Preface

This third edition is a substantially revised and expanded treatment of the theory of interest from that contained in the second edition. With a few minor exceptions, all the material in the second edition has been retained and updated. In addition, a significant amount of new material has been added.

The first seven chapters cover the basic mathematical theory of interest as traditionally developed. These seven chapters match the first seven chapters in the second edition. However, the material on yield rates was moved from Chapter 5 to Chapter 7 and the other two chapters were renumbered accordingly.

The coverage of topics in these seven chapters largely tracks the second edition. The consideration of annuities varying in geometric progression has been expanded into a separate section reflecting the increasing importance of indexed annuities in various types of applications. The material on capital budgeting in Chapter 7 has been significantly expanded with the introduction of several techniques not covered in the second edition. Finally, the discussion of short sales has been expanded and repositioned into Chapter 7

Chapter 8 covers practical applications of material presented in the first seven chapters. It is organized into largely independent sections, so that it can readily be used as a reference for the topics covered. One new topic that has been added in Chapter 8 is leasing as an alternative to traditional loan financing, with particular emphasis on automobile leasing. Also, the section introducing the reader to modern financial instruments has been expanded to include additional financial instruments.

Chapters 9 through 13 introduce the reader to the economic and financial theory of interest, in additional to the mathematical theory of interest. Much of this material was covered in the second edition, but the extent and depth of coverage has been significantly expanded in the third edition. For example, Chapter 9 has separate sections devoted to reflecting the effects of inflation, expenses, taxes, currency exchange rates, and risk and uncertainty in calculations involving interest.

Chapters 10 and 11 are two new chapters representing a significantly expanded treatment of two important topics covered in Chapter 9 of the second edition. Chapter 10 covers the term structure of interest rates with expanded

consideration of spot rates, forward rates, relationship with bond yields, and a section with a detailed discussion of arbitrage. Chapter 11 covers important techniques in the management of assets and liabilities, such as duration, convexity, and immunization. The analysis of interest sensitive cash flows is considered more explicitly and in more depth. Also, the material on the full immunization technique has been moved from an appendix and expanded into a separate section.

With a couple of notable exceptions, the first eleven chapters largely utilize a deterministic approach to the subject of interest. The final two chapters explicitly address stochastic approaches to interest theory. Chapter 12 contains a number of different models for doing this and consists of an expanded treatment of material from Chapter 10 in the second edition. The use of binomial lattices for interest rate modeling and the development of several continuous stochastic models are new to the third edition.

Chapter 13 addresses options and other derivatives and has been expanded into an entire chapter. Significant non-mathematical introductory material has been added in the early part of the chapter to provide a more complete introduction into the basics of options. The two primary approaches for option valuation, binomial lattices and the Black-Scholes formula, have been updated and expanded. Finally, the reader is briefly introduced to some extensions of option valuation techniques for more complex types of options.

The computational approaches in the third edition have been modernized to reflect the widespread availability of calculators with exponential and logarithmic capability, including those with built-in financial functions. Techniques for solving certain key types of problems, e.g. the determination of an unknown yield rate given a set of cash flows, are illustrated. However, the presentation is generic and not tied to any one particular financial calculator. The coverage of calculator techniques is targeted and is not widespread throughout the book. The importance of the mastery of basic concepts and techniques is stressed throughout and is not sacrificed in those areas in which calculator techniques are illustrated.

The interest tables have been eliminated from the third edition as obsolete. Also, iteration techniques are greatly deemphasized from the presentation in the second edition. An appendix on iteration methods is retained for those reader interested in pursuing this subject in more detail.

The pedagogical approach in the second edition has been retained in the third edition. The textbook narrative emphasizes both the importance of conceptual understanding and the ability to apply the techniques to practical

problems. Verbal interpretations of key results are emphasized throughout. Key formulas are numbered for ease of reference. Illustrative examples are provided at the ends of most sections. The number of exercises at the ends of the chapters has been significantly expanded to 545. Each exercise is intended to illustrate a somewhat different point to keep the number of repetitious exercises to a minimum. Answers to the exercises are provided at the back of the book.

A new feature in the third edition is the addition of chapter appendices. These appendices contain such items as the more complex derivations, extended results of interest but not fundamental, and additional formulas and techniques. The purpose is for the primary textbook narrative to be "tighter" and focused on the fundamental material. In addition to these chapter appendices, the book also contains five general appendices at the end of the book. These latter five appendices are lettered rather than numbered to avoid ambiguity.

A working knowledge of calculus is required, since the continuous nature of interest is recognized throughout the book. Also, the last two chapters of the book dealing with stochastic approaches assume knowledge of basic probability and statistics.

The book is designed to be appropriate for both classroom use with an instructor and for self-study by those learning the subject without the aid of an instructor. The amount of material probably exceeds that which can be covered in a one-semester university course.

The author is indebted to a number of students who have used the textbook and a number of other correspondents who have written over the years in connection with the second edition. As a result of this input and correspondence, a number of improvements have been incorporated into the third edition.

The author wishes to express his appreciation to the Society of Actuaries and to the Casualty Actuarial Society for using the second edition as a syllabus reference on the actuarial examination covering financial mathematics for many years. A number of the exercises appearing in this book have been obtained from published examinations of these two actuarial organizations.

The author also wishes to give special recognition and appreciation to two individuals at the University of Central Florida. Kellie Tabor spent uncountable hours typing the manuscript for the book. Since final copy was produced by word processing, this was a very painstaking process. Dandan Xu, a graduate student, used special software to develop the figures in the book and also contributed extensively to the exercises.

Finally, the author wishes to recognize the patience and understanding of his wife Toni for her unfailing support. Without her dedication and support this book could not have been completed.

October 2007   STEPHEN G. KELLISON