income and Other Nontraded Assets / A Multiperiod Model and Hedge Portfolios / A Consumption-Based CAPM / Liquidity and the CAPM
- 9.3 The CAPM and the Academic World 296
- 9.4 The CAPM and the Investment Industry 297
End of Chapter Material 298–306

Chapter 10

Arbitrage Pricing Theory and Multifactor Models of Risk and Return 307

- 10.1 Multifactor Models: A Preview 308
Factor Models of Security Returns
- 10.2 Arbitrage Pricing Theory 310
Arbitrage, Risk Arbitrage, and Equilibrium / Diversification in a Single-Factor Security Market / Well-Diversified Portfolios / The Security Market Line of the APT
Individual Assets and the APT
Well-Diversified Portfolios in Practice
- 10.3 The APT and the CAPM 317
- 10.4 A Multifactor APT 318

- 10.5 The Fama-French (FF) Three-Factor Model 321**
Estimating and Implementing a Three-Factor SML / Smart Betas and Multifactor Models
End of Chapter Material 325–330

Chapter 11

The Efficient Market Hypothesis 331

- 11.1 Random Walks and Efficient Markets 332**
Competition as the Source of Efficiency / Versions of the Efficient Market Hypothesis
- 11.2 Implications of the EMH 336**
Technical Analysis / Fundamental Analysis / Active versus Passive Portfolio Management / The Role of Portfolio Management in an Efficient Market / Resource Allocation
- 11.3 Event Studies 341**
- 11.4 Are Markets Efficient? 345**
The Issues
The Magnitude Issue / The Selection Bias Issue / The Lucky Event Issue
Weak-Form Tests: Patterns in Stock Returns
Returns over Short Horizons / Returns over Long Horizons
Predictors of Broad Market Returns / Semistrong Tests: Market Anomalies
The Small-Firm Effect / The Neglected-Firm and Liquidity Effects / Book-to-Market Ratios / Post-Earnings-Announcement Price Drift / Other Predictors of Stock Returns
Strong-Form Tests: Inside Information / Interpreting the Anomalies
Risk Premiums or Inefficiencies? / Anomalies or Data Mining? / Anomalies over Time
Bubbles and Market Efficiency
- 11.5 Mutual Fund and Analyst Performance 358**
Stock Market Analysts / Mutual Fund Managers / So, Are Markets Efficient?
End of Chapter Material 363–370

Chapter 12

Behavioral Finance and Technical Analysis 371

- 12.1 The Behavioral Critique 372**
Information Processing
Limited Attention, Underreaction, and Overreaction / Overconfidence / Conservatism / Extrapolation and Pattern Recognition

- Behavioral Biases*
Framing / Mental Accounting / Regret Avoidance / Affect and Feelings / Prospect Theory
Limits to Arbitrage
Fundamental Risk / Implementation Costs / Model Risk
Limits to Arbitrage and the Law of One Price
“Siamese Twin” Companies / Equity Carve-Outs / Closed-End Funds
Bubbles and Behavioral Economics / Evaluating the Behavioral Critique
- 12.2 Technical Analysis and Behavioral Finance 382**
Trends and Corrections
Momentum and Moving Averages / Relative Strength / Breadth
Sentiment Indicators
Trin Statistic / Confidence Index / Short Interest / Put/Call Ratio
A Warning
End of Chapter Material 389–394

Chapter 13

Empirical Evidence on Security Returns 395

- 13.1 The Index Model and the Single-Factor SML 396**
The Expected Return–Beta Relationship
Setting Up the Sample Data / Estimating the SCL / Estimating the SML
Tests of the CAPM / The Market Index / Measurement Error in Beta
- 13.2 Tests of the Multifactor Models 401**
Labor Income / Private (Nontraded) Business / Early Tests of the Multifactor CAPM and APT / A Macro Factor Model
- 13.3 Fama-French-Type Factor Models 405**
Size and B/M as Risk Factors / Behavioral Explanations / Momentum: A Fourth Factor / Characteristics versus Factor Sensitivities
- 13.4 Liquidity and Asset Pricing 413**
- 13.5 Consumption-Based Asset Pricing and the Equity Premium Puzzle 415**
Expected versus Realized Returns / Survivorship Bias / Extensions to the CAPM May Resolve the Equity Premium Puzzle / Liquidity and the Equity Premium Puzzle / Behavioral Explanations of the Equity Premium Puzzle
End of Chapter Material 421–424

PART IV

Fixed-Income Securities 425

Chapter 14

Bond Prices and Yields 425

- 14.1 Bond Characteristics 426**
Treasury Bonds and Notes
Accrued Interest and Quoted Bond Prices
Corporate Bonds
Call Provisions on Corporate Bonds / Convertible Bonds / Puttable Bonds / Floating-Rate Bonds
Preferred Stock / Other Domestic Issuers / International Bonds / Innovation in the Bond Market
Inverse Floaters / Asset-Backed Bonds / Catastrophe Bonds / Indexed Bonds
- 14.2 Bond Pricing 432**
Bond Pricing between Coupon Dates
- 14.3 Bond Yields 438**
Yield to Maturity / Yield to Call / Realized Compound Return versus Yield to Maturity
- 14.4 Bond Prices over Time 444**
Yield to Maturity versus Holding-Period Return / Zero-Coupon Bonds and Treasury Strips / After-Tax Returns
- 14.5 Default Risk and Bond Pricing 449**
Junk Bonds / Determinants of Bond Safety / Bond Indentures
Sinking Funds / Subordination of Further Debt / Dividend Restrictions / Collateral
Yield to Maturity and Default Risk / Credit Default Swaps / Credit Risk and Collateralized Debt Obligations
End of Chapter Material 460–466

Chapter 15

The Term Structure of Interest Rates 467

- 15.1 The Yield Curve 467**
Bond Pricing
- 15.2 The Yield Curve and Future Interest Rates 470**
The Yield Curve under Certainty / Holding-Period Returns / Forward Rates
- 15.3 Interest Rate Uncertainty and Forward Rates 475**
- 15.4 Theories of the Term Structure 477**
The Expectations Hypothesis / Liquidity Preference Theory
- 15.5 Interpreting the Term Structure 480**
- 15.6 Forward Rates as Forward Contracts 484**
End of Chapter Material 486–494

Chapter 16

Managing Bond Portfolios 495

- 16.1 Interest Rate Risk 496**
Interest Rate Sensitivity / Duration / What Determines Duration?
Rule 1 for Duration / Rule 2 for Duration / Rule 3 for Duration / Rule 4 for Duration / Rule 5 for Duration
- 16.2 Convexity 505**
Why Do Investors Like Convexity? / Duration and Convexity of Callable Bonds / Duration and Convexity of Mortgage-Backed Securities
- 16.3 Passive Bond Management 513**
Bond-Index Funds / Immunization / Cash Flow Matching and Dedication / Other Problems with Conventional Immunization
- 16.4 Active Bond Management 522**
Sources of Potential Profit / Horizon Analysis
End of Chapter Material 525–536

PART V

Security Analysis 537

Chapter 17

Macroeconomic and Industry Analysis 537

- 17.1 The Global Economy 537**
- 17.2 The Domestic Macroeconomy 540**
Key Economic Indicators
Gross Domestic Product / Employment / Inflation / Interest Rates / Budget Deficit / Sentiment
- 17.3 Demand and Supply Shocks 542**
- 17.4 Federal Government Policy 542**
Fiscal Policy / Monetary Policy / Supply-Side Policies
- 17.5 Business Cycles 545**
The Business Cycle / Economic Indicators / Other Indicators
- 17.6 Industry Analysis 549**
Defining an Industry / Sensitivity to the Business Cycle / Sector Rotation / Industry Life Cycles
Start-Up Stage / Consolidation Stage / Maturity Stage / Relative Decline
Industry Structure and Performance
Threat of Entry / Rivalry between Existing Competitors / Pressure from Substitute Products / Bargaining Power of Buyers / Bargaining Power of Suppliers
End of Chapter Material 560–568

Chapter 18

Equity Valuation Models 569

- 18.1 Valuation by Comparables 569**
Limitations of Book Value
- 18.2 Intrinsic Value versus Market Price 571**
- 18.3 Dividend Discount Models 573**
The Constant-Growth DDM / Convergence of Price to Intrinsic Value / Stock Prices and Investment Opportunities / Life Cycles and Multistage Growth Models / Multistage Growth Models
- 18.4 The Price–Earnings Ratio 587**
The Price–Earnings Ratio and Growth Opportunities / P/E Ratios and Stock Risk / Pitfalls in P/E Analysis / The Cyclically Adjusted P/E Ratio / Combining P/E Analysis and the DDM / Other Comparative Valuation Ratios
Price-to-Book Ratio / Price-to-Cash-Flow Ratio / Price-to-Sales Ratio
- 18.5 Free Cash Flow Valuation Approaches 596**
Comparing the Valuation Models / The Problem with DCF Models
- 18.6 The Aggregate Stock Market 601**
End of Chapter Material 603–614

Chapter 19

Financial Statement Analysis 615

- 19.1 The Major Financial Statements 615**
The Income Statement / The Balance Sheet / The Statement of Cash Flows
- 19.2 Measuring Firm Performance 620**
- 19.3 Profitability Measures 621**
Return on Assets, ROA / Return on Capital, ROC / Return on Equity, ROE / Financial Leverage and ROE / Economic Value Added
- 19.4 Ratio Analysis 625**
Decomposition of ROE / Turnover and Other Asset Utilization Ratios / Liquidity Ratios / Market Price Ratios: Growth versus Value / Choosing a Benchmark
- 19.5 An Illustration of Financial Statement Analysis 635**
- 19.6 Comparability Problems 638**
Inventory Valuation / Depreciation / Inflation and Interest Expense / Fair Value Accounting / Quality of Earnings and Accounting Practices / International Accounting Conventions
- 19.7 Value Investing: The Graham Technique 644**
End of Chapter Material 645–658

PART VI

Options, Futures, and Other Derivatives 659

Chapter 20

Options Markets: Introduction 659

- 20.1 The Option Contract 659**
Options Trading / American versus European Options / Adjustments in Option Contract Terms / The Options Clearing Corporation / Other Listed Options
Index Options / Futures Options / Foreign Currency Options / Interest Rate Options
- 20.2 Values of Options at Expiration 665**
Call Options / Put Options / Option versus Stock Investments
- 20.3 Option Strategies 669**
Protective Put / Covered Calls / Straddle / Spreads / Collars
- 20.4 The Put-Call Parity Relationship 677**
- 20.5 Option-Like Securities 680**
Callable Bonds / Convertible Securities / Warrants / Collateralized Loans / Levered Equity and Risky Debt
- 20.6 Financial Engineering 686**
- 20.7 Exotic Options 688**
Asian Options / Barrier Options / Lookback Options / Currency-Translated Options / Digital Options
End of Chapter Material 689–700

Chapter 21

Option Valuation 701

- 21.1 Option Valuation: Introduction 701**
Intrinsic and Time Values / Determinants of Option Values
- 21.2 Restrictions on Option Values 705**
Restrictions on the Value of a Call Option / Early Exercise and Dividends / Early Exercise of American Puts
- 21.3 Binomial Option Pricing 708**
Two-State Option Pricing / Generalizing the Two-State Approach / Making the Valuation Model Practical
- 21.4 Black-Scholes Option Valuation 716**
The Black-Scholes Formula / Dividends and Call Option Valuation / Put Option Valuation / Dividends and Put Option Valuation

- 21.5 Using the Black-Scholes Formula 724**
Hedge Ratios and the Black-Scholes Formula / Portfolio Insurance / Option Pricing and the Financial Crisis / Option Pricing and Portfolio Theory / Hedging Bets on Mispriced Options
- 21.6 Empirical Evidence on Option Pricing 736**
End of Chapter Material 737–748

Chapter 22

Futures Markets 749

- 22.1 The Futures Contract 749**
The Basics of Futures Contracts / Existing Contracts
- 22.2 Trading Mechanics 755**
The Clearinghouse and Open Interest / The Margin Account and Marking to Market / Cash versus Actual Delivery / Regulations / Taxation
- 22.3 Futures Markets Strategies 759**
Hedging and Speculation / Basis Risk and Hedging
- 22.4 Futures Prices 763**
The Spot-Futures Parity Theorem / Spreads / Forward versus Futures Pricing
- 22.5 Futures Prices versus Expected Spot Prices 770**
Expectations Hypothesis / Normal Backwardation / Contango / Modern Portfolio Theory
- End of Chapter Material 772–776**

Chapter 23

Futures, Swaps, and Risk Management 777

- 23.1 Foreign Exchange Futures 777**
The Markets / Interest Rate Parity / Direct versus Indirect Quotes / Using Futures to Manage Exchange Rate Risk
- 23.2 Stock-Index Futures 785**
The Contracts / Creating Synthetic Stock Positions: An Asset Allocation Tool / Index Arbitrage / Using Index Futures to Hedge Market Risk
- 23.3 Interest Rate Futures 790**
Hedging Interest Rate Risk
- 23.4 Swaps 792**
Swaps and Balance Sheet Restructuring / The Swap Dealer / Other Interest Rate Contracts / Swap Pricing / Credit Risk in the Swap Market / Credit Default Swaps
- 23.5 Commodity Futures Pricing 799**
Pricing with Storage Costs / Discounted Cash Flow Analysis for Commodity Futures
- End of Chapter Material 803–812**

PART VII

Applied Portfolio Management 813

Chapter 24

Portfolio Performance Evaluation 813

- 24.1 The Conventional Theory of Performance Evaluation 813**
Average Rates of Return / Time-Weighted Returns versus Dollar-Weighted Returns / Adjusting Returns for Risk / Risk-Adjusted Performance Measures / The Sharpe Ratio for Overall Portfolios
The M² Measure and the Sharpe Ratio
The Treynor Ratio / The Information Ratio / The Role of Alpha in Performance Measures / Implementing Performance Measurement: An Example / Realized Returns versus Expected Returns / Selection Bias and Portfolio Evaluation
- 24.2 Style Analysis 825**
- 24.3 Performance Measurement with Changing Portfolio Composition 827**
Performance Manipulation and the Morningstar Risk-Adjusted Rating
- 24.4 Market Timing 831**
The Potential Value of Market Timing / Valuing Market Timing as a Call Option / The Value of Imperfect Forecasting
- 24.5 Performance Attribution Procedures 836**
Asset Allocation Decisions / Sector and Security Selection Decisions / Summing Up Component Contributions
- End of Chapter Material 841–852**

Chapter 25

International Diversification 853

- 25.1 Global Markets for Equities 853**
Developed Countries / Emerging Markets / Market Capitalization and GDP / Home-Country Bias
- 25.2 Exchange Rate Risk and International Diversification 857**
Exchange Rate Risk / Investment Risk in International Markets / International Diversification / Are Benefits from International Diversification Preserved in Bear Markets?
- 25.3 Political Risk 868**

25.4 International Investing and Performance Attribution 871
Constructing a Benchmark Portfolio of Foreign Assets / Performance Attribution
End of Chapter Material 875–880

Chapter 26

Hedge Funds 881

26.1 Hedge Funds versus Mutual Funds 882
Transparency / Investors / Investment Strategies / Liquidity / Compensation Structure

26.2 Hedge Fund Strategies 883
Directional versus Nondirectional Strategies / Statistical Arbitrage / High-Frequency Strategies
Electronic News Feeds / Cross-Market Arbitrage / Electronic Market Making / Electronic “Front Running”

26.3 Portable Alpha 886
An Example of a Pure Play

26.4 Style Analysis for Hedge Funds 889

26.5 Performance Measurement for Hedge Funds 891
Liquidity and Hedge Fund Performance / Hedge Fund Performance and Selection Bias / Hedge Fund Performance and Changing Factor Loadings / Tail Events and Hedge Fund Performance

26.6 Fee Structure in Hedge Funds 898
End of Chapter Material 901–904

Chapter 27

The Theory of Active Portfolio Management 905

27.1 Optimal Portfolios and Alpha Values 905
Forecasts of Alpha Values and Extreme Portfolio Weights / Restriction of Benchmark Risk

27.2 The Treynor-Black Model and Forecast Precision 912
Adjusting Forecasts for the Precision of Alpha / Distribution of Alpha Values / Organizational Structure and Performance

27.3 The Black-Litterman Model 916
Black-Litterman Asset Allocation Decision / Step 1: The Covariance Matrix from Historical Data / Step 2: Determination of a Baseline Forecast / Step 3: Integrating the Manager’s Private Views / Step 4: Revised (Posterior) Expectations / Step 5: Portfolio Optimization

27.4 Treynor-Black versus Black-Litterman: Complements, Not Substitutes 921
The BL Model as Icing on the TB Cake / Why Not Replace the Entire TB Cake with the BL Icing?

27.5 The Value of Active Management 923
A Model for the Estimation of Potential Fees / Results from the Distribution of Actual Information Ratios / Results from Distribution of Actual Forecasts

27.6 Concluding Remarks on Active Management 925
End of Chapter Material 925–926
Appendix A: Forecasts and Realizations of Alpha 926
Appendix B: The General Black-Litterman Model 927

Chapter 28

Investment Policy and the Framework of the CFA Institute 929

28.1 The Investment Management Process 930
Objectives

28.2 Major Investor Types 932
Individual Investors / Personal Trusts / Mutual Funds / Pension Funds / Endowment Funds / Life Insurance Companies / Non-Life Insurance Companies / Banks

28.3 Constraints 935
Liquidity / Investment Horizon / Regulations / Tax Considerations / Unique Needs

28.4 Policy Statements 938
Sample Policy Statements for Individual Investors

28.5 Asset Allocation 942
Taxes and Asset Allocation

28.6 Managing Portfolios of Individual Investors 944
Human Capital and Insurance / Investment in Residence / Saving for Retirement and the Assumption of Risk / Retirement Planning Models / Manage Your Own Portfolio or Rely on Others? / Tax Sheltering
The Tax-Deferral Option / Tax-Protected Retirement Plans / Deferred Annuities / Variable and Universal Life Insurance

28.7 Pension Funds 950
Defined Contribution Plans / Defined Benefit Plans / Pension Investment Strategies
Investing in Equities / Wrong Reasons to Invest in Equities

28.8 Investments for the Long Run 953
Target Date Funds / Inflation Risk and Long-Term Investors
End of Chapter Material 954–964

REFERENCES TO CFA PROBLEMS 965
GLOSSARY G-1
NAME INDEX I-1
SUBJECT INDEX I-4
NOTATION, FORMULAS F-1

Preface

The past three decades witnessed rapid and profound change in the investments industry as well as a financial crisis of historic magnitude. The vast expansion of financial markets during this period was due in part to innovations in securitization and credit enhancement that gave birth to new trading strategies. These strategies were in turn made feasible by developments in communication and information technology, as well as by advances in the theory of investments.

Yet the financial crisis also was rooted in the cracks of these developments. Many of the innovations in security design facilitated high leverage and an exaggerated notion of the efficacy of risk transfer strategies. This engendered complacency about risk that was coupled with relaxation of regulation as well as reduced transparency, masking the precarious condition of many big players in the system. Of necessity, our text has evolved along with financial markets and their influence on world events.

Investments, Twelfth Edition, is intended primarily as a textbook for courses in investment analysis. Our guiding principle has been to present the material in a framework that is organized by a central core of consistent fundamental principles. We attempt to strip away unnecessary mathematical and technical detail, and we have concentrated on providing the intuition that may guide students and practitioners as they confront new ideas and challenges in their professional lives.

This text will introduce you to major issues currently of concern to all investors. It can give you the skills to assess watershed current issues and debates covered by both the popular media and more-specialized finance journals. Whether you plan to become an investment professional, or simply a sophisticated individual investor, you will find these skills essential, especially in today's rapidly evolving environment.

Our primary goal is to present material of practical value, but all three of us are active researchers in financial economics and find virtually all of the material in this book

to be of great intellectual interest. The capital asset pricing model, the arbitrage pricing model, the efficient markets hypothesis, the option-pricing model, and the other centerpieces of modern financial research are as much intellectually engaging subjects as they are of immense practical importance for the sophisticated investor.

In our effort to link theory to practice, we also have attempted to make our approach consistent with that of the CFA Institute. In addition to fostering research in finance, the CFA Institute administers an education and certification program to candidates seeking designation as a Chartered Financial Analyst (CFA). The CFA curriculum represents the consensus of a committee of distinguished scholars and practitioners regarding the core of knowledge required by the investment professional.

Many features of this text make it consistent with and relevant to the CFA curriculum. Questions adapted from past CFA exams appear at the end of nearly every chapter, and references are listed at the end of the book. Chapter 3 includes excerpts from the "Code of Ethics and Standards of Professional Conduct" of the CFA Institute. Chapter 28, which discusses investors and the investment process, presents the CFA Institute's framework for systematically relating investor objectives and constraints to ultimate investment policy. End-of-chapter problems also include questions from test-prep leader Kaplan Schweser.

In the Twelfth Edition, we have continued our systematic presentation of Excel spreadsheets that will allow you to explore concepts more deeply. These spreadsheets, available in Connect and on the student resources site (www.mhhe.com/Bodie12e), provide a taste of the sophisticated analytic tools available to professional investors.

UNDERLYING PHILOSOPHY

While the financial environment is constantly evolving, many basic *principles* remain important. We believe that

fundamental principles should organize and motivate all study and that attention to these few central ideas can simplify the study of otherwise difficult material. These principles are crucial to understanding the securities traded in financial markets and in understanding new securities that will be introduced in the future, as well as their effects on global markets. For this reason, we have made this book thematic, meaning we never offer rules of thumb without reference to the central tenets of the modern approach to finance.

The common theme unifying this book is that *security markets are nearly efficient*, meaning most securities are usually priced appropriately given their risk and return attributes. Free lunches are rarely found in markets as competitive as the financial market. This simple observation is, nevertheless, remarkably powerful in its implications for the design of investment strategies; as a result, our discussions of strategy are always guided by the implications of the efficient markets hypothesis. While the degree of market efficiency is, and always will be, a matter of debate (in fact we devote a full chapter to the behavioral challenge to the efficient market hypothesis), we hope our discussions throughout the book convey a good dose of healthy skepticism concerning much conventional wisdom.

Distinctive Themes

Investments is organized around several important themes:

1. The central theme is the **near-informational-efficiency of well-developed security markets**, such as those in the United States, and the general awareness that competitive markets do not offer “free lunches” to participants.

A second theme is the **risk–return trade-off**. This too is a no-free-lunch notion, holding that in competitive security markets, higher expected returns come only at a price: the need to bear greater investment risk. However, this notion leaves several questions unanswered. How should one measure the risk of an asset? What should be the quantitative trade-off between risk (properly measured) and expected return? The approach we present to these issues is known as *modern portfolio theory*, which is another organizing principle of this book. Modern portfolio theory focuses on the techniques and implications of *efficient diversification*, and we devote considerable attention to the effect of diversification on portfolio risk as well as the implications of efficient diversification for the proper measurement of risk and the risk–return relationship.

2. This text places great emphasis on **asset allocation**. We prefer this emphasis for two important reasons. First, it corresponds to the procedure that most individuals

actually follow. Typically, you start with all of your money in a bank account, only then considering how much to invest in something riskier that might offer a higher expected return. The logical step at this point is to consider risky asset classes, such as stocks, bonds, or real estate. This is an asset allocation decision. Second, asset allocation is the primary determinant of the risk–return profile of the investment portfolio, and so it deserves primary attention in a study of investment policy.

3. This text offers a **broad and deep treatment of futures, options, and other derivative security markets**. These markets have become both crucial and integral to the financial universe. Your only choice is to become conversant in these markets—whether you are to be a finance professional or simply a sophisticated individual investor.

NEW IN THE TWELFTH EDITION

The following is a guide to changes in the Twelfth Edition. This is not an exhaustive road map, but instead is meant to provide an overview of substantial additions and changes to coverage from the last edition of the text.

Chapter 1 The Investment Environment

This chapter now addresses Fintech and cryptocurrency.

Chapter 2 Asset Classes and Financial Instruments

We have updated the material on the LIBOR scandal and proposed replacements for the LIBOR rate that may be implemented in the next few years.

Chapter 3 How Securities Are Traded

This chapter has been updated for developments in market microstructure, including the replacement of specialists by designated market makers.

Chapter 5 Risk, Return, and the Historical Record

This chapter has been extensively reorganized and substantially streamlined. The material on interest rates and the discussion of historical evidence on the risk–return relation have both been unified.

Chapter 7 Efficient Diversification

The discussion of risk sharing, risk pooling, and time diversification has been extensively rewritten with a greater emphasis on intuition.

Chapter 9 The Capital Asset Pricing Model

We have added more discussion of extensions to the CAPM, in particular, the implications of labor and other nonfinancial income for the risk–return trade-off.

Chapter 10 Arbitrage Pricing Theory and Multifactor Models of Risk and Return

The chapter now contains an explicit illustration of the estimation and implementation of a multifactor security market line. It also contains a new section on smart betas.

Chapter 11 The Efficient Market Hypothesis

We have added material on recently uncovered market anomalies, for example, related to volatility, accruals, growth, and profitability.

Chapter 12 Behavioral Finance and Technical Analysis

We have updated and expanded the material on the range of behavioral biases that seem to characterize investor decision making.

Chapter 13 Empirical Evidence on Security Returns

We have added a discussion of the debate concerning characteristics versus factor sensitivities as determinants of expected return.

Chapter 18 Equity Valuation Models

This chapter includes more examples and discussion of growth opportunities. It also now includes a discussion of Shiller's CAPE (cyclically-adjusted P/E ratio).

Chapter 24 Portfolio Performance Evaluation

We have revamped the derivation and motivation of the M-square and T-square measures, which attempt to restate the Sharpe and Treynor measures in terms of more easily interpreted units. We also extend the discussion of selection bias in interpreting published investment performance.

Chapter 26 Hedge Funds

This chapter has been updated to include more material on high-frequency hedge fund strategies.

Chapter 28 Investment Policy and the Framework of the CFA Institute

We have added material on online retirement planners and have expanded and better organized the material on the objectives and constraints facing a wide variety of investors.

ORGANIZATION AND CONTENT

The text is composed of seven sections that are fairly independent and may be studied in a variety of sequences. Because there is enough material in the book for a two-semester course, clearly a one-semester course will require the instructor to decide which parts to include.

Part One is introductory and contains important institutional material focusing on the financial environment.

We discuss the major players in the financial markets, provide an overview of the types of securities traded in those markets, and explain how and where securities are traded. We also discuss in depth mutual funds and other investment companies, which have become an increasingly important means of investing for individual investors. Perhaps most important, we address how financial markets can influence all aspects of the global economy, as in 2008.

The material presented in Part One should make it possible for instructors to assign term projects early in the course. These projects might require the student to analyze in detail a particular group of securities. Many instructors like to involve their students in some sort of investment game, and the material in these chapters will facilitate this process.

Parts Two and Three contain the core of modern portfolio theory. Chapter 5 is a general discussion of risk and return, making the general point that historical returns on broad asset classes are consistent with a risk–return trade-off and examining the distribution of stock returns. We focus more closely in Chapter 6 on how to describe investors' risk preferences and how they bear on asset allocation. In the next two chapters, we turn to portfolio optimization (Chapter 7) and its implementation using index models (Chapter 8).

After our treatment of modern portfolio theory in Part Two, we investigate in Part Three the implications of that theory for the equilibrium structure of expected rates of return on risky assets. Chapter 9 treats the capital asset pricing model and Chapter 10 covers multifactor descriptions of risk and the arbitrage pricing theory. Chapter 11 covers the efficient market hypothesis, including its rationale as well as evidence that supports the hypothesis and challenges it. Chapter 12 is devoted to the behavioral critique of market rationality. Finally, we conclude Part Three with Chapter 13 on empirical evidence on security pricing. This chapter contains evidence concerning the risk–return relationship, as well as liquidity effects on asset pricing.

Part Four is the first of three parts on security valuation. This part treats fixed-income securities—bond pricing (Chapter 14), term structure relationships (Chapter 15), and interest-rate risk management (Chapter 16). **Parts Five and Six** deal with equity securities and derivative securities. For a course emphasizing security analysis and excluding portfolio theory, one may proceed directly from Part One to Part Four with no loss in continuity.

Finally, **Part Seven** considers several topics important for portfolio managers, including performance evaluation, international diversification, active management, and practical issues in the process of portfolio management. This part also contains a chapter on hedge funds.

Distinctive Features

This book contains several features designed to make it easy for students to understand, absorb, and apply the concepts and techniques presented.

CONCEPT CHECKS

A unique feature of this book! These self-test questions and problems found in the body of the text enable the students to determine whether they've understood the preceding material. Detailed solutions are provided at the end of each chapter.

✓ Concept Check 9.2

Data from the last nine decades for the broad U.S. equity market yield the following statistics: average excess return, 8.3%; standard deviation, 20.1%.

- To the extent that these averages approximated investor expectations for the period, what must have been the average coefficient of risk aversion?
- If the coefficient of risk aversion were actually 3.5, what risk premium would have been consistent with the market's historical standard deviation?

Example 18.2 The Constant-Growth DDM

High Flyer Industries has just paid its annual dividend of \$3 per share. The dividend is expected to grow at a constant rate of 8% indefinitely. The beta of High Flyer stock is 1.0, the risk-free rate is 6%, and the market risk premium is 8%. What is the intrinsic value of the stock? What would be your estimate of intrinsic value if you believed that the stock was riskier, with a beta of 1.25?

Because a \$3 dividend has just been paid and the growth rate of dividends is 8%, the forecast for the year-end dividend is $\$3 \times 1.08 = \3.24 . The market capitalization rate (using the CAPM) is $6\% + 1.0 \times 8\% = 14\%$. Therefore, the value of the stock is

$$V_0 = \frac{D_1}{k - g} = \frac{\$3.24}{.14 - .08} = \$54$$

If the stock is perceived to be riskier, its value must be lower. At the higher beta, the market capitalization rate is $6\% + 1.25 \times 8\% = 16\%$, and the stock is worth only

$$\frac{\$3.24}{.16 - .08} = \$40.50$$

NUMBERED EXAMPLES

are integrated throughout chapters.

Using the worked-out solutions to these examples as models, students can learn how to solve specific problems step-by-step as well as gain insight into general principles by seeing how they are applied to answer concrete questions.

WORDS FROM THE STREET BOXES

Short articles and financial coverage adapted from business periodicals, such as *The Wall Street Journal*, are included in boxes throughout the text. The articles are chosen for real-world relevance and clarity of presentation.

WORDS FROM THE STREET

What Level of Risk Is Right for You?

No risk, no reward. Most people intuitively understand that they have to bear some risk to achieve an acceptable return on their investment portfolios.

But how much risk is right for you? If your investments turn sour, you may put at jeopardy your ability to retire, to pay for your kid's college education, or to weather an unexpected need for cash. These worst-case scenarios focus our attention on how to manage our exposure to uncertainty.

Assessing—and quantifying—risk aversion is, to put it mildly, difficult. It requires confronting at least these two big questions.

First, how much investment risk can you afford to take? If you have a steady high-paying job, for example, you have greater ability to withstand investment losses. Conversely, if you are close to retirement, you have less ability to adjust your lifestyle in response to bad investment outcomes.

Second, you need to think about your personality and decide how much risk you can tolerate. At what point will you be unable to sleep at night?

To help clients quantify their risk aversion, many financial firms have designed quizzes to help people determine whether they are conservative, moderate, or aggressive investors. These quizzes try to get at clients' attitudes toward risk and their capacity to absorb investment losses.

Here is a sample of the sort of questions that can shed light on an investor's risk tolerance.

MEASURING YOUR RISK TOLERANCE

Circle the letter that corresponds to your answer.

- The stock market fell by more than 30% in 2008. If you had been holding a substantial stock investment in that year, which of the following would you have done?
 - Sold off the remainder of your investment before it had the chance to fall further.
 - Stayed the course with neither redemptions nor purchases.
 - Bought more stock, reasoning that the market is now cheaper and therefore offers better deals.
- The value of one of the funds in your 401(k) plan (your primary source of retirement savings) increased 30% last year. What do you do?
 - At the end of the month, you find yourself
 - Short of cash and impatiently waiting for your next paycheck.
 - Not overspending your salary, but not saving very much.
 - With a comfortable surplus of funds to put into your savings account.
 - You are 30 years old and enrolling in your company's retirement plan, and you need to allocate your contributions across 3 funds: a money market account, a bond fund, and a stock fund. Which of these allocations sounds best to you?
 - Invest everything in a safe money-market fund.
 - Split your money evenly between the bond fund and stock fund.
 - Put everything into the stock fund, reasoning that by the time you retire, the year-to-year fluctuations in stock returns will have evened out.
 - You are a contestant on *Let's Make a Deal*, and have just won \$1,000. But you can exchange the winnings for two random payoffs. One is a coin flip with a payoff of \$2,500 if the coin comes up heads. The other is a flip of two coins with a payoff of \$6,000 if both coins come up heads. What will you do?
 - Keep the \$1,000 in cash.
 - Choose the single coin toss.
 - Choose the double coin toss.
 - Suppose you have the opportunity to invest in a start-up firm. If the firm is successful, you will multiply your investment by a factor of ten. But if it fails, you will lose everything. You think the odds of success are around 20%. How much would you be willing to invest in the start-up?
 - Nothing
 - 2 months' salary
 - 6 months' salary
 - Now imagine that to buy into the start-up you will need to borrow money. Would you be willing to take out a \$10,000 loan to make the investment?

EXCEL APPLICATIONS

The Twelfth Edition features Excel Spreadsheet Applications with Excel questions. A sample spreadsheet is presented in the text with an interactive version available in Connect and on the student resources site at www.mhhe.com/Bodie12e.

eXcel APPLICATIONS: Two-Security Model

The accompanying spreadsheet can be used to analyze the return and risk of a portfolio of two risky assets. The model calculates expected return and volatility for varying weights of each security as well as the optimal risky and minimum-variance portfolios. Graphs are automatically generated for various model inputs. The model allows you to specify a target rate of return and solves for optimal complete portfolios composed of the risk-free asset and the optimal risky portfolio. The spreadsheet is constructed using the two-security return data (expressed as decimals, not percentages) from Table 7.1. This spreadsheet is available in Connect or through your course instructor.

Excel Question

- Suppose your target expected rate of return is 11%.
 - What is the lowest-volatility portfolio that provides that expected return?
 - What is the standard deviation of that portfolio?
 - What is the composition of that portfolio?

Asset Allocation Analysis: Risk and Return	A	B	C	D	E	F
Expected Return	Expected	Standard	Correlation			
Return	Deviation	Coefficient	Covariance			
Security 1	0.08	0.12	0.3	0.0072		
Security 2	0.13	0.22				
T-Bill	0.05	0				
Weight	Weight	Expected	Standard	Reward to		
Security 1	Security 2	Return	Deviation	Volatility		
1	0	0.08000	0.12000	0.25000		
0.9	0.1	0.08500	0.11999	0.26281		
0.8	0.2	0.09000	0.11854	0.26922		
0.7	0.3	0.09500	0.11696	0.28474		
0.6	0.4	0.10000	0.12264	0.40771		

EXCEL EXHIBITS

Selected exhibits are set as Excel spreadsheets, and the accompanying files are available in Connect and on the student resources site at www.mhhe.com/Bodie12e.

	A	B	C	D	E	F	G
		Time until			PV of CF		Column (C)
		Payment			(Discount rate =		times
		Period	Years	Cash Flow	5% per period)	Weight*	Column (F)
4	A. 8% coupon bond	1	0.5	40	38.095	0.0395	0.0197
5		2	1.0	40	36.281	0.0376	0.0376
6		3	1.5	40	34.554	0.0358	0.0537
7		4	2.0	1040	855.611	0.8871	1.7741
8		Sum:			964.540	1.0000	1.8852
10	B. Zero-coupon	1	0.5	0	0.000	0.0000	0.0000
11		2	1.0	0	0.000	0.0000	0.0000
12		3	1.5	0	0.000	0.0000	0.0000
13		4	2.0	1000	822.702	1.0000	2.0000
14		Sum:			822.702	1.0000	2.0000
16	Semiannual int rate:	0.05					
18	*Weight = Present value of each payment (column E) divided by the bond price.						

Spreadsheet 16.1
Calculating the duration of two bonds
Column sums subject to rounding error.

PROBLEM SETS

We strongly believe that practice in solving problems is critical to understanding investments, so each chapter provides a good variety of problems. Select problems and algorithmic versions are assignable within Connect.

PROBLEM SETS

- The Fisher equation tells us that the real interest rate approximately equals the nominal rate minus the inflation rate. Suppose the inflation rate increases from 3% to 5%. Does the Fisher equation imply that this increase will result in a fall in the real rate of interest? Explain.
- You've just stumbled on a new dataset that enables you to compute historical rates of return on U.S. stocks all the way back to 1880. What are the advantages and disadvantages in using these data to help estimate the expected rate of return on U.S. stocks over the coming year?
- The Narnian stock market had a rate of return of 45% last year, but the inflation rate was 30%. What was the real rate of return to Narnian investors?
- You have \$5,000 to invest for the next year and are considering three alternatives:

EXAM PREP QUESTIONS

Practice questions for the CFA® exams provided by Kaplan Schweser, A Global Leader in CFA® Education, are available in selected chapters for additional test practice. Look for the Kaplan Schweser logo. Learn more at www.schweser.com.



- Characterize each company in the previous problem as underpriced, overpriced, or properly priced.
- What is the expected rate of return for a stock that has a beta of 1.0 if the expected return on the market is 15%?
 - 15%.
 - More than 15%.
 - Cannot be determined without the risk-free rate.
- Kaskin, Inc., stock has a beta of 1.2 and Quinn, Inc., stock has a beta of .6. Which of the following statements is *most* accurate?
 - The expected rate of return will be higher for the stock of Kaskin, Inc., than that of Quinn, Inc.
 - The stock of Kaskin, Inc., has more total risk than the stock of Quinn, Inc.
 - The stock of Quinn, Inc., has more systematic risk than that of Kaskin, Inc.
- You are a consultant to a large manufacturing corporation that is considering a project with the

CFA PROBLEMS

We provide several questions adapted for this text from past CFA examinations in applicable chapters. These questions represent the kinds of questions that professionals in the field believe are relevant to the “real world.” Located at the back of the book is a listing of each CFA question and the level and year of the CFA exam it was included in for easy reference.

CFA® PROBLEMS

1. Given \$100,000 to invest, what is the expected risk premium in dollars of investing in equities versus risk-free T-bills (U.S. Treasury bills) based on the following table?

Action	Probability	Expected Return
Invest in equities	0.6	\$50,000
	0.4	-\$30,000
Invest in risk-free T-bill	1.0	\$ 5,000

2. Based on the scenarios below, what is the expected return for a portfolio with the following return profile?

	Bear Market	Normal Market	Bull Market
Probability	0.2	0.3	0.5
Rate of return	-25%	10%	24%

Use the following scenario analysis for Stocks X and Y to answer CFA Problems 3 through 5 (round to the nearest percent).

	Bear Market	Normal Market	Bull Market
Probability	0.2	0.5	0.3
Stock X	-20%	18%	50%
Stock Y	-15%	20%	10%

3. What are the expected rates of return for Stocks X and Y?
 4. What are the standard deviations of returns on Stocks X and Y?

EXCEL PROBLEMS

Selected chapters contain problems, denoted by an icon, specifically linked to Excel templates that are available in Connect and on the student resource site at www.mhhe.com/Bodie12e.

\$49.75	500	\$50.25	100
49.50	800	51.50	100
49.25	500	54.75	300
49.00	200	58.25	100
48.50	600		

a. If a market buy order for 100 shares comes in, at what price will it be filled?
 b. At what price would the next market buy order be filled?
 c. If you were a security dealer, would you want to increase or decrease your inventory of this stock?

9. You are bullish on Telecom stock. The current market price is \$50 per share, and you have \$5,000 of your own to invest. You borrow an additional \$5,000 from your broker at an interest rate of 8% per year and invest \$10,000 in the stock.

a. What will be your rate of return if the price of Telecom stock goes up by 10% during the next year? The stock currently pays no dividends.
 b. How far does the price of Telecom stock have to fall for you to get a margin call if the maintenance margin is 30%? Assume the price fall happens immediately.

10. You are bearish on Telecom and decide to sell short 100 shares at the current market price of \$50 per share.

a. How much in cash or securities must you put into your brokerage account if the broker's initial margin requirement is 50% of the value of the short position?
 b. How high can the price of the stock go before you get a margin call if the maintenance margin is 30% of the value of the short position?

Excel
 Please visit us at www.mhhe.com/Bodie12e

E-INVESTMENTS EXERCISES

The Federal Reserve Bank of St. Louis has information available on interest rates and economic conditions. Its Monetary Trends page (<https://research.stlouisfed.org/datatrends/mtd/>) contains graphs and tables with information about current conditions in the capital markets. Find the most recent issue of *Monetary Trends* and answer these questions.

1. What is the professionals' consensus forecast for inflation for the next two years? (Use the Federal Reserve Bank of Philadelphia line on the graph for *Measures of Expected Inflation* to answer this.)
2. What do consumers expect to happen to inflation over the next two years? (Use the University of Michigan line on the graph to answer this.)
3. Have real interest rates increased, decreased, or remained the same over the last two years?
4. What has happened to short-term nominal interest rates over the last two years? What about long-term nominal interest rates?
5. How do recent U.S. inflation and long-term interest rates compare with those of the other countries listed?
6. What are the most recently available levels of 3-month and 10-year yields on Treasury securities?

E-INVESTMENTS BOXES

These exercises provide students with simple activities to enhance their experience using the Internet. Easy-to-follow instructions and questions are presented so students can utilize what they have learned in class and apply it to today's data-driven world.

FOR INSTRUCTORS

You're in the driver's seat.

Want to build your own course? No problem. Prefer to use our turnkey, prebuilt course? Easy. Want to make changes throughout the semester? Sure. And you'll save time with Connect's auto-grading too.



Laptop: McGraw-Hill; Woman/dog: George Doyle/Getty Images

65%

Less Time
Grading

They'll thank you for it.

Adaptive study resources like SmartBook® 2.0 help your students be better prepared in less time. You can transform your class time from dull definitions to dynamic debates. Find out more about the powerful personalized learning experience available in SmartBook 2.0 at www.mheducation.com/highered/connect/smartbook

Make it simple,
make it affordable.



Connect makes it easy with seamless integration using any of the major Learning Management Systems—Blackboard®, Canvas, and D2L, among others—to let you organize your course in one convenient location. Give your students access to digital materials at a discount with our inclusive access program. Ask your McGraw-Hill representative for more information.

Padlock: Jobalou/Getty Images

Solutions for your
challenges.



A product isn't a solution. Real solutions are affordable, reliable, and come with training and ongoing support when you need it and how you want it. Our Customer Experience Group can also help you troubleshoot tech problems—although Connect's 99% uptime means you might not need to call them. See for yourself at **status.mheducation.com**

Checkmark: Jobalou/Getty Images

SUPPORT ^{AT}
every step

FOR STUDENTS

Effective, efficient studying.

Connect helps you be more productive with your study time and get better grades using tools like SmartBook 2.0, which highlights key concepts and creates a personalized study plan. Connect sets you up for success, so you walk into class with confidence and walk out with better grades.

Study anytime, anywhere.

Download the free ReadAnywhere app and access your online eBook or SmartBook 2.0 assignments when it's convenient, even if you're offline. And since the app automatically syncs with your eBook and SmartBook 2.0 assignments in Connect, all of your work is available every time you open it. Find out more at www.mheducation.com/readanywhere

"I really liked this app—it made it easy to study when you don't have your textbook in front of you."

- Jordan Cunningham,
Eastern Washington University



Calendar: owattaphotos/Getty Images

No surprises.

The Connect Calendar and Reports tools keep you on track with the work you need to get done and your assignment scores. Life gets busy; Connect tools help you keep learning through it all.

Learning for everyone.

McGraw-Hill works directly with Accessibility Services Departments and faculty to meet the learning needs of all students. Please contact your Accessibility Services office and ask them to email accessibility@mheducation.com, or visit www.mheducation.com/about/accessibility for more information.

Top: Jenner Images/Getty Images, Left: Hero Images/Getty Images, Right: Hero Images/Getty Images



Supplements

connect.mheducation.com

INSTRUCTOR LIBRARY

The Connect Instructor Library is your repository for additional resources to improve student engagement in and out of class. You can select and use any asset that enhances your lecture. The Connect Instructor Library includes all of the instructor supplements for this text.

- **Solutions Manual** Updated by Nicholas Racculia, Saint Vincent College, in close collaboration with the authors, this Manual provides detailed solutions to the end-of-chapter problem sets.
- **Test Bank** Prepared by Matt Will, University of Indianapolis, the Test Bank has been revised to improve the quality of questions. Each question is ranked by level of difficulty, which allows greater flexibility in creating a test and also provides a rationale for the solution. The test bank is available as downloadable Word files, and tests can also be created online within McGraw-Hill's Connect or through TestGen.
- **Computerized TestGen Test Bank** TestGen is a complete, state-of-the-art test generator and editing application software that allows instructors to quickly and easily select test items from McGraw-Hill's test bank content. The instructors can then organize, edit, and customize questions and answers to rapidly generate tests for paper or online administration. Questions can include stylized text, symbols, graphics, and equations that are inserted directly into questions using built-in mathematical templates. TestGen's random generator provides the option to display different text or calculated number values each time questions are used. With both quick-and-simple test creation

and flexible and robust editing tools, TestGen is a complete test generator system for today's educators.

- **Instructor's Manual** Prepared by Leslie Rush, University of Hawaii-West Oahu, the Manual has been revised and improved for this edition. Each chapter includes a Chapter Overview, Learning Objectives, and Presentation of Material.
- **PowerPoint Presentation** These presentation slides, prepared by Courtney Baggett, Troy University, contain figures and tables from the text, key points, and summaries in a visually stimulating collection of slides that you can customize to fit your lecture.

STUDENT STUDY CENTER

The Connect Student Study Center is the place for students to access additional resources. The Student Study Center:

- Offers students quick access to the recommended study tools, Excel files and templates, a listing of related Web sites, lectures, eBooks, and more.
- Provides instant practice material and study questions, easily accessible on the go.

Students can also access the text resources at www.mhhe.com/Bodie12e.

STUDENT PROGRESS TRACKING

Connect keeps instructors informed about how each student, section, and class is performing, allowing for more productive use of lecture and office hours. The progress-tracking function enables you to:

- View scored work immediately and track individual or group performance with assignment and grade reports.

Supplements

- Access an instant view of student or class performance relative to learning objectives.
- Collect data and generate reports required by many accreditation organizations, such as the AACSB and AICPA.

MCGRAW-HILL CUSTOMER CARE CONTACT INFORMATION

At McGraw-Hill, we understand that getting the most from new technology can be challenging. That's why

our services don't stop after you purchase our products. You can e-mail our product specialists 24 hours a day to get product training online. Or you can search our knowledge bank of frequently asked questions on our support site.

For customer support, call **800-331-5094** or visit **www.mhhe.com/support**. One of our technical support analysts will be able to assist you in a timely fashion.

Acknowledgments

Throughout the development of this text, experienced instructors have provided critical feedback and suggestions for improvement. These individuals deserve a special thanks for their valuable insights and contributions. The following instructors played a vital role in the development of this and previous editions of *Investments*:

J. Amanda Adkisson
Texas A&M University

Sandro Andrade
University of Miami at Coral Gables

Tor-Erik Bakke
University of Wisconsin

Richard J. Bauer Jr.
St. Mary's University

Scott Besley
University of Florida

John Binder
University of Illinois at Chicago

Paul Bolster
Northwestern University

Phillip Braun
University of Chicago

Leo Chan
Delaware State University

Charles Chang
Cornell University

Kee Chaung
SUNY Buffalo

Ludwig Chincarini
Pomona College

Stephen Ciccone
University of New Hampshire

James Cotter
Wake Forest University

L. Michael Couvillion
Plymouth State University

Anna Craig
Emory University

Elton Daal
University of New Orleans

David C. Distad
University of California at Berkeley

Craig Dunbar
University of Western Ontario

David Durr
Murray State University

Bjorn Eaker
Duke University

John Earl
University of Richmond

Michael C. Ehrhardt
University of Tennessee at Knoxville

Venkat Eleswarapu
Southern Methodist University

David Ellis
Babson College

Andrew Ellul
Indiana University

John Farlin
Ohio Dominican University

John Fay
Santa Clara University

Greg Filbeck
University of Toledo

James Forjan
York College of Pennsylvania

David Gallagher
University of Technology, Sydney

Jeremy Goh
Washington University

Richard Grayson
Loyola College

John M. Griffin
Arizona State University

Weiyu Guo
University of Nebraska at Omaha

Mahmoud Haddad
Wayne State University

Greg Hallman
University of Texas at Austin

Robert G. Hansen
Dartmouth College

Joel Hasbrouck
New York University

Andrea Heuson
University of Miami

Eric Higgins
Drexel University

Shalom J. Hochman
University of Houston

Stephen Huffman
University of Wisconsin at Oshkosh

Eric Hughson
University of Colorado

Delroy Hunter
University of South Florida

A. James Ifflander
A. James Ifflander and Associates

Robert Jennings
Indiana University

George Jiang
University of Arizona

Richard D. Johnson
Colorado State University

Susan D. Jordan
University of Kentucky

Acknowledgments

G. Andrew Karolyi
Ohio State University

Ajay Khorana
Georgia Institute of Technology

Anna Kovalenko
Virginia Tech University

Josef Lakonishok
University of Illinois at Champaign/Urbana

Malek Lashgari
University of Hartford

Dennis Lasser
Binghamton SUNY

Hongbok Lee
Western Illinois University

Bruce Lehmann
University of California at San Diego

Jack Li
Northeastern University

Larry Lockwood
Texas Christian University

Christopher K. Ma
Texas Tech University

Anil K. Makhija
University of Pittsburgh

Davinder Malhotra
Philadelphia University

Steven Mann
University of South Carolina

Deryl W. Martin
Tennessee Technical University

Jean Masson
University of Ottawa

Ronald May
St. John's University

William McDonald
University of Notre Dame

Rick Meyer
University of South Florida

Bruce Mizrach
Rutgers University at New Brunswick

Mbodja Mougoue
Wayne State University

Kyung-Chun (Andrew) Mun
Truman State University

Carol Osler
Brandeis University

Gurupesh Pandner
DePaul University

Don B. Panton
University of Texas at Arlington

Dimitris Papanikolaou
Northwestern University

Dilip Patro
Rutgers University

Robert Pavlik
Southwest Texas State

Marianne Plunkert
University of Colorado at Denver

Jeffrey Pontiff
Boston College

Andrew Prevost
Ohio University

Herbert Quigley
University of the District of Columbia

Nicholas Racculia
Saint Vincent College

Murli Rajan
University of Scranton

Speima Rao
University of Southwestern Louisiana

Rathin Rathinasamy
Ball State University

William Reese
Tulane University

Craig Rennie
University of Arkansas

Maurico Rodriguez
Texas Christian University

Leonard Rosenthal
Bentley College

Anthony Sanders
Ohio State University

Gary Sanger
Louisiana State University

James Scott
Missouri State University

Don Seeley
University of Arizona

John Settle
Portland State University

Edward C. Sims
Western Illinois University

Robert Skena
Carnegie Mellon University

Steve L. Slezak
University of North Carolina at Chapel Hill

Keith V. Smith
Purdue University

Patricia B. Smith
University of New Hampshire

Ahmad Sohrabian
California State Polytechnic University–Pomona

Eileen St. Pierre
University of Northern Colorado

Laura T. Starks
University of Texas

Mick Swartz
University of Southern California

Manuel Tarrazo
University of San Francisco

Steve Thorley
Brigham Young University

Ashish Tiwari
University of Iowa

Jack Treynor
Treynor Capital Management

Charles A. Trzinka
SUNY Buffalo

Yiuan Tse
Binghamton SUNY

Joe Ueng
University of St. Thomas

Gopala Vasuderan
Suffolk University

Joseph Vu
DePaul University

Qinghai Wang
Georgia Institute of Technology

Richard Warr
North Carolina State University

Simon Wheatley
University of Chicago

Marilyn K. Wiley
Florida Atlantic University

James Williams
California State University at Northridge

Michael Williams
University of Denver

Tony R. Wingler
University of North Carolina at Greensboro

Guojun Wu
University of Michigan

Hsiu-Kwang Wu
University of Alabama

Geungu Yu
Jackson State University

Thomas J. Zwirlein
University of Colorado at Colorado Springs

Edward Zychowicz
Hofstra University

Acknowledgments

For granting us permission to include many of its examination questions in the text, we are grateful to the CFA Institute.

In addition, we would like to thank the dedicated experts who have helped with updates to our instructor materials and online content in Connect and LearnSmart, including Marc-Anthony Isaacs, Nicholas Racculia, Matthew Will, Leslie Rush, and Courtney Baggett. Their efforts

are much appreciated as they will help both students and instructors.

Much credit is due to the development and production team at McGraw-Hill Education: our special thanks go to Allison McCabe-Carroll, Senior Product Developer; Chuck Synovec, Executive Portfolio Manager and Director; Lori Koettters, Core Project Manager; Jamie Koch, Assessment Project Manager; Trina Maurer,

Senior Marketing Manager; Sue Culbertson, Senior Buyer; and Matt Diamond, Designer.

Finally, we thank Judy, Hava, and Sheryl, who contribute to the book with their support and understanding.

Zvi Bodie
Alex Kane
Alan J. Marcus

The Investment Environment

AN INVESTMENT IS the *current* commitment of money or other resources in the expectation of reaping *future* benefits. For example, an individual might purchase shares of stock anticipating that the future proceeds from the shares will justify both the time that her money is tied up as well as the risk of the investment. The time you will spend studying this text (not to mention its cost) also is an investment. You are forgoing either current leisure or the income you could be earning at a job in the expectation that your future career will be sufficiently enhanced to justify this commitment of time and effort. While these two investments differ in many ways, they share one key attribute that is central to all investments: You sacrifice something of value now, expecting to benefit from that sacrifice later.

This text can help you become an informed practitioner of investments. We will focus on investments in securities such as stocks, bonds, or derivatives contracts, but much of what we discuss will be useful in the analysis of any type of investment. The text will provide you with background in the organization of various securities markets; will survey the valuation and risk-management principles useful in particular markets, such as those for bonds or stocks; and will introduce you to the principles of portfolio construction.

Broadly speaking, this chapter addresses three topics that will provide a useful perspective for the material that is to come later. First, before delving into the topic of “investments,” we consider the role of financial assets in the economy. We discuss the relationship between securities and the “real” assets that actually produce goods and services for consumers, and we consider why financial assets are important to the functioning of a developed economy.

Given this background, we then take a first look at the types of decisions that confront investors as they assemble a portfolio of assets. These investment decisions are made in an environment where higher returns usually can be obtained only at the price of greater risk and in which it is rare to find assets that are so mispriced as to be obvious bargains. These themes—the risk–return trade-off and the efficient pricing of financial assets—are central to the investment process, so it is worth pausing for a brief discussion of their implications as we begin the text. These implications will be fleshed out in much greater detail in later chapters.

We provide an overview of the organization of security markets as well as its key participants. Finally, we discuss the financial crisis that began playing out in 2007 and peaked in 2008. The crisis dramatically illustrated the connections between the financial system and the “real”

(concluded)

side of the economy. We look at the origins of the crisis and the lessons that may be drawn about systemic risk. We close the chapter with an overview of the remainder of the text.

1.1 Real Assets versus Financial Assets

The material wealth of a society is ultimately determined by the productive capacity of its economy, that is, the goods and services its members can create. This capacity is a function of the **real assets** of the economy: the land, buildings, machines, and knowledge that can be used to produce goods and services.

In contrast to real assets are **financial assets** such as stocks and bonds. Such securities are no more than sheets of paper or, far more likely, computer entries, and they do not contribute directly to the productive capacity of the economy. Instead, these assets are the means by which individuals in well-developed economies hold their claims on real assets. Financial assets are claims to the income generated by real assets (or claims on income from the government). If we cannot own our own auto plant (a real asset), we can still buy shares in Ford or Toyota (financial assets) and thereby share in the income derived from the production of automobiles.

While real assets generate net income to the economy, financial assets simply define the allocation of income or wealth among investors. When investors buy securities issued by companies, the firms use the money so raised to pay for real assets, such as plant, equipment, technology, or inventory. So investors' returns ultimately come from the income produced by the real assets that were financed by the issuance of those securities.



Concept Check 1.1

Are the following assets real or financial?

- a. Patents
- b. Lease obligations
- c. Customer goodwill
- d. A college education
- e. A \$5 bill

The distinction between real and financial assets is apparent when we compare the balance sheet of U.S. households, shown in Table 1.1, with the composition of national wealth in the United States, shown in Table 1.2. Household wealth includes financial assets such as bank accounts, corporate stock, or bonds. However, these securities, which are financial assets of households, are *liabilities* of the issuers of the securities. For example, a bond that you treat as an asset because it gives you a claim on interest income and repayment of principal from Toyota is a liability of Toyota, which is obligated to make these payments. Your asset is Toyota's

liability. Therefore, when we aggregate over all balance sheets, these claims cancel out, leaving only real assets as the net wealth of the economy. National wealth consists of structures, equipment, inventories of goods, and land.¹

¹You might wonder why real assets held by households in Table 1.1 amount to \$34,855 billion, while total real assets in the domestic economy (Table 1.2) are far larger, at \$72,683 billion. A big part of the difference reflects the fact that real assets held by firms, for example, property, plant, and equipment, are included as *financial* assets of the household sector, specifically through the value of corporate equity and other stock market investments. Also, Table 1.2 includes assets of noncorporate businesses. Finally, there are some differences in valuation methods. For example, equity and stock investments in Table 1.1 are measured by market value, whereas plant and equipment in Table 1.2 are valued at replacement cost.

Assets	\$ Billion	% Total	Liabilities and Net Worth	\$ Billion	% Total
Real assets			Liabilities		
Real estate	\$ 28,816	23.5%	Mortgages	\$ 10,437	8.5%
Consumer durables	5,411	4.4	Consumer credit	3,865	3.2
Other	628	0.5	Bank and other loans	1,207	1.0
<i>Total real assets</i>	\$ 34,855	28.4%	Other	219	0.2
			<i>Total liabilities</i>	\$ 15,727	12.8%
Financial assets					
Deposits and money market shares	\$ 12,442	10.1%			
Life insurance reserves	1,647	1.3			
Pension reserves	26,069	21.3			
Corporate equity	18,106	14.8			
Equity in noncorporate business	13,044	10.6			
Mutual fund shares	8,764	7.1			
Debt securities	6,210	5.1			
Other	1,521	1.2			
<i>Total financial assets</i>	\$ 87,802	71.6	<i>Net worth</i>	106,929	87.2
<i>Total</i>	\$122,657	100.0%		\$122,657	100.0%

Table 1.1

Balance sheet of U.S. households

Note: Column sums may differ from total because of rounding error.

Source: *Flow of Funds Accounts of the United States*, Board of Governors of the Federal Reserve System, September 2018.

Assets	\$ Billion
Commercial real estate	\$22,642
Residential real estate	32,539
Equipment and intellectual property	9,350
Inventories	2,741
Consumer durables	5,411
<i>Total</i>	\$72,683

Note: Column sums may differ from total because of rounding error.

Source: *Flow of Funds Accounts of the United States*, Board of Governors of the Federal Reserve System, September 2018.

Table 1.2

Domestic net worth

We will focus almost exclusively on financial assets. But keep in mind that the successes or failures of these financial assets ultimately depend on the performance of the underlying real assets.

1.2 Financial Assets

It is common to distinguish among three broad types of financial assets: fixed income, equity, and derivatives. **Fixed-income** or **debt securities** promise either a fixed stream of income or a stream of income determined by a specified formula. For example, a corporate

bond typically promises that the bondholder will receive a fixed amount of interest each year. Other so-called floating-rate bonds promise payments that depend on current interest rates. For example, a bond may pay an interest rate that is fixed at 2 percentage points above the rate paid on U.S. Treasury bills. Unless the borrower is declared bankrupt, the payments on these securities are either fixed or determined by formula. For this reason, the investment performance of debt securities typically is least closely tied to the financial condition of the issuer.

Fixed-income securities come in a tremendous variety of maturities and payment provisions. At one extreme, the *money market* refers to debt securities that are short term, highly marketable, and generally of very low risk, for example, U.S. Treasury bills or bank certificates of deposit (CDs). In contrast, the fixed-income *capital market* includes long-term securities such as Treasury bonds, as well as bonds issued by federal agencies, state and local municipalities, and corporations. These bonds range from very safe in terms of default risk (e.g., Treasury securities) to relatively risky (e.g., high-yield or “junk” bonds). They also are designed with extremely diverse provisions regarding payments provided to the investor and protection against the bankruptcy of the issuer. We will take a first look at these securities in Chapter 2 and undertake a more detailed analysis of the debt market in Part Four.

Unlike debt securities, common stock, or **equity**, represents an ownership share in the corporation. Equityholders are not promised any particular payment. They receive any dividends the firm may pay and have prorated ownership in the real assets of the firm. If the firm is successful, the value of equity will increase; if not, it will decrease. The performance of equity investments, therefore, is tied directly to the success of the firm and its real assets. For this reason, equity investments tend to be riskier than investments in debt securities. Equity markets and equity valuation are the topics of Part Five.

Finally, **derivative securities** such as options and futures contracts provide payoffs that are determined by the prices of *other* assets such as bond or stock prices. For example, a call option on a share of Intel stock might turn out to be worthless if Intel’s share price remains below a threshold or “exercise” price such as \$50 a share, but it can be quite valuable if the stock price rises above that level.² Derivative securities are so named because their values derive from the prices of other assets. For example, the value of the call option will depend on the price of Intel stock. Other important derivative securities are futures and swap contracts. We will treat these in Part Six.

Derivatives have become an integral part of the investment environment. One use of derivatives, perhaps the primary use, is to hedge risks or transfer them to other parties. This is done successfully every day, and the use of these securities for risk management is so commonplace that the multitrillion-dollar market in derivative assets is routinely taken for granted. Derivatives also can be used to take highly speculative positions, however. Every so often, one of these positions blows up, resulting in well-publicized losses of hundreds of millions of dollars. While these losses attract considerable attention, they are in fact the exception to the more common use of such securities as risk management tools. Derivatives will continue to play an important role in portfolio construction and the financial system. We will return to this topic later in the text.

Investors and corporations regularly encounter other financial markets as well. Firms engaged in international trade regularly transfer money back and forth between dollars and other currencies. In London alone, about \$2 trillion of currency is traded each day.

²A call option is the right to buy a share of stock at a given exercise price on or before the option’s expiration date. If the market price of Intel remains below \$50 a share, the right to buy for \$50 will turn out to be valueless. If the share price rises above \$50 before the option expires, however, the option can be exercised to obtain the share for only \$50.

Investors also might invest directly in some real assets. For example, dozens of commodities are traded on exchanges such as the New York Mercantile Exchange or the Chicago Board of Trade. You can buy or sell corn, wheat, natural gas, gold, silver, and so on.

Commodity and derivative markets allow firms to adjust their exposure to various business risks. For example, a construction firm may lock in the price of copper by buying copper futures contracts, thus eliminating the risk of a sudden jump in the price of its raw materials. Wherever there is uncertainty, investors may be interested in trading, either to speculate or to lay off their risks, and a market may arise to meet that demand.

1.3 Financial Markets and the Economy

We stated earlier that real assets determine the wealth of an economy, while financial assets merely represent claims on real assets. Nevertheless, financial assets and the markets in which they trade play several crucial roles in developed economies. Financial assets allow us to make the most of the economy's real assets.

The Informational Role of Financial Markets

Stock prices reflect investors' collective assessment of a firm's current performance and future prospects. When the market is more optimistic about the firm, its share price will rise. That higher price makes it easier for the firm to raise capital and therefore encourages investment. In this manner, stock prices play a major role in the allocation of capital in market economies, directing capital to the firms and applications with the greatest perceived potential.

Do capital markets actually channel resources to the most efficient use? At times, they appear to fail miserably. Companies or whole industries can be "hot" for a period of time (think about the dot-com bubble that peaked and then collapsed in 2000), attract a large flow of investor capital, and then fail after only a few years.

The process seems highly wasteful. But we need to be careful about our standard of efficiency. No one knows with certainty which ventures will succeed and which will fail. It is therefore unreasonable to expect that markets will never make mistakes. The stock market encourages allocation of capital to those firms that appear *at the time* to have the best prospects. Many smart, well-trained, and well-paid professionals analyze the prospects of firms whose shares trade on the stock market. Stock prices reflect their collective judgment.

You may well be skeptical about resource allocation through markets. But if you are, then take a moment to think about the alternatives. Would a central planner make fewer mistakes? Would you prefer that Congress make these decisions? To paraphrase Winston Churchill's comment about democracy, markets may be the worst way to allocate capital except for all the others that have been tried.

Consumption Timing

Some individuals are earning more than they currently wish to spend. Others, for example, retirees, spend more than they currently earn. How can you shift your purchasing power from high-earnings to low-earnings periods of life? One way is to "store" your wealth in financial assets. In high-earnings periods, you can invest your savings in financial assets such as stocks and bonds. In low-earnings periods, you can sell these assets to provide funds for your consumption needs. By so doing, you can "shift" your consumption over the course of your lifetime, thereby allocating your consumption to periods that provide

the greatest satisfaction. Thus, financial markets allow individuals to separate decisions concerning current consumption from constraints that otherwise would be imposed by current earnings.

Allocation of Risk

Virtually all real assets involve some risk. When Toyota builds its auto plants, for example, it cannot know for sure what cash flows those plants will generate. Financial markets and the diverse financial instruments traded in those markets allow investors with the greatest taste for risk to bear that risk, while other, less risk-tolerant individuals can, to a greater extent, stay on the sidelines. For example, if Toyota raises the funds to build its auto plant by selling both stocks and bonds to the public, the more optimistic or risk-tolerant investors can buy shares of its stock, while the more conservative ones can buy its bonds. Because the bonds promise to provide a fixed payment, the stockholders bear most of the business risk but reap potentially higher rewards. Thus, capital markets allow the risk that is inherent to all investments to be borne by the investors most willing to bear it.

This allocation of risk also benefits the firms that need to raise capital to finance their investments. When investors are able to select security types with the risk-return characteristics that best suit their preferences, each security can be sold for the best possible price. This facilitates the process of building the economy's stock of real assets.

Separation of Ownership and Management

Many businesses are owned and managed by the same individual. This simple organization is well suited to small businesses and, in fact, was the most common form of business organization before the Industrial Revolution. Today, however, with global markets and large-scale production, the size and capital requirements of firms have skyrocketed. For example, at the end of 2018, ExxonMobil listed on its balance sheet about \$250 billion of property, plant, and equipment and total assets of \$350 billion. Corporations of such size simply cannot exist as owner-operated firms. ExxonMobil actually has tens of thousands of stockholders with an ownership stake in the firm proportional to their holdings of shares.

Such a large group of individuals obviously cannot actively participate in the day-to-day management of the firm. Instead, they elect a board of directors that in turn hires and supervises the management of the firm. This structure means that the owners and managers of the firm are different parties. This gives the firm a stability that the owner-managed firm cannot achieve. For example, if some stockholders decide they no longer wish to hold shares in the firm, they can sell their shares to other investors, with no impact on the management of the firm. Thus, financial assets and the ability to buy and sell those assets in the financial markets allow for easy separation of ownership and management.

How can all of the disparate owners of the firm, ranging from large pension funds holding hundreds of thousands of shares to small investors who may hold only a single share, agree on the objectives of the firm? Again, the financial markets provide some guidance. All may agree that the firm's management should pursue strategies that enhance the value of their shares. Such policies will make all shareholders wealthier and allow them all to better pursue their personal goals, whatever those goals might be.

Do managers really attempt to maximize firm value? It is easy to see how they might be tempted to engage in activities not in the best interest of shareholders. For example, they might engage in empire building or avoid risky projects to protect their own jobs or overconsume luxuries such as corporate jets, reasoning that the cost of such perquisites is largely borne by the shareholders. These potential conflicts of interest are called **agency problems** because managers, who are hired as agents of the shareholders, may pursue their own interests instead.

Several mechanisms have evolved to mitigate potential agency problems. First, compensation plans tie the income of managers to the success of the firm. A major part of the total compensation of top executives is often in the form of shares or stock options, which means that the managers will not do well unless the stock price increases, benefiting shareholders. (Of course, we've learned that overuse of options can create its own agency problem. Options can create an incentive for managers to manipulate information to prop up a stock price temporarily, giving them a chance to cash out before the price returns to a level reflective of the firm's true prospects. More on this shortly.) Second, while boards of directors have sometimes been portrayed as defenders of top management, they can, and in recent years, increasingly have, forced out management teams that are underperforming. Third, outsiders such as security analysts and large institutional investors such as mutual funds or pension funds monitor the firm closely and make the life of poor performers at the least uncomfortable. Such large investors today hold about half of the stock in publicly listed firms in the U.S.

Finally, bad performers are subject to the threat of takeover. If the board of directors is lax in monitoring management, unhappy shareholders in principle can elect a different board. They can do this by launching a *proxy contest* in which they seek to obtain enough proxies (i.e., rights to vote the shares of other shareholders) to take control of the firm and vote in another board. Historically, this threat was usually minimal. Shareholders who attempt such a fight have to use their own funds, while management can defend itself using corporate coffers.

However, in recent years, the odds of a successful proxy contest have increased along with the rise of so-called activist investors. These are large and deep-pocketed investors, often hedge funds, that identify firms they believe to be mismanaged in some respect. They buy large positions in shares of those firms and then campaign for slots on the board of directors and/or for specific reforms.

Aside from proxy contests, the real takeover threat is from other firms. If one firm observes another underperforming, it can acquire the underperforming business and replace management with its own team. The stock price should rise to reflect the prospects of improved performance, which provides an incentive for firms to engage in such takeover activity.

Example 1.1 Activist Investors and Corporate Control

Here are a few of the better known activist investors, along with a sample of their more notable initiatives.

- Nelson Peltz, Trian. Trian gained a seat on General Electric's board of directors and pressured the company to cut costs; to return capital to shareholders, for example, through stock buybacks; and to downsize the firm.
- William Ackman, Pershing Square. Pushed for a merger between pharmaceutical firms Valeant and Allergan.
- Dan Loeb, Third Point. Attempted to replace the entire board of Campbell Soup and accelerate Campbell's divestiture and restructuring of struggling business units. Eventually settled for the right to nominate two new board members.
- Carl Icahn. One of the earliest and most combative of activist investors. Invested \$100 million in Lyft, helping to fund its battle for market share in the ride-sharing industry.
- Christer Gardell, Cevian Capital. Cevian is the largest activist firm in Europe, with large stakes in Volvo, ABB, and Danske Bank.

Corporate Governance and Corporate Ethics

We've argued that securities markets can play an important role in facilitating the deployment of capital resources to their most productive uses. But market signals will help to allocate capital efficiently only if investors are acting on accurate information. We say that markets need to be *transparent* for investors to make informed decisions. If firms can mislead the public about their prospects, then much can go wrong.

Despite the many mechanisms to align incentives of shareholders and managers, the three years from 2000 through 2002 were filled with a seemingly unending series of scandals that collectively signaled a crisis in corporate governance and ethics. For example, the telecom firm WorldCom overstated its profits by at least \$3.8 billion by improperly classifying expenses as investments. When the true picture emerged, it resulted in the largest bankruptcy in U.S. history, at least until Lehman Brothers smashed that record in 2008. The next-largest U.S. bankruptcy was Enron, which used its now-notorious "special-purpose entities" to move debt off its own books and similarly present a misleading picture of its financial status. Unfortunately, these firms had plenty of company. Other firms such as Rite Aid, HealthSouth, Global Crossing, and Qwest Communications also manipulated and misstated their accounts to the tune of billions of dollars. And the scandals were hardly limited to the United States. Parmalat, the Italian dairy firm, claimed to have a \$4.8 billion bank account that turned out not to exist. These episodes suggest that agency and incentive problems are far from solved, and that transparency is far from complete.

Other scandals of that period included systematically misleading and overly optimistic research reports put out by stock market analysts. (Their favorable analysis was traded for the promise of future investment banking business, and analysts were commonly compensated not for their accuracy or insight, but for their role in garnering investment banking business for their firms.) Additionally, initial public offerings were allocated to corporate executives as a quid pro quo for personal favors or the promise to direct future business back to the manager of the IPO.

What about the auditors who were supposed to be the watchdogs of the firms? Here too, incentives were skewed. Recent changes in business practice had made the consulting businesses of these firms more lucrative than the auditing function. For example, Enron's (now-defunct) auditor Arthur Andersen earned more money consulting for Enron than by auditing it; given Arthur Andersen's incentive to protect its consulting profits, we should not be surprised that it, and other auditors, was overly lenient in its auditing work.

In 2002, in response to the spate of ethics scandals, Congress passed the Sarbanes-Oxley Act, commonly referred to as SOX, to tighten the rules of corporate governance and disclosure. For example, the act requires corporations to have more independent directors, that is, more directors who are not themselves managers (or affiliated with managers). The act also requires each CFO to personally vouch for the corporation's accounting statements, provides for an oversight board to oversee the auditing of public companies, and prohibits auditors from providing various other services to clients.

1.4 The Investment Process

An investor's *portfolio* is simply his collection of investment assets. Once the portfolio is established, it is updated or "rebalanced" by selling existing securities and using the proceeds to buy new securities, by investing additional funds to increase the overall size of the portfolio, or by selling securities to decrease the size of the portfolio.

Investment assets can be categorized into broad asset classes, such as stocks, bonds, real estate, commodities, and so on. Investors make two types of decisions in constructing their portfolios. The **asset allocation** decision is the choice among these broad asset classes, while the **security selection** decision is the choice of which particular securities to hold *within* each asset class.

“Top-down” portfolio construction starts with asset allocation. For example, an individual who currently holds all of his money in a bank account would first decide what proportion of the overall portfolio ought to be moved into stocks, bonds, and so on. In this way, the broad features of the portfolio are established. For example, while the average annual return on the common stock of large firms since 1926 has been about 12% per year, the average return on U.S. Treasury bills has been less than 4%. On the other hand, stocks are far riskier, with annual returns (as measured by the Standard & Poor’s 500 index) that have ranged as low as –46% and as high as 55%. In contrast, T-bills are effectively risk-free: You know what interest rate you will earn when you buy them. Therefore, the decision to allocate your investments to the stock market or to the money market where Treasury bills are traded will have great ramifications for both the risk and the return of your portfolio. A top-down investor first makes this and other crucial asset allocation decisions before turning to the decision of the particular securities to be held in each asset class.

Security analysis involves the valuation of particular securities that might be included in the portfolio. For example, an investor might ask whether Merck or Pfizer is more attractively priced. Both bonds and stocks must be evaluated for investment attractiveness, but valuation is far more difficult for stocks because a stock’s performance usually is far more sensitive to the condition of the issuing firm.

In contrast to top-down portfolio management is the “bottom-up” strategy. In this process, the portfolio is constructed from securities that seem attractively priced without as much concern for the resultant asset allocation. Such a technique can result in unintended bets on one or another sector of the economy. For example, it might turn out that the portfolio ends up with a very heavy representation of firms in one industry, from one part of the country, or with exposure to one source of uncertainty. However, a bottom-up strategy does focus the portfolio on the assets that seem to offer the most attractive investment opportunities.

1.5 Markets Are Competitive

Financial markets are highly competitive. Thousands of intelligent and well-backed analysts constantly scour securities markets searching for the best buys. This competition means that we should expect to find few, if any, “free lunches,” securities that are so underpriced that they represent obvious bargains. This no-free-lunch proposition has several implications. Let’s examine two.

The Risk–Return Trade-Off

Investors invest for anticipated future returns, but those returns rarely can be predicted precisely. There will almost always be risk associated with investments. Actual or realized returns will almost always deviate from the expected return anticipated at the start of the investment period. For example, in 1931 (the worst calendar year for the market since 1926), the S&P 500 index fell by 46%. In 1933 (the best year), the index gained 55%. You can be sure that investors did not anticipate such extreme performance at the start of either of these years.