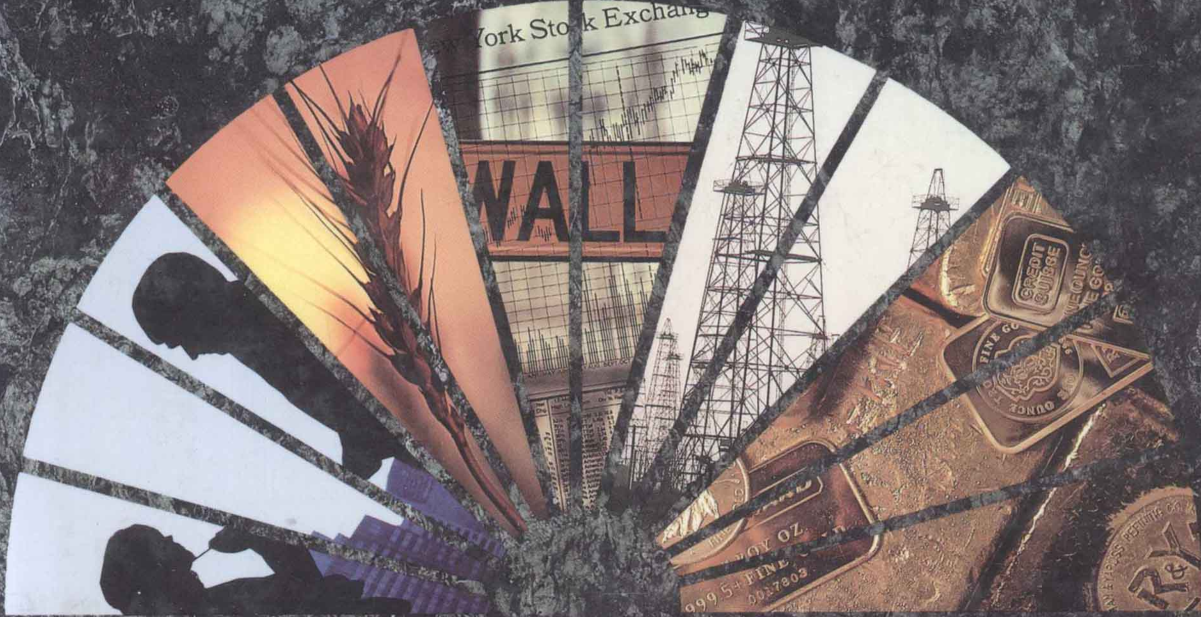

INVESTMENTS

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with **234** *illustrations*

1989

IRWIN

Homewood, IL 60430
Boston, MA 02116

Foreword

Along with the explosive growth in world financial markets has come an interaction between scholarly theory and day-to-day business practice that is unprecedented in the history of economics. Not only are the tools of modern finance the accepted modes of analysis for sophisticated investors and traders, they are also the sources of many of the new products that are dramatically altering the financial markets. For the teacher of investments, however, the excitement and relevance of the field are matched by its dangers. A teacher must carefully craft a course for the student that balances the ever-changing and often unsettled background of scholarly theories against the temptation to titillate with the latest fad to hit the securities markets. The only way to teach successfully in such a minefield is to take a firm grasp of what is truly fundamental and to utilize what is happening in the financial markets to illustrate the workings of these fundamentals. *Investments* accomplishes that difficult task with consummate skill.

Investments sensibly begins with an overview that lays out the workings of the securities markets in a thorough but lively fashion. After the student has been exposed to the institutional structure of the securities markets, the fundamental intuitions of the trade-off between return and risk and the role of information are developed and used to clarify the workings of the markets. The major asset-pricing models are all treated with a commendable clarity that should make teaching them a pleasure.

A central theme of the book is the investor's perspective on using securities to form portfolios. The fine treatments of the stock and fixed-income markets further this theme with their emphasis on the empirical properties of these markets, and derivative securities such as options and futures become natural topics from the perspective of how they fit into investor portfolios. A careful distinction is drawn between passive and active investment management, and this distinction is used to great advantage to deal with such troublesome matters as the reconciliation of the efficient market hypotheses with active management. As with all the material, a clear presentation of the theory is accompanied by a rich matrix of institutional material within which it is applied.

Students and teachers will welcome this thoroughly modern and well executed treatment of investments. I believe that it will become the central text in the field.

Stephen A. Ross

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To our families with love and gratitude.

Preface

In teaching and practice, the field of investments has experienced many changes over the last 2 decades. This is due in part to an abundance of newly designed securities, in part to the creation of new trading strategies that would have been impossible without concurrent advances in computer technology, and in part to rapid advances in the theory of investments that have come out of the academic community. In no other field, perhaps, is the transmission of theory to real-world practice as rapid as is now commonplace in the financial industry. These developments place new burdens on practitioners and teachers of investments far beyond what was required only a short while ago.

Investments 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 make every 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.

Our primary goal is to present material of practical value, but all three of us are active researchers in the science of financial economics and find virtually all of the material in this book to be of great intellectual interest. Fortunately, we think, there is no contradiction in the field of investments between the pursuit of truth and the pursuit of money. Quite the opposite. 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 satisfying subjects of scientific inquiry as they are of immense practical importance for the sophisticated investor.

Since 1983 we have conducted an annual review program at Boston University for candidates from all over the world preparing for the Chartered Financial Analyst examinations. From its inception in 1963 the CFA program has come to symbolize high standards of professionalism in the investment community. The CFA curriculum represents the consensus of a committee of distinguished scholars and practitioners regarding the core of knowledge required by the investment professional.

This book has benefited from our continuing CFA experience in two ways. First, we have incorporated in the text much of the content of the readings and other study materials in the official CFA curriculum. As a result, the book includes some material not found in most other investments texts. Most notably, Part VIII presents material on portfolio management principles and techniques for both the individual and institutional investor that stems largely from the CFA curriculum.

Second, we have included questions from CFA examinations in the end-of-chapter problem sets throughout the book. In every case we have indicated the year and level of the examination in which the question appeared.

Realistic Presentation of Modern Portfolio Theory

The exposition of modern portfolio theory in this text differs from its presentation in all other major investments texts in that we develop the basic model starting with a risk-free asset such as a bank certificate of deposit or a U.S. Treasury bill, and a single risky asset such as a common stock mutual fund.[1] Not until later do we add other risky assets. Other texts develop the model by first assuming that the investor has to choose from two risky assets; only later do they introduce the possibility of investing in a risk-free asset. Ultimately both approaches reach the same end point, which is a model in which there are many risky assets in addition to a risk-free asset.

We think our approach is better for two important reasons. First, it corresponds to the actual procedure that most individual investors follow. Typically, one starts with all of one's money invested in a bank account and only then considers how much to invest in something riskier that may offer the prospect of a higher expected return. The next logical step is to consider the addition of other risky assets such as real estate or gold, which requires determining whether the benefits of such increased diversification are worth the additional transaction costs involved in including them in one's portfolio.

The second advantage of our approach is that it vastly simplifies exposition of the mathematics for deriving the menu of risk-return combinations open to the investor. Portfolio optimization techniques are mathematically complex, ultimately requiring a computer. Anything that can help to simplify their presentation should thus be welcome. In short, we believe our approach is both more realistic and analytically simpler than the conventional one.

Organization and Content

The text is composed of eight sections, which are fairly independent and may be studied in a variety of sequences. Since there is enough material in the book for two

[1]We define and discuss mutual funds in Chapter 3. For now it is sufficient to know that a common stock mutual fund is a diversified portfolio of stocks in which an investor can invest as much money as desired.

one-semester courses, clearly a one-semester course will require the instructor to decide which parts to include and which to exclude. In the **Instructor's Manual** that accompanies the text we suggest several alternative syllabi for a one- or a two-course sequence in investments.

Part I is introductory and contains much institutional material. Chapter 1 is a description of the financial environment that contains useful background information for the student of investments.

Chapter 2 is an overview of the types of securities traded in financial markets: fixed-income, equities, options, and futures contracts. It presents a complete taxonomy of security types, describes their main features, and explains how to read security listings in the financial pages of the newspaper. The emphasis throughout the chapter is on understanding the essential features of the financial instruments without getting bogged down in unnecessary detail.

Chapter 3 explains how and where securities are traded. It starts from the issuance of new securities in the primary market, explains the securities exchanges and the over-the-counter market and how they operate, and then gives a thorough but not overly detailed presentation of the mechanics of trading. It goes through the types of orders an investor might give and explains the meaning and mechanics of buying and short-selling. It also discusses the costs of trading, how to choose a broker, and the use of mutual funds and other investment companies by the individual investor.

The material presented in Chapters 2 and 3 should make it possible for the instructor to assign term projects early in the course. These projects might require the students to analyze in detail a particular security or group of securities. Many instructors like to involve their students in some sort of investment game, which gets them to simulate the process of real-world investing. The material in these two chapters is intended to facilitate this.

Part II contains the core of modern portfolio theory as it relates to optimal portfolio selection. Chapters 4 and 5 introduce the fundamental concepts of expected return, risk, risk aversion, and diversification. Chapter 6 develops the model of portfolio optimization with a risk-free asset and a single risky asset, and Chapter 7 generalizes it to encompass many risky assets.

The level of analysis in this part of the book is as nontechnical as possible without being operationally useless. In the computer software diskette provided free to adopters of the book there is a portfolio optimization program that is quite easy to use. The student must still develop at least enough sophistication to be able to supply the inputs required and interpret the output. All of the mathematics needed to master this material is presented in the Quantitative Review at the end of the book.

Part III contains the core of modern portfolio theory as it relates to the equilibrium structure of expected rates of return on risky assets. It builds on the material in Part II, which is a prerequisite. Topics covered include the capital asset pricing model and the arbitrage pricing theory.

The last chapter in Part III, Chapter 13, treats the efficient markets hypothesis. It gives rigorous definitions of the alternative forms of the hypothesis, explains the rationale behind it, and summarizes in some detail the evidence for and against it.

Part IV, which focuses on the analysis and valuation of fixed-income securities, is the first of three parts devoted to security valuation. The other two deal with equity securities and derivative securities. For a course emphasizing security analysis and excluding portfolio theory, one may proceed directly from Part I to Part IV with no loss in continuity.

Chapter 14 introduces the fundamentals of bond pricing and yield calculations. Chapter 15 addresses the term structure of interest rates. Chapter 16 deals with fixed-income investment strategies, including the concepts of duration and immunization.

Part V is devoted to equity securities. Chapter 17 presents the theory of equity valuation, primarily discounted dividend models of progressively greater degrees of complexity and realism. It attempts to reach the level of sophistication at which professional security analysts employ these models. Chapter 18 is devoted to fundamental analysis, including the analysis of financial statements, the preparation of earnings forecasts, and other applied techniques used in trying to identify mispriced common stocks.

Part VI covers derivative assets such as options, futures contracts, and convertible securities. It contains two chapters on options and two on futures. Chapter 19, the first of the two chapters on options, is a general introduction to options markets and option pricing theory. Chapter 20 contains more advanced material on options and discusses warrants and convertible securities as well.

Chapter 21 is a general introduction to futures contracts. It explains the kinds of contracts traded, their uses in hedging and in speculating, and the equilibrium relationships between spot and futures prices. Chapter 22 takes a closer look at several selected futures contracts.

Part VII is devoted to active portfolio management. Chapter 23 develops the theory of active portfolio management. It attempts to integrate the material on security analysis in Parts IV through VI with the material on portfolio selection in Parts II and III by addressing the question of how to combine securities that you believe are mispriced into an overall portfolio that is efficiently diversified. To the best of our knowledge, the material in this chapter has never before appeared in a textbook.

Chapter 24 addresses the evaluation of portfolio performance. It develops the theory behind some of the popularly used risk-adjusted performance measures and explains the methods of determining whether a portfolio manager has superior market timing or security selection ability. Chapter 25 shows how the analysis presented thus far can be extended to a wider context that includes international investments, as well as investments in real estate or precious metals. Chapter 26 discusses some of the key organizational issues in the actual business of money management.

Part VIII is about the process of portfolio management. Chapter 27 lays out the general framework. It contains an extensive explanation of the process of asset allocation based on the theory of efficient diversification. Chapter 28 applies it to the individual investor and to pension funds. This part of the book should be of special interest to students participating in the CFA program, since it covers much of the same ground as the portfolio management parts of the CFA syllabus.

Pedagogical Features and Ancillary Materials

This book contains several features designed to make it easy for the student to understand, absorb, and apply the concepts and techniques presented. Each chapter begins with an **overview**, which states the objectives of the chapter and describes the material to be covered, and ends with a detailed **summary**, which recapitulates the main ideas presented.

Learning investments is in many ways like learning a new language. Before one can communicate, one must learn the basic vocabulary. To facilitate this process, all new terms are presented in **boldface** type the first time we use them, and at the end of each chapter there is a **Key Terms** section listing the most important new terms introduced in that chapter. A **Glossary** of all of the terms used appears at the end of the book.

Boxes containing short articles from business periodicals are included throughout the book. We think they enliven the text discussion with examples from the world of current events. The article in the Prologue from *Business Week* on the invasion of Wall Street by so-called rocket scientists is an example. We chose the boxed material on the basis of relevance, clarity of presentation, and consistency with good sense.

A unique feature of this book is the inclusion of **Concept Checks** in the body of the text. These self-test questions and problems enable the student to determine whether he or she has understood the preceding material and to reinforce that understanding. Detailed solutions to all these questions are provided at the end of the book.

These Concept Checks may be approached in a variety of ways. They may be skipped altogether in a first reading of the chapter with no loss in continuity. They can then be answered with any degree of diligence and application upon the second reading. Finally, they can serve as models for solving the end-of-chapter problems assigned by the instructor.

Each chapter also contains a list of **Selected Readings** that are annotated to guide the student toward useful sources of additional information in specific subject areas.

The **end-of-chapter problems** progress from the simple to the complex. We strongly believe that practice in solving problems is a critical part of learning investments, so we have provided lots of problems. Many are taken from CFA examinations and therefore represent the kinds of questions that professionals in the field believe are relevant to the "real world." The **Student Problems Manual,** which accompanies the text, provides many more practice problems with solutions.

Software is available for use with the text. First, it is designed to enhance the student's understanding of the material presented in the chapter. Second, it shows that the concepts and techniques presented in the chapter can be easily implemented in real-world applications by using the computer.

Many schools now make PC laboratories available for individual or class use. We have found that for some students the integration of the use of the computer into the investments course either as a mandatory or a voluntary component adds a great deal.

The software diskette provides a basic set of programs and data that the student can actually use for analysis or for personal investing.

The **Instructor's Manual** that accompanies this text contains detailed solutions to the end-of-chapter questions and problems, and a **Test Bank** contains multiple-choice problems.

Acknowledgments

This book was developed over a period of 3 years, and it involved the efforts of many dedicated professionals. Our thanks go to Steve Ross, who persuaded us that writing such a text was an endeavor worth undertaking. A distinguished panel of reviewers read the first draft, after which a focus group of selected reviewers met to discuss its content in detail. Their suggestions were incorporated in the second draft, which likewise was reviewed by a highly qualified panel. The text was extensively class tested by experienced instructors, and throughout the production process the material was examined by technical reviewers with specialized expertise in the various subject areas.

These reviewers, each of whom was carefully selected by the Irwin development team, deserve special thanks for their valuable insights and contributions.

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For granting us permission to include many of their examination questions in the text, we are grateful to the Institute of Chartered Financial Analysts.

Several colleagues read portions of the manuscript and offered many helpful suggestions. In particular, we would like to acknowledge the contributions of Jeff Daskin, Steve Marks, and Don Smith. We also are indebted to Abraham Abraham for his help with the text.

Much credit is due also to the development and production team: our special thanks go to Glenn Turner, Senior Vice President; Denise Clinton and Mike Junior, Sponsoring Editors; Terry Eynon, Developmental Editor; Carol Wiseman, Project Manager; John A. Rogers, Production Editor; and John Rokusek, Designer.

We also thank Mary Jeanne Curtenaz, Gisele Gauthier, Jeannie O'Brien, and especially Vince Mahler, who typed seemingly endless revisions of the manuscripts with good cheer.

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

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