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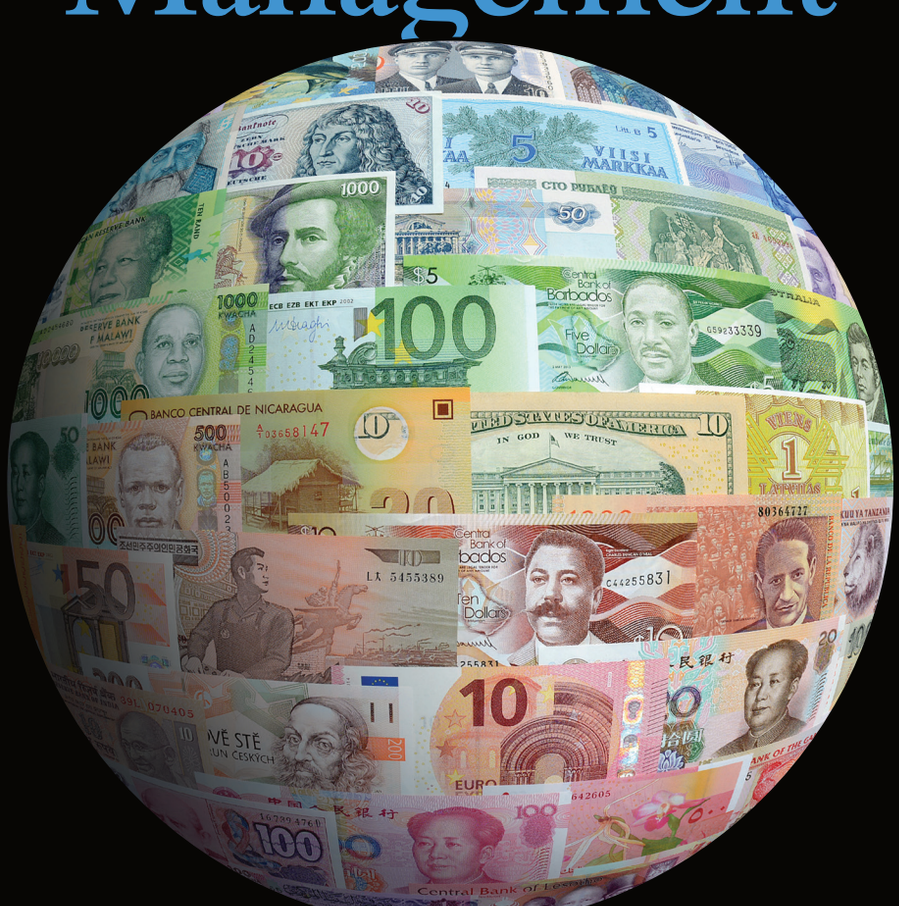
Investment Analysis & Portfolio Management



Eleventh Edition

FREQUENTLY USED SYMBOLS AND TERMS

α	alpha coefficient, a measure of a portfolio's "value added" return.
ABS	asset-backed securities.
APT	arbitrage pricing theory.
AUM	assets under management.
β	beta coefficient, a measure of an asset's systematic riskiness.
C	call option value.
CAPM	capital asset pricing model.
CAR	cumulative average residuals.
CF	cash flow; CF_t is cash flow in period t.
CML	capital market line.
Cov_{ij}	covariance of the returns between assets i and j.
D	dividend per share of stock; D_t is dividend per share during period t.
D_p	Macaulay duration measure of portfolio p.
DDM	dividend discount model.
€	euro currency.
EBIT	earnings before interest and taxes.
EBITDA	earnings before interest, taxes, depreciation, and amortization.
EMH	efficient market hypothesis.
EPS	earnings per share.
$E(R)$	expected return; $E(R_t)$is the expected return during period t.
ETY	equivalent taxable yield.
F	futures or forward contract delivery price.
FV	future value.
FVIF	future value interest factor for a lump sum.
FVIFA	future value interest factor for an annuity.
FX	foreign exchange.
GM	geometric mean.
g	growth rate in earnings, dividends, or stock prices.
h	hedge ratio.
HML	value-growth ("high minus low") risk factor.
HPR	holding period return.
HPY	holding period yield.
I	rate of inflation. $E(I)$ is the expected rate of inflation.
IR_p	information ratio portfolio performance measure.
MBS	mortgage-backed securities.
k	required rate of return.
£	pound (United Kingdom currency).
NAV	net asset value.
OAS	option-adjusted spread.
P	price of a share of stock or put option; P_0 is the current price.
P/BV	price/book value ratio.
P/CF	price/cash flow ratio.
P/E	price/earnings ratio.
PPP	purchasing power parity.
P/S	price/sales ratio.
PV	present value.
PVIF	present value interest factor for a lump sum.
PVIFA	present value interest factor for an annuity.
r_{ij}	correlation coefficient between assets i and j.
RFR	rate of return on a risk-free asset.
ROA	return on assets.
ROE	return on equity.
RR	fraction of a firm's earnings retained rather than paid out. It is equal to $(I - D/E)$, where D/E is the ratio of dividends (D) to earnings (E).
S_p	Sharpe ratio portfolio performance measure.
SMB	size ("small minus big") risk factor.
SML	security market line.
Σ	summation sign (capital sigma).
σ	standard deviation (lowercase sigma).
σ_{ij}	covariance between returns for security i and j.
t	tax rate or time when used as a subscript (e.g., D_t is the dividend in a year t).
T	time to expiration.
TE	tracking error.
V	value of an asset; V_j is the value of asset j.
W_i	proportion of portfolio invested in asset i.
WACC	weighted average cost of capital.
X	option of exercise price.
¥	yen (Japanese currency).
YTC	yield to call.
YTM	yield to maturity.

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Investment Analysis & Portfolio Management

Eleventh Edition

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ELEVENTH EDITION

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To my best friend & wife,
Therese,
and the greatest gifts and
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Edgar B., Lisa, Kayleigh, Madison J. T., Francesca, and Alessandra
—F. K. R.

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—K. C. B.

To Jenny, Jay, John, and Genet, who bring meaning and happiness to my life.
—S. J. L.

Brief Contents

Contents

Preface

The pleasure of authoring a textbook comes from writing about a subject that we enjoy and find exciting. As authors, we hope that we can pass on to the reader not only knowledge but also the excitement that we feel for the topic. In addition, writing about investments brings an added stimulant because the subject can affect the reader during his or her entire business career and beyond. We hope that what readers derive from this course will help them enjoy better lives through managing their financial resources properly.

The purpose of this book is to help you learn how to manage your money so you will derive the maximum benefit from what you earn. To accomplish this purpose, you need to learn about the many investment alternatives that are available today and, what is more important, to develop a way of analyzing and thinking about investments that will remain with you in the years ahead when new and different investment opportunities become available.

Because of its dual purpose, the book mixes description and theory. The descriptive material discusses available investment instruments and considers the purpose and operation of capital markets in the United States and around the world. The theoretical portion details how you should evaluate current investments and future opportunities to develop a portfolio of investments that will satisfy your risk–return objectives. We feel that this marriage of theory and practice in the exposition will serve you quite well in both your professional careers and personal lives as investors.

Preparing this 11th edition has been challenging for at least two reasons. First, we continue to experience rapid changes in the securities markets in terms of theory, new financial instruments, innovative trading practices, and the effects of significant macroeconomic disruptions and the numerous regulatory changes that inevitably follow. Second, capital markets are continuing to become very global in nature. Consequently, to ensure that you are prepared to function in a global environment, almost every chapter discusses how investment practice or theory is influenced by the globalization of investments and capital markets. This completely integrated treatment is meant to ensure that you develop a broad mindset on investments that will serve you well in the 21st century.

Intended Market

This text is addressed to both graduate and advanced undergraduate students who are looking for an in-depth discussion of investments and portfolio management. The presentation of the material is intended to be rigorous and empirical, without being overly quantitative. A proper discussion of the modern developments in investments and portfolio theory must be rigorous. The discussion of numerous empirical studies reflects the belief that it is essential for alternative investment theories to be exposed to the real world and be judged on the basis of how well they help us understand and explain reality.

Key Features of the 11th Edition

When planning the 11th edition of *Investment Analysis and Portfolio Management*, we wanted to retain its traditional strengths and capitalize on new developments in the investments area to make it the most comprehensive and accessible investments textbook available. To achieve that goal, we have made a number of modifications to this edition.

First and foremost, we have considerably streamlined our presentation of the material from previous editions. Most notably, we have been able to compress our treatment of these important topics into 18 chapters, compared to the 25 chapters contained in the 10th edition. Importantly, we have not removed any content that we consider vital to a thorough understanding of investment management; rather, we have condensed and rearranged our presentations in a more effective way. An example of this is the section on equity valuation and management, which previously spanned six separate chapters but now is contained in Chapters 8–11.

Second, the current edition maintains its unparalleled international coverage. Investing knows no borders, and although the total integration of domestic and global investment opportunities may seem to contradict the need for separate discussions of international issues, it in fact makes the need for specific information on non-U.S. markets, instruments, conventions, and techniques even more compelling.

Third, both technology and regulations have caused more significant changes during the past decade in the functioning and organization of global security markets than during the prior 50 years. Chapter 3 contains a detailed discussion of this evolution and the results for global markets, and Chapter 2 describes how specific security innovations and asset allocation practices have been affected by these changes.

Fourth, today's investing environment includes derivative securities not as exotic anomalies but as standard investment instruments. We felt that *Investment Analysis and Portfolio Management* must reflect that reality. Consequently, our three chapters on derivatives (Chapters 14–16) are written to provide the reader with an intuitive, clear discussion of the different instruments, their markets, valuation, trading strategies, and general use as risk management and return enhancement tools.

Finally, we have updated and expanded the set of questions and problems at the end of each chapter to provide more student practice on executing computations concerned with more sophisticated investment problems. These problems are also available in an interactive format through the online resource described below.

Major Content Changes in the 11th Edition

The text has been thoroughly updated for currency as well as condensed for the sake of brevity. In addition to these time-related revisions, we have also made the following specific changes to individual chapters:

Chapter 1 This introductory discussion has been revised and updated to reflect recent changes in financial market conditions that impact the investment setting.

Chapter 2 This chapter has been completely reworked to combine the discussions of the asset allocation process and the global security markets that had been spread over multiple chapters in previous editions. After establishing the importance of the asset allocation decision to all investors, we focus on the notion of global diversification and provide an updated study on the variety of investment instruments available for the use of global investors, including global index funds and country-specific exchange-traded funds (ETFs).

Chapter 3 Because of the continuing growth in trading volume handled by electronic communications networks (ECNs), this chapter continues to detail the significant changes in the market as well as the results of this new environment. This includes a discussion on the continuing changes on the NYSE during recent years. We also consider the rationale for the continuing consolidation of global exchanges across asset classes of stocks, bonds, and derivatives. In addition, we document recent mergers and discuss several proposed and failed mergers. Finally, we note that the corporate bond market continues to experience major changes in how and when trades are reported and the number of bond issues involved.

Chapter 4 This chapter contains a discussion of fundamental weighted stock and bond indexes that use sales and earnings to weight components rather than market value. Also included is an updated analysis of the relationship among indexes and the myriad ways that investors can actually commit their financial capital to capture the returns on various indexes.

Chapter 5 New studies that both support the efficient market hypothesis and provide new evidence of anomalies are examined in this chapter. There is also discussion of behavioral finance and how it explains many of the anomalies, as well as a consideration of technical analysis. Further, we discuss the implications of the recent changes in the cost of trading (considered in Chapter 3) on some of the empirical results of prior studies.

Chapter 6 The development of modern portfolio theory, starting with a discussion of the risk tolerance of the investor, has been considerably revised and updated in an effort to stress the conceptual nature of the portfolio formation process. An extensive example of global portfolio optimization has also been included. The chapter now concludes with an intuitive discussion of the transition from Markowitz portfolio analysis to capital market theory and the development of the capital market line (CML).

Chapter 7 This chapter has been extensively revised to consider the topic of how asset pricing models evolved conceptually and how they are used by investors in practice. We begin with an extensive discussion of the capital asset pricing model (CAPM) in a more intuitive way, including how this model represents a natural progression from modern portfolio theory. We then describe the theory and practice of using multifactor models of risk and expected return. The connection between the arbitrage pricing theory (APT) and empirical implementations of the APT continues to be stressed, both conceptually and with several revised examples using style classification data.

Chapter 8 This is the first of three entirely new chapters focusing on equity analysis and valuation. We begin with a discussion of how valuation theory is used in practice. We distinguish between valuing the equity portion of the firm (FCFE) and valuing the entire firm (FCFF). Importantly, we show how the sustainable growth formula can be used to estimate the percentage of earnings that can be considered to be free cash flow. In the section on relative valuation, we focus on fundamental multiples so that students will consider the underlying drivers of value.

Chapter 9 This chapter presents a study of the top-down approach to equity analysis and introduces new material designed to link monetary policy and interest rates to stock prices. Most importantly, we describe the importance of the real federal funds rate, the shape of the yield curve, and the risk premium for BBB bonds (versus Treasury bonds). Later in the chapter, we discuss how the Shiller P/E ratio (also known as the cyclically adjusted price–earnings [CAPE] ratio) is applied to the overall market.

Chapter 10 In this completely new chapter we discuss several topics that students need to understand if they intend to enter the asset management industry as a profession. We provide a detailed description of the IPO process, the difference between the buy-side and sell-side, and the importance of management's capital allocation function. The chapter ends with a discussion of how to design and deliver a persuasive stock pitch.

Chapter 11 This chapter contains an enhanced discussion of the relative merits of passive versus active management techniques for equity portfolio management, focusing on the important role of tracking error. Expanded material on forming risk factor–based equity portfolios has been introduced, along with additional analysis of other equity portfolio investment strategies, including fundamental and technical approaches, as well as a detailed description of equity style analysis.

Chapter 12 This is the first of two new chapters that describe the information, tools, and techniques necessary to analyze fixed-income securities and portfolios. We begin with a discussion of the myriad bond instruments available to global investors, including traditional fixed-coupon securities from sovereign and corporate issuers, securities issued by government-sponsored entities (GSEs), collateralized debt obligations (CDOs), and auction-rate securities. We then develop the intuition and mechanics for how bonds are valued under a variety of market conditions, as well as the relationship that must exist between bond prices and bond yields.

Chapter 13 We continue our development of the quantitative toolkit required of successful bond investors by developing the technical concepts of implied forward rates, duration, and convexity. In particular, we discuss the importance of the duration statistic as a measure of price volatility in terms of both designing and managing bond portfolios. The discussion at the end of the chapter on bond portfolio management strategies has been enhanced and revised to include comparisons of active and passive fixed-income strategies, as well as updated examples of how the bond immunization process functions.

Chapter 14 Expanded discussions of the fundamentals associated with using derivative securities (interpreting price quotations, basic payoff diagrams, basic strategies) are included in this chapter. We also provide updated examples of both basic and intermediate risk management applications using derivative positions, as well as new material on how these contracts trade in the marketplace.

Chapter 15 New and updated examples and applications are provided throughout the chapter, emphasizing the role that forward and futures contracts play in managing exposures to equity, fixed-income, and foreign exchange risk. Also included is an enhanced discussion of how futures and forward markets are structured and operate, as well as how swap contracts can be viewed as portfolios of forward agreements.

Chapter 16 Here we expand the discussion linking valuation and applications of call and put options in the context of investment management. The chapter contains both new and updated examples designed to illustrate how investors use options in practice as well as a discussion of the recent changes to options markets. We also include extensive discussions of two other ways that options can be structured into other financial arrangements: convertible bonds and credit default swaps.

Chapter 17 This chapter includes a revised and updated discussion of the organization and participants in the professional asset management industry. Of particular note is an extensive update of the structure and strategies employed by hedge funds as well as enhanced analysis of how private equity funds function. The discussion of ethics and regulation in the asset management industry that concludes the chapter has also been updated and expanded.

Chapter 18 An updated and considerably expanded application of the performance measurement techniques introduced throughout the chapter is provided, including new material regarding the calculation of both simple and risk-adjusted performance measures. The discussion emphasizes the two main questions of performance measurement, as well as how the concept of downside risk can be incorporated into the evaluation process and the examination of techniques that focus on the security holdings of a manager's portfolio rather than the returns that the portfolio generates.

Supplement Package

Preparation of the 11th edition provided the opportunity to enhance the supplement products offered to instructors and students who use *Investment Analysis and Portfolio*

Management. The result of this examination is a greatly improved package that provides more than just basic answers and solutions. We are indebted to the supplement writers who devoted their time, energy, and creativity to making this supplement package the best it has ever been.

Website

The text's Website, which can be accessed through http://login.cengage.com, includes up-to-date teaching and learning aids for instructors. The *Instructor's Manual*, *Test Bank*, and PowerPoint slides are available to instructors for download. If they choose to, instructors may post, on a *password-protected site only*, the PowerPoint presentation for their students.

Instructor's Manual

The *Instructor's Manual* contains a brief outline of each chapter's key concepts and equations, which can be easily copied and distributed to students as a reference tool.

Test Bank

The *Test Bank* includes an extensive set of new questions and problems and complete solutions to the testing material. The *Test Bank* is available through Cognero, an online, fully customizable version of the *Test Bank*, which provides instructors with all the tools they need to create, author/edit, and deliver multiple types of tests. Instructors can import questions directly from the *Test Bank*, create their own questions, or edit existing questions.

Solutions Manual

This manual contains all the answers to the end-of-chapter questions and solutions to end-of-chapter problems.

Lecture Presentation Software

A comprehensive set of PowerPoint slides is available. Corresponding with each chapter is a self-contained presentation that covers all the key concepts, equations, and examples within the chapter. The files can be used as is for an innovative, interactive class presentation. Instructors who have access to Microsoft PowerPoint can modify the slides in any way they wish, adding or deleting materials to match their needs.

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About the Authors

Frank K. Reilly is the Bernard J. Hank Professor of Finance and former dean of the Mendoza College of Business at the University of Notre Dame. Holding degrees from the University of Notre Dame (BBA), Northwestern University (MBA), and the University of Chicago (PhD), Professor Reilly has taught at the University of Illinois, the University of Kansas, and the University of Wyoming in addition to the University of Notre Dame. He has several years of experience as a senior securities analyst, as well as experience in stock and bond trading. A chartered financial analyst (CFA), he has been a member of the Council of Examiners, the Council on Education and Research, the grading committee, and was chairman of the board of trustees of the Institute of Charted Financial Analysts and chairman of the board of the Association of Investment Management and Research (AIMR; now the CFA Institute). Professor Reilly has been president of the Financial Management Association, the Midwest Business Administration Association, the Eastern Finance Association, the Academy of Financial Services, and the Midwest Finance Association. He is or has been on the board of directors of the First Interstate Bank of Wisconsin, Norwest Bank of Indiana, the Investment Analysts Society of Chicago, UBS Global Funds (chairman), Fort Dearborn Income Securities (chairman), Discover Bank, NIBCO, Inc., the International Board of Certified Financial Planners, Battery Park High Yield Bond Fund, Inc., Morgan Stanley Trust FSB, the CFA Institute Research Foundation (chairman), the Financial Analysts Seminar, the Board of Certified Safety Professionals, and the University Club at the University of Notre Dame.

As the author of more than 100 articles, monographs, and papers, his work has appeared in numerous publications including *Journal of Finance*, *Journal of Financial and Quantitative Analysis*, *Journal of Accounting Research*, *Financial Management*, *Financial Analysts Journal*, *Journal of Fixed Income*, and *Journal of Portfolio Management.* In addition to *Investment Analysis and Portfolio Management*, 10th ed., Professor Reilly is the coauthor of another textbook, *Investments*, 7th ed. (South-Western, 2006) with Edgar A. Norton. He is editor of *Readings and Issues in Investments, Ethics and the Investment Industry*, and *High Yield Bonds: Analysis and Risk Assessment.*

Professor Reilly was named on the list of *Outstanding Educators in America* and has received the University of Illinois Alumni Association Graduate Teaching Award, the Outstanding Educator Award from the MBA class at the University of Illinois, and the Outstanding Teacher Award from the MBA class and the senior class at Notre Dame. He also received from the CFA Institute both the C. Stewart Sheppard Award for his contribution to the educational mission of the Association and the Daniel J. Forrestal III Leadership Award for Professional Ethics and Standards of Investment Practice. He also received the Hortense Friedman Award for Excellence from the CFA Society of Chicago and a Lifetime Achievement Award from the Midwest Finance Association. He was part of the inaugural group selected as a fellow of the Financial Management Association International. He is or has been a member of the editorial boards of *Financial Management*, *The Financial Review*, *International Review of Economics and Finance*, *Journal of Financial Education*, *Quarterly Review of Economics and Finance*, and the *European Journal of Finance*. He is included in *Who's Who in Finance and Industry*, *Who's Who in America*, *Who's Who in American Education*, and *Who's Who in the World.*

Keith C. Brown holds the position of University Distinguished Teaching Professor of Finance and Fayez Sarofim Fellow at the McCombs School of Business, University of Texas. He received a BA in economics from San Diego State University, where he was a member of the Phi Beta Kappa, Phi Kappa Phi, and Omicron Delta Epsilon honor societies. He received his MS and PhD in financial economics from the Krannert Graduate School of Management at Purdue University. Since leaving school in 1981, he has specialized in teaching investment management, portfolio management and security analysis, capital markets, and derivatives courses at the undergraduate, MBA, and PhD levels, and he has received numerous awards for teaching innovation and excellence, including election to the university's prestigious Academy of Distinguished Teachers. In addition to his academic responsibilities, he has also served as president and chief executive officer of The MBA Investment Fund, LLC, a privately funded investment company managed by graduate students at the University of Texas.

Professor Brown has published more than 45 articles, monographs, chapters, and papers on topics ranging from asset pricing and investment strategy to financial risk management. His publications have appeared in such journals as *Journal of Finance*, *Journal of Financial Economics*, *Review of Financial Studies*, *Journal of Financial and Quantitative Analysis*, *Review of Economics and Statistics*, *Journal of Financial Markets*, *Financial Analysts Journal*, *Financial Management*, *Journal of Investment Management*, *Advances in Futures and Options Research*, *Journal of Fixed Income*, *Journal of Retirement*, *Journal of Applied Corporate Finance*, and *Journal of Portfolio Management*. In addition to coauthoring *Investment Analysis and Portfolio Management,* 11th edition, he is a coauthor of *Interest Rate and Currency Swaps: A Tutorial*, a textbook published through the CFA Institute. He received a Graham and Dodd Award from the Financial Analysts Federation as an author of one of the best articles published by *Financial Analysts Journal* in 1990, a Smith-Breeden Prize from the *Journal of Finance* in 1996, and a Harry M. Markowitz Special Distinction Award from *Journal of Investment Management* in 2016.

In August 1988, Professor Brown received the Chartered Financial Analyst designation from the CFA Institute, and he has served as a member of that organization's CFA Candidate Curriculum Committee and Education Committee and on the CFA Examination Grading staff. For five years, he was the research director of the Research Foundation of the CFA Institute, from which position he guided the development of the research portion of the organization's worldwide educational mission. For several years, he was also associate editor for *Financial Analysts Journal*, and he currently holds that position for *Journal of Investment Management* and *Journal of Behavioral Finance*. In other professional service, Professor Brown has been a regional director for the Financial Management Association and has served as the applied research track chairman for that organization's annual conference.

Professor Brown is the cofounder and senior partner of Fulcrum Financial Group, a portfolio management and investment advisory firm located in Austin, Texas, that currently oversees three fixed-income security portfolios. From May 1987 to August 1988, he was based in New York as a senior consultant to the Corporate Professional Development Department at Manufacturers Hanover Trust Company. He has lectured extensively throughout the world on investment and risk management topics in the executive development programs for such companies as Fidelity Investments, JP Morgan Chase, Commonfund, BMO Nesbitt Burns, Merrill Lynch, Chase Manhattan Bank, Chemical Bank, Lehman Brothers, Union Bank of Switzerland, Shearson, Chase Bank of Texas, The Beacon Group, Motorola, and Halliburton. He is an advisor to the boards of the Teachers Retirement System of Texas and the University of Texas Investment Management Company and has served on the Investment Committee of LBJ Family Wealth Advisors, Ltd.

Sanford J. Leeds is a distinguished senior lecturer at the McCombs School of Business, University of Texas. He graduated summa cum laude from the University of Alabama with a BS in

investment analysis. He has an MBA from The University of Texas Graduate School of Business, where he received the Dean's Award for Academic Excellence. He also has a JD from the University of Virginia, where he was on the editorial board of *The Virginia Tax Review*.

Professor Leeds has been a member of the McCombs faculty for 16 years. For 13 of those years, Professor Leeds also served as president of The MBA Investment Fund, LLC, a privately funded investment company managed by graduate students at the McCombs School. During his time on the faculty, he has taught a wide variety of classes, including Investment Theory and Practice, Portfolio Management, Capital Markets, Macroeconomics, Corporate Finance, and Advanced Corporate Finance. He has received numerous teaching awards, including three school wide awards: the Joe D. Beasley Teaching Award (for teaching in the graduate program), the CBA Foundation Advisory Council Award for Teaching Innovation, and the Jim Nolen Award for Excellence in Graduate Teaching. He has received recognition from his students with the "Outstanding MBA Professor Award" (selected by the full-time MBA students in multiple years, the Evening MBA students, and the Dallas MBA students) and the "Outstanding MSF Professor Award" (in multiple years). In 2015, he was selected (at the university level) to be a Provost Teaching Fellow and then served on the steering committee of that organization. He currently serves as a Senior Provost Fellow.

Professor Leeds received the Chartered Financial Analyst designation in 1998. He has served the CFA Institute as a grader, as a member of the Candidate Curriculum Committee, and as an editor of a candidate reading section. He is also a member of the Texas State Bar.

Prior to joining the faculty, Professor Leeds worked as an attorney and then as a money manager. After starting his career at a large law firm, he left to become a prosecutor. Then he attended business school and was one of four managers at a firm that had $1.6 billion under management. In recent years, he has served on the investment committee of the Austin Community Foundation (a $100 million endowment) and has also been the vice-chair of The Girls' School of Austin. He is frequently a speaker at industry conferences, normally discussing the economy and the markets.

PART 1

The Investment Background

The chapters in this section will provide a background for your study of investments by answering the following questions:

- Why do people invest?
- How do you measure the returns and risks for alternative investments?
- What factors should you consider when you make asset allocation decisions?
- What investments are available?
- How do securities markets function?
- How and why are securities markets in the United States and around the world changing?
- What are the major uses of security market indexes?
- How can you evaluate the market behavior of common stocks and bonds?
- What factors cause differences among stock and bond market indexes?

In the first chapter, we consider why an individual would invest, how to measure the rates of return and risk for alternative investments, and what factors determine an investor's required rate of return on an investment. The latter point will be important when we work to understand investor behavior, the markets for alternative securities, and the valuation of various investments.

Because the ultimate decision facing an investor is the makeup of his or her portfolio, Chapter 2 deals with the all-important asset allocation decision. As we will see, to minimize risk, investment theory asserts the need to diversify, which leads to a discussion of the specific steps in the portfolio management process and factors that influence the makeup of an investor's portfolio over his or her life cycle. We also begin our exploration of investments available for investors to select by making an overpowering case for investing globally rather than limiting choices to only U.S. securities. Building on this premise, we discuss several global investment instruments used in global markets. We conclude the chapter with a review of the historical returns and measures of risk for a number of different asset class groups.

In Chapter 3, we examine how markets work in general and then specifically focus on the purpose and function of primary and secondary bond and stock markets. During the past two decades, significant changes have occurred in the operation of the securities market, including a trend toward a global capital market, electronic trading markets, and substantial worldwide consolidation. After discussing these changes and the rapid development of new capital markets around the world, we speculate about how global markets will continue to consolidate and will increase available investment alternatives.

Investors, market analysts, and financial theorists generally gauge the behavior of securities markets by evaluating the return and risk implied by various market indexes and evaluate portfolio performance by comparing a portfolio's results to an appropriate benchmark. Because these indexes are used to make asset allocation decisions and then to evaluate portfolio performance, it is important to have a deep understanding of how they are constructed and the numerous alternatives available. Therefore, in Chapter 4, we examine and compare a number of stock market and bond market indexes available for the domestic and global markets.

This initial section provides the framework for you to understand various securities, how to allocate among alternative asset classes, the markets where these securities are bought and sold, the indexes that reflect their performance, and how you might manage a collection of investments in a portfolio using *index funds*, which are an investable form of the security index.

CHAPTER 1

The Investment Setting

After you read this chapter, you should be able to answer the following questions:

- Why do individuals invest?
- What is an investment?
- How do investors measure the rate of return on an investment?
- How do investors measure the risk related to alternative investments?
- What factors contribute to the rates of return that investors require on alternative investments?
- What macroeconomic and microeconomic factors contribute to changes in the required rates of return for investments?

This initial chapter discusses several topics that are basic to the subsequent chapters. We begin by defining the term *investment* and discussing the returns and risks related to investments. This leads to a presentation of how to measure the expected and historical rates of returns for an individual asset or a portfolio of assets. In addition, we consider how to measure risk not only for an individual investment but also for an investment that is part of a portfolio.

The third section of the chapter discusses the factors that determine the required rate of return for an individual investment. The factors discussed are those that contribute to an asset's *total* risk. Because most investors have a portfolio of investments, it is necessary to consider how to measure the risk of an asset when it is a part of a large portfolio of assets. The risk that prevails when an asset is part of a diversified portfolio is referred to as its *systematic risk*.

The final section deals with what causes *changes* in an asset's required rate of return over time. Notably, changes occur because of both macroeconomic events that affect all investment assets and microeconomic events that affect only the specific asset.

1.1 What Is an Investment?

For most of your life, you will be earning and spending money. Rarely, though, will your current money income exactly balance with your consumption desires. Sometimes, you may have more money than you want to spend; at other times, you may want to purchase more than you can afford based on your current income. These imbalances will lead you either to borrow or to save to maximize the long-run benefits from your income.

When current income exceeds current consumption desires, people tend to save the excess, and they can do any of several things with these savings. One possibility is to put the money under a mattress or bury it in the backyard until some future time when consumption desires

exceed current income. When they retrieve their savings from the mattress or backyard, they have the same amount they saved.

Another possibility is that they can give up the immediate possession of these savings for a future larger amount of money that will be available for future consumption. This trade-off of *present* consumption for a higher level of *future* consumption is the reason for saving. What you do with the savings to make them increase over time is *investment*.[1]

Those who give up immediate possession of savings (that is, defer consumption) expect to receive in the future a greater amount than they gave up. Conversely, those who consume more than their current income (that is, borrow) must be willing to pay back in the future more than they borrowed.

The rate of exchange between *future consumption* (future dollars) and *current consumption* (current dollars) is the *pure rate of interest*. Both people's willingness to pay this difference for borrowed funds and their desire to receive a surplus on their savings (that is, some rate of return) give rise to an interest rate referred to as the *pure time value of money*. This interest rate is established in the capital market by a comparison of the supply of excess income available (savings) to be invested and the demand for excess consumption (borrowing) at a given time. If you can exchange $100 of certain income today for $104 of certain income one year from today, then the pure rate of exchange on a risk-free investment (that is, the time value of money) is said to be 4 percent (104/100 − 1).

The investor who gives up $100 today expects to consume $104 of goods and services in the future. This assumes that the general price level in the economy stays the same. This price stability has rarely been the case during the past several decades, when inflation rates have varied from 1.1 percent in 1986 to as much as 13.3 percent in 1979, with a geometric average of 4.2 percent a year from 1970 to 2016. If investors expect a change in prices, they will require a higher rate of return to compensate for it. For example, if an investor expects a rise in prices (that is, he or she expects inflation) at an annual rate of 2 percent during the period of investment, he or she will increase the required interest rate by 2 percent. In our example, the investor would require $106 in the future to defer the $100 of consumption during an inflationary period (that is, a 6 percent *nominal*, risk-free interest rate will be required instead of 4 percent).

Further, if the future payment from the investment is not certain (the borrower may not be able to pay off the loan when it is due), the investor will demand an interest rate that exceeds the nominal risk-free interest rate. The uncertainty of the payments from an investment is the *investment risk*. The additional return added to the nominal, risk-free interest rate is called a *risk premium*. In our previous example, the investor would require more than $106 one year from today to compensate for the uncertainty. As an example, if the required amount were $110, $4 (4 percent) would be considered a risk premium.

1.1.1 Investment Defined

From our discussion, we can specify a formal definition of investment. Specifically, an **investment** is the current commitment of dollars for a period of time in order to derive future payments that will compensate the investor for (1) the time the funds are committed, (2) the expected rate of inflation during this time period, and (3) the uncertainty of the future payments. The "investor" can be an individual, a government, a pension fund, or a corporation. Similarly, this definition includes all types of investments, including investments by corporations in plant and equipment and investments by individuals in stocks, bonds, commodities, or real estate. This text emphasizes investments by individual investors. In all cases, the investor is trading a *known* dollar amount today for some *expected* future stream of payments that will be greater than the current dollar amount today.

[1]In contrast, when current income is less than current consumption desires, people borrow to make up the difference. Although we will discuss borrowing on several occasions, the major emphasis of this text is how to invest savings.

At this point, we have answered the questions about why people invest and what they want from their investments. They invest to earn a return from savings due to their deferred consumption. They want a rate of return that compensates them for the time period of the investment, the expected rate of inflation, and the uncertainty of the future cash flows. This return, the investor's **required rate of return**, is discussed throughout this book. A central question of this book is how investors select investments that will give them their required rates of return.

The next section describes how to measure the expected or historical rate of return on an investment and also how to quantify the uncertainty (risk) of expected returns. You need to understand these techniques for measuring the rate of return and the uncertainty of these returns to evaluate the suitability of a particular investment. Although our emphasis will be on financial assets, such as bonds and stocks, we will refer to other assets, such as art and antiques. Chapter 2 discusses the range of financial assets and also considers some nonfinancial assets.

1.2 Measures of Return and Risk

The purpose of this book is to help you understand how to choose among alternative investment assets. This selection process requires that you estimate and evaluate the expected risk–return trade-offs for the alternative investments available. Therefore, you must understand how to measure the rate of return and the risk involved in an investment accurately. To meet this need, in this section we examine ways to quantify return and risk. The presentation will consider how to measure both *historical* and *expected* rates of return and risk.

We consider historical measures of return and risk because this book and other publications provide numerous examples of historical average rates of return and risk measures for various assets, and understanding these presentations is important. In addition, these historical results are often used by investors to estimate the *expected* rates of return and risk for an asset class.

The first measure is the historical rate of return on an individual investment over the time period the investment is held (that is, its holding period). Next, we consider how to measure the *average* historical rate of return for an individual investment over a number of time periods. The third subsection considers the average rate of return for a *portfolio* of investments.

Given the measures of historical rates of return, we will present the traditional measures of risk for a historical time series of returns (that is, the variance and standard deviation of the returns over the time period examined).

Following the presentation of measures of historical rates of return and risk, we turn to estimating the *expected* rate of return for an investment. Obviously, such an estimate contains a great deal of uncertainty, and we present measures of this uncertainty or risk.

1.2.1 Measures of Historical Rates of Return

When you are evaluating alternative investments for inclusion in your portfolio, you will often be comparing investments with widely different prices or lives. As an example, you might want to compare a $10 stock that pays no dividends to a stock selling for $150 that pays dividends of $5 a year. To properly evaluate these two investments, you must accurately compare their historical rates of returns. A proper measurement of the rates of return is the purpose of this section.

When we invest, we defer current consumption in order to add to our wealth so that we can consume more in the future. Therefore, when we talk about a return on an investment, we are concerned with the *change in wealth* resulting from this investment. This change in wealth can be either due to cash inflows, such as interest or dividends, or caused by a change in the price of the asset (positive or negative).

If you commit $200 to an investment at the beginning of the year and you get back $220 at the end of the year, what is your return for the period? The period during which you own an investment is called its *holding period*, and the return for that period is the **holding period return (HPR)**. In this example, the HPR is 1.10, calculated as follows:

1.1

$$\begin{aligned}\text{HPR} &= \frac{\text{Ending Value of Investment}}{\text{Beginning Value of Investment}} \\ &= \frac{\$220}{\$200} = 1.10\end{aligned}$$

This HPR value will always be zero or greater—that is, it can never be a negative value. A value greater than 1.0 reflects an increase in your wealth, which means that you received a positive rate of return during the period. A value less than 1.0 means that you suffered a decline in wealth, which indicates that you had a negative return during the period. An HPR of zero indicates that you lost all your money (wealth) invested in this asset.

Although HPR helps us express the change in value of an investment, investors generally evaluate returns in *percentage terms on an annual basis.* This conversion to annual percentage rates makes it easier to directly compare alternative investments that have markedly different characteristics. The first step in converting an HPR to an annual percentage rate is to derive a percentage return, referred to as the **holding period yield (HPY)**. The HPY is equal to the HPR minus 1.

1.2

$$\text{HPY} = \text{HPR} - 1$$

In our example:

$$\begin{aligned}\text{HPY} &= 1.10 - 1 = 0.10 \\ &= 10\%\end{aligned}$$

To derive an *annual* HPY, you compute an **annual HPR** and subtract 1. Annual HPR is found by:

1.3

$$\text{Annual HPR} = \text{HPR}^{1/n}$$

where:

n = number of years the investment is held

Consider an investment that cost $250 and is worth $350 after being held for two years:

$$\begin{aligned}\text{HPR} &= \frac{\text{Ending Value of Investment}}{\text{Beginning Value of Investment}} = \frac{\$350}{\$250} \\ &= 1.40 \\ \text{Annual HPR} &= 1.40^{1/n} \\ &= 1.40^{1/2} \\ &= 1.1832 \\ \text{Annual HPY} &= 1.1832 - 1 = 0.1832 \\ &= 18.32\%\end{aligned}$$

If you experience a decline in your wealth value, the computation is as follows:

$$\begin{aligned}\text{HPR} &= \frac{\text{Ending Value}}{\text{Beginning Value}} = \frac{\$400}{\$500} = 0.80 \\ \text{HPY} &= 0.80 - 1.00 = -0.20 = -20\%\end{aligned}$$

A multiple-year loss over two years would be computed as follows:

$$\text{HPR} = \frac{\text{Ending Value}}{\text{Beginning Value}} = \frac{\$750}{\$1{,}000} = 0.75$$

$$\text{Annual HPY} = (0.75)^{1/n} = 0.75^{1/2}$$

$$= 0.866$$

$$\text{Annual HPY} = 0.866 - 1.00 = -0.134 = -13.4\%$$

In contrast, consider an investment of $100 held for only six months that earned a return of $12:

$$\text{HPR} = \frac{\$112}{100} = 1.12 \quad (n = 0.5)$$

$$\text{Annual HPR} = 1.12^{1/.5}$$

$$= 1.12^2$$

$$= 1.2544$$

$$\text{Annual HPY} = 1.2544 - 1 = 0.2544$$

$$= 25.44\%$$

Note that we made some implicit assumptions when converting the six-month HPY to an annual basis. This annualized holding period yield computation assumes a constant annual yield for each year. In the two-year investment, we assumed an 18.32 percent rate of return each year, compounded. In the partial year HPR that was annualized, we assumed that the return is compounded for the whole year. That is, we assumed that the rate of return earned during the first half of the year is likewise earned on the value at the end of the first six months. The 12 percent rate of return for the initial six months compounds to 25.44 percent for the full year.[2] Because of the uncertainty of being able to earn the same return in the future six months, institutions will typically *not* compound partial year results.

Remember one final point: The ending value of the investment can be the result of a positive or negative change in price for the investment alone (for example, a stock going from $20 a share to $22 a share), income from the investment alone, or a combination of price change and income. Ending value includes the value of everything related to the investment.

1.2.2 Computing Mean Historical Returns

Now that we have calculated the HPY for a single investment for a single year, we want to consider **mean rates of return** for a single investment and for a portfolio of investments. Over a number of years, a single investment will likely give high rates of return during some years and low rates of return, or possibly negative rates of return, during others. Your analysis should consider each of these returns, but you also want a summary figure that indicates this investment's typical experience, or the rate of return you might expect to receive if you owned this investment over an extended period of time. You can derive such a summary figure by computing the mean annual rate of return (its HPY) for this investment over some period of time.

Alternatively, you might want to evaluate a portfolio of investments that might include similar investments (for example, all stocks or all bonds) or a combination of investments (for example, stocks, bonds, and real estate). In this instance, you would calculate the mean rate of return for this portfolio of investments for an individual year or for a number of years.

[2]To check that you understand the calculations, determine the annual HPY for a three-year HPR of 1.50. (Answer: 14.47 percent.) Compute the annual HPY for a three-month HPR of 1.06. (Answer: 26.25 percent.)

Single Investment Given a set of annual rates of return (HPYs) for an individual investment, there are two summary measures of return performance. The first is the arithmetic mean return, the second is the geometric mean return. To find the **arithmetic mean (AM)**, the sum (Σ) of annual HPYs is divided by the number of years (n) as follows:

1.4
$$\text{AM} = \Sigma\text{HPY}/n$$

where:

ΣHPY = sum of annual holding period yields

An alternative computation, the **geometric mean (GM)**, is the nth root of the product of the HPRs for n years minus one.

1.5
$$\text{GM} = [\pi\text{HPR}]^{1/n} - 1$$

where:

π = product of the annual holding period returns as follows:

$$(\text{HPR}_1) \times (\text{HPR}_2) \ldots (\text{HPR}_n)$$

To illustrate these alternatives, consider an investment with the following data:

Year	Beginning Value	Ending Value	HPR	HPY
1	100.0	115.0	1.15	0.15
2	115.0	138.0	1.20	0.20
3	138.0	110.4	0.80	−0.20

$$\begin{aligned}
\text{AM} &= [(0.15) + (0.20) + (-0.20)]/3 \\
&= 0.15/3 \\
&= 0.05 = 5\% \\
\text{GM} &= [(1.15) \times (1.20) \times (0.80)]^{1/3} - 1 \\
&= (1.104)^{1/3} - 1 \\
&= 1.03353 - 1 \\
&= 0.03353 = 3.353\%
\end{aligned}$$

Investors are typically concerned with long-term performance when comparing alternative investments. GM is considered a superior measure of the long-term mean rate of return because it indicates *the compound annual rate of return* based on the ending value of the investment versus its beginning value.[3] Specifically, using the prior example, if we compounded 3.353 percent for three years, $(1.03353)^3$, we would get an ending wealth value of 1.104.

Although the arithmetic average provides a good indication of the expected rate of return for an investment during a future individual year, it is biased upward if you are attempting to measure an asset's long-term performance. This is obvious for a volatile security. Consider, for example, a security that increases in price from $50 to $100 during year 1 and drops back to $50 during year 2. The annual HPYs would be:

Year	Beginning Value	Ending Value	HPR	HPY
1	50	100	2.00	1.00
2	100	50	0.50	−0.50

[3]Note that the GM is the same whether you compute the geometric mean of the individual annual holding period yields or the annual HPY for a three-year period, comparing the ending value to the beginning value, as discussed earlier under annual HPY for a multiperiod case.

This would give an AM rate of return of:

$$[(1.00) + (-0.50)]/2 = .50/2$$
$$= 0.25 = 25\%$$

This investment brought no change in wealth and therefore no return, yet the AM rate of return is computed to be 25 percent.

The GM rate of return would be:

$$(2.00 \times 0.50)^{1/2} - 1 = (1.00)^{1/2} - 1$$
$$= 1.00 - 1 = 0\%$$

This answer of a 0 percent rate of return accurately measures the fact that there was no change in wealth from this investment over the two-year period.

When rates of return are the same for all years, the GM will be equal to the AM. If the rates of return vary over the years, the GM will always be lower than the AM. The difference between the two mean values will depend on the year-to-year changes in the rates of return. Larger annual changes in the rates of return—that is, more volatility—will result in a greater difference between the alternative mean values. We will point out examples of this in subsequent chapters.

An awareness of both methods of computing mean rates of return is important because most published accounts of long-run investment performance or descriptions of financial research will use both the AM and the GM as measures of average historical returns. We will also use both throughout this book with the understanding that the AM is best used as an expected value for an individual year, while the GM is the best measure of long-term performance since it measures the compound annual rate of return for the asset being measured.

A Portfolio of Investments The mean historical rate of return (HPY) for a portfolio of investments is measured as the weighted average of the HPYs for the individual investments in the portfolio, or the overall percent change in value of the original portfolio. The weights used in computing the averages are the relative *beginning* market values for each investment; this is referred to as *dollar-weighted* or *value-weighted* mean rate of return. This technique is demonstrated by the examples in Exhibit 1.1. As shown, the HPY is the same (9.5 percent) whether you compute the weighted average return using the beginning market value weights or if you compute the overall percent change in the total value of the portfolio.

Although the analysis of historical performance is useful, selecting investments for your portfolio requires you to predict the rates of return you *expect* to prevail. The next section

Exhibit 1.1 Computation of Holding Period Yield for a Portfolio

Investment	Number of Shares	Beginning Price	Beginning Market Value	Ending Price	Ending Market Value	HPR	HPY	Market Weight[a]	Weighted HPY
A	100,000	$10	$1,000,000	$12	$1,200,000	1.20	20%	0.05	0.01
B	200,000	20	4,000,000	21	4,200,000	1.05	5	0.20	0.01
C	500,000	30	15,000,000	33	16,500,000	1.10	10	0.75	0.075
Total			$20,000,000		$21,900,000				0.095

$$\text{HPR} = \frac{21{,}900{,}000}{20{,}000{,}000} = 1.095$$

$$\text{HPY} = 1.095 - 1 = 0.095$$
$$= 9.5\%$$

[a]Weights are based on beginning values.