



EIGHTH EDITION

Modern Portfolio Theory and Investment Analysis

Edwin J. Elton | Martin J. Gruber

Stephen J. Brown | William N. Goetzmann

International Student Version

MODERN PORTFOLIO THEORY AND INVESTMENT ANALYSIS

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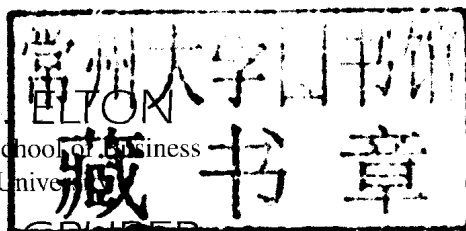
INTERNATIONAL STUDENT VERSION

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Preface

This book, as the title suggests, is concerned with the characteristics and analysis of individual securities, as well as with the theory and practice of optimally combining securities into portfolios. Part 1 of the book provides a description of securities and markets. Two chapters provide the reader with the institutional background to place the analytics that follow in perspective.

The second, and longest, part of the book discusses modern portfolio theory. We begin Part 2 with a detailed presentation of the theory of modern portfolio analysis and show that the characteristics of portfolios are significantly different from those of the individual securities from which they are formed. In fact, portfolio analysis is the recipe for one of the few “free lunches” in economics. By the end of Chapter 6, the reader will have learned the basis of portfolio theory from the relationship of portfolio characteristics to security characteristics to the method of computing sets of portfolios that investors will find desirable.

Although the theory presented at the beginning of the book is relatively new (any economic theory less than 60 years old is new!), it has been around long enough that major breakthroughs have occurred in its implementation. These breakthroughs involve simplification of the amount and type of inputs to the portfolio problem (Chapters 7 and 8), as well as simplification of the computational procedure to find sets of desirable portfolios (Chapter 9). The major advantage in the latter simplification is that the portfolio selection process and the final portfolios selected have a structure with a clear-cut economic rationale, one to which both the practicing security analyst and the economist can relate. A discussion of the potential benefits derived from diversifying portfolios internationally is provided in chapter 10. Chapter 11 discusses the all-important input to portfolio management expected return.

The reader might note that up to now we have discussed sets of portfolios. These sets contain portfolios that would be desirable to any investor. In Chapter 12, we examine how an individual investor might choose the one optimal portfolio (for him or her) from among the sets of portfolios designed to appeal to any investor.

Part 3 provides a discussion of equilibrium in the capital markets. This material usually is included under the rubric of the capital asset pricing model or arbitrage pricing theory and shows how portfolio theory can be used to infer what equilibrium returns and prices will be for individual securities. This area is changing rapidly. But, as the reader will see, empirical tests suggest that the theory as it now stands provides great insight into the functioning of security markets and the pricing of individual issues. It also suggests ways that equilibrium theory can be used to manage portfolios more meaningfully.

Part 4 of this book deals with the characteristics and evaluation of individual securities. In this part we discuss whether security markets are efficient, the valuation of common stocks, the characteristics of earnings and their role in the valuation process, the valuation of bonds, the nature of and valuation of options, and finally the valuation and uses of futures. In addition, we explore the new field of behavioral finance and its implications for investor action and asset prices.

Part 5 is a discussion of the evaluation of the investment analysis and portfolio management process. In writing this part we have stressed techniques for evaluating every stage of the process, from the forecasting of earnings by security analysts to the performance of portfolios that are finally selected. It seems fitting that a book that deals primarily with investment analysis and portfolio management should end with a discussion of how to tell if these functions are performed well.

The book was designed to serve as a text for courses both in portfolio theory and in investment analysis that have an emphasis on portfolio theory. We have used it for these purposes at New York University for several years. For the course in portfolio analysis, we use Chapters 4–16 plus Chapters 25 and 27. This thoroughly introduces the students to modern portfolio theory and general equilibrium models (capital asset pricing models and arbitrage pricing models).

The book can also be used in a course in investments where both portfolio analysis and security analysis are discussed. For these purposes, the institutional material in Chapters 1 and 2, the security analysis chapters of Part 4, as well as Chapter 26 on the Evaluation of Security Analysis, are appropriate, and some of the advanced portfolio theory and general equilibrium chapters of Parts 2 and 3 can be deleted. Each professor's preference and the dictates of the course will ultimately determine the final choice. One possible choice that has been successfully used was the replacement of much of Chapter 6 and Chapters 8, 11, 14, 15, and 16 with the chapters on security analysis contained in Part 4. Courses covering portfolio theory and investments vary greatly in their content. We have included in this book those areas that we view as most relevant.

We believe that this book will be an aid to the practicing security analyst and portfolio manager. It is remarkable how quickly the ideas of modern portfolio theory have found their way into investment practice. The manager who wishes an overview of modern portfolio theory and investment analysis will find that Chapters 4, 5, 7, 9, 10, and 17–25 will provide a thorough and readable understanding of the issues. Specialists who are concerned with issues on implementation will find that the other chapters will equip them with the most modern tools available.

As the reader may know, New York University has not only the normal MBA and undergraduate student courses, but also courses intended for full-time portfolio managers and securities analysts. The professional reader can be assured that the book has been used in these courses and that some of our most enthusiastic responses came from practicing managers who learned not only the ideas of modern portfolio theory and investment analysis but also its strengths and weaknesses.

In writing this book, our purpose has been to make all the material accessible to students of portfolio analysis and investment management, at both the undergraduate and the graduate levels. To the extent possible, the text stresses the economic intuition behind the subject matter. Mathematical proofs involving more than simple algebra are placed in footnotes, appendices, or specially noted sections of the text. They can be deleted without losing the general thrust of the subject matter. In addition, we have included problems both in the text and at the end of each chapter. We have tried to capture in this book the frontier of the state of the art of modern portfolio analysis, general equilibrium theory, and investment analysis while presenting it in a form that is accessible and has intuitive appeal.

A book must, of necessity, present material in a certain order. We have tried to present the material so that much of it can be used in alternative sequences. For example, we tend

to teach formal utility analysis after many of the concepts of portfolio analysis. However, we realize that many professors prefer to begin with a discussion of utility analysis. Thus, this chapter in particular could be read immediately after the introductory chapter.

This and earlier editions of this work had the benefit of reviews by many of our colleagues. Those reviews have helped to shape the text you now hold. Those colleagues include Chris Blake at Fordham who was been especially helpful in all of the revisions; Ed Blomeyer, Louisiana State University; James Bradfield, Hamilton College; Gregg Brauer, University of Iowa; Tom Conine, Fairfield University; Ronald E. Copley, University of North Carolina, Wilmington; Edward A. Downe, University of New Haven; Cheol S. Eun, Georgia Institute of Technology; Jim Farrell, MPT Associates; Bob Ferguson, Fordham; Steve Figlewski, New York University; William Fouse, Chairman of Mellon Capital Management Corporation; Ed Friedman, City College of New York; James Gale, Michigan Technological University; Stuart L. Gillan, The University of Hong Kong; Gabriel Hawawini, INSEAD; C. Thomas Howard, University of Denver; David Ikenbery, Rice University; Nancy Jacob, University of Washington; Christine Jiang, University of Memphis; George Jiang, University of Arizona; Charles Jones, North Carolina State University; Maurice Joy, University of Kansas; Gregory Kadlec, Virginia Polytechnic University; Bob Klemkosky, Indiana University; Dorothy Koehl, University of Maryland; Richard Kolodny, University of Maryland; Robert A. Korajczyk, Northwestern University; Jerry Levine, Temple University; Joseph Liberman, University of Illinois, Chicago Circle; Susan M. Mangiero, Sacred Heart University; Richard McEnally, University of North Carolina; Roger Murray, Professor Emeritus at Columbia University; Tom Schneeweis, University of Massachusetts; Adam Schwartz, University of Mississippi; Brent Sorenson, Brown University; Robert F. Stambaugh, University of Pennsylvania; Maurry Tamarkin, Clark University; John L. Tealle, Pace University; James M. Tipton, Baylor University; Don Tuttle, Indiana University; Stuart Wood, Tulane University; Tzyy-Jeng Wu, Pace University; Xinlei Zhao, Kent State University; and Thomas J. Zweirlein, Colorado State University. Earlier editions also benefited from the help of our colleagues at New York University, including Ramasastry Ambarish, Yahov Amihud, Steve Figlewski, Mustafa Gultekin (University of North Carolina), Tom Ho, Avner Kalay (University of Utah), Jerry Kallberg, Mike Keenan, Richard Levich, Prafulla Nabar, Bob Schwartz, and Marti Subrahmanyam. Matt Hlavka and Bruce Tuckman provided much help with the revision. We also thank Harold Jennings, Nancy Mark, and Anna Palumbo for their help in typing the revisions. We have also benefited from additional comments from Joseph Finnerty, University of Illinois, Champaign; Diana Harrington, Babson College; Frederick Puritz, SUNY Oneonta; Linda Richardson, Siena College; Anthony Sanders, Ohio State University; Ethel Silverstein, New York Institute of Technology; and Joan Lamm-Tennant, Villanova University.

Finally, we wish to acknowledge Dr. Watson. We have noted her contribution to utility analysis and security valuation in previous books. Her contribution to earlier versions of this book were substantial. Her untimely death meant that we did not have the benefit of her excellent advice on this latest edition, though her help is still reflected in the book you have before you.

Software Applications

We are especially pleased to announce the continued publication of the software program, The Investment Portfolio. This program is a self-contained, Windows-based tool that will allow the user to perform most of the analyses in this book.

We wish to thank Chris Blake of Fordham University for his help in designing, developing, and beta-testing this package. Philippe Marchal and Rick Clinton of Intellipro, Inc., developed the software, and their efficient and thorough development work was critical. To

order this software package please visit our Web sites at <http://www.wiley.com> or <http://www.wiley.co.uk> (for customers in Europe, South Africa, and the Middle East). In addition to The Investment Portfolio, a complete *Instructor's Manual with Tests*, prepared by Chris Blake in conjunction with the authors, and a full set of power point presentations, are available on the Book Companion Web Site at <http://www.wiley.com/college/elton>.

A NOTE ON THE EIGHTH EDITION

Almost all of the chapters in the book have been revised and updated. The most extensive revisions occur in Chapter 10 which deals with issues relating to international diversification. It is inevitable that many readers will look to this book to explain the recent and very dramatic developments in the financial markets. Indeed we have added discussion relating to these events throughout the text, particularly in describing instruments and institutions that are widely implicated in the financial crisis. However, it is too early to write the definitive history of these times. As this Edition is going to press, there is an efflorescence of academic research that has been prompted and inspired by this crisis. We expect that the next Edition will be extensively revised to consider the lessons and implications of these events.

Final Thoughts

More than 25 years have passed since we began to write the first edition of this book. Progress has been made in several areas, and yet new changes have occurred that reopen old questions. The acceptance of quantitative techniques by the investment community both here and overseas has grown at a rate we would not have dreamed of then. The use of modern portfolio techniques for stocks and bonds, dividend discount models, concepts of passive portfolios, the incorporation of international assets in portfolios, and the use of futures and options as risk control techniques are very widespread. Yet the world of investments continues to change. No sooner do we begin to believe that the capital asset pricing model (CAPM) describes reality than the arbitrage pricing theory (APT) comes along. No sooner do we convince ourselves that markets are efficient than market anomalies become hot topics. No sooner do we say that security analysis does not pay than we justify the cost of analysis in a world of partially revealing prices. No sooner is market timing discredited than it arises again under the name of tactical asset allocation.

Will the field continue to evolve and will today's truths become less true tomorrow? Probably. We will continue to learn. We know more about the capital markets now than we did 20 years ago. There is still a lot more to learn. That is why there will no doubt be a ninth edition of this book, and why there are securities and strategies that have expected returns above the riskless rate.

E. J. Elton
M. J. Gruber
S. J. Brown
W. N. Goetzmann

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Part 1

INTRODUCTION

1

Introduction

Almost everyone owns a portfolio (group) of assets. This portfolio is likely to contain real assets such as a car, a house, or a refrigerator, as well as financial assets such as stocks and bonds. The composition of the portfolio may be the result of a series of haphazard and unrelated decisions, or it may be the result of deliberate planning. In this book we discuss the basic principles underlying rational portfolio choice and what this means for prices determined in the marketplace. We confine our attention to financial assets, although much of the analysis we develop is equally applicable to real assets.

An investor is faced with a choice from among an enormous number of assets. When one considers the number of possible assets and the various possible proportions in which each can be held, the decision process seems overwhelming. In the first part of this book we analyze how decision makers can structure their problems so that they are left with a manageable number of alternatives. Later sections of the book deal with rational choice among these alternatives, methods for implementing and controlling the decision process, and equilibrium conditions in the capital markets to which the previous analysis leads.

Let us examine the composition of this book in more detail.

OUTLINE OF THE BOOK

This book is divided into five parts. The first part provides background material on securities and financial markets. The reader already familiar with these topics can go directly to Part 2.

The second and longest part deals with the subject of portfolio analysis. Portfolio analysis is concerned with finding the most desirable group of securities to hold, given the properties of each of the securities. This part of the book is itself divided into four sections. The first of these sections is titled “Mean Variance Portfolio Theory.” This section deals with determining the properties of combinations (portfolios) of risky assets given the properties of the individual assets, delineating the characteristics of portfolios that make them preferable to others, and, finally, showing how the composition of the preferred portfolios can be determined.