bla18632_fm.qxd 09/13/2004 7:27 PM Page xv

MASTER 1

PREFACE

The primary purpose of this text is to present the principles and applications of economic analysis in a clearly written fashion, supported by a large number and wide range of engineering-oriented examples, end-of-chapter exercises, and electronic-based learning options. Through all editions of the book, our objective has been to present the material in the clearest, most concise fashion possible without sacrificing coverage or true understanding on the part of the learner. The sequence of topics and flexibility of chapter selection used to accommodate different course objectives are described later in the preface.

EDUCATION LEVEL AND USE OF TEXT

This text is best used in learning and teaching at the university level, and as a reference book for the basic computations of engineering economic analysis. It is well suited for a one-semester or one-quarter undergraduate course in engineering economic analysis, project analysis, or engineering cost analysis. Additionally, because of its behavioral-based structure, it is perfect for individuals who wish to learn the material for the first time completely on their own, and for individuals who simply want to review. Students should be at least at the sophomore level, and preferably of junior standing, so that they can better appreciate the engineering context of the problems. A background in calculus is not necessary to understand the calculations, but a basic familiarization with engineering terminology makes the material more meaningful and therefore easier and more enjoyable to learn. Nevertheless, the building-block approach used in the text's design allows a practitioner unacquainted with economics and engineering principles to use the text to learn, understand, and correctly apply the principles and techniques for effective decision making.

NEW TO THIS EDITION

The basic design and structure of previous editions have been retained for the sixth edition. However, considerable changes have been made. The most significant changes include these:

- More than 80% of the end-of-chapter problems are new or revised for this edition.
- Time-based materials such as tax rates and cost indexes have been updated.
- The international dimension of the book is more apparent.
- The Fundamentals of Engineering (FE) Review Problems are new to this edition.

STRUCTURE OF TEXT AND OPTIONS FOR PROGRESSION THROUGH THE CHAPTERS

The text is written in a modular form, providing for topic integration in a variety of ways that serve different course purposes, structures, and time limitations.

bla18632_fm.qxd 09/13/2004 7:27 PM Page xvi

There are a total of 19 chapters in four levels. As indicated in the flowchart on the next page, some of the chapters have to be covered in sequential order; however, the modular design allows for great flexibility in the selection and sequencing of topics. The chapter progression graphic (which follows the flowchart) shows some of the options for introducing chapters earlier than their numerical order. For example, if the course is designed to emphasize after-tax analysis early in the semester or quarter, Chapter 16 and the initial sections of Chapter 17 may be introduced at any point after Chapter 6 without loss of foundation preparation. There are clear primary and alternate entry points for the major categories of inflation, estimation, taxes, and risk. Alternative entries are indicated by a dashed arrow on the graphic.

The material in Level One emphasizes basic computational skills, so these chapters are prerequisites for all the others in the book. The chapters in Level Two are primarily devoted to the most common analytical techniques for comparing alternatives. While it is advisable to cover all the chapters in this level, only the first two (Chapters 5 and 6) are widely used throughout the remainder of the text. The three chapters of Level Three show how any of the techniques in Level Two can be used to evaluate presently owned assets or independent alternatives, while the chapters in Level Four emphasize the tax consequences of decision making and some additional concepts in cost estimation, activity-based costing, sensitivity analysis, and risk, as treated using Monte Carlo simulation.

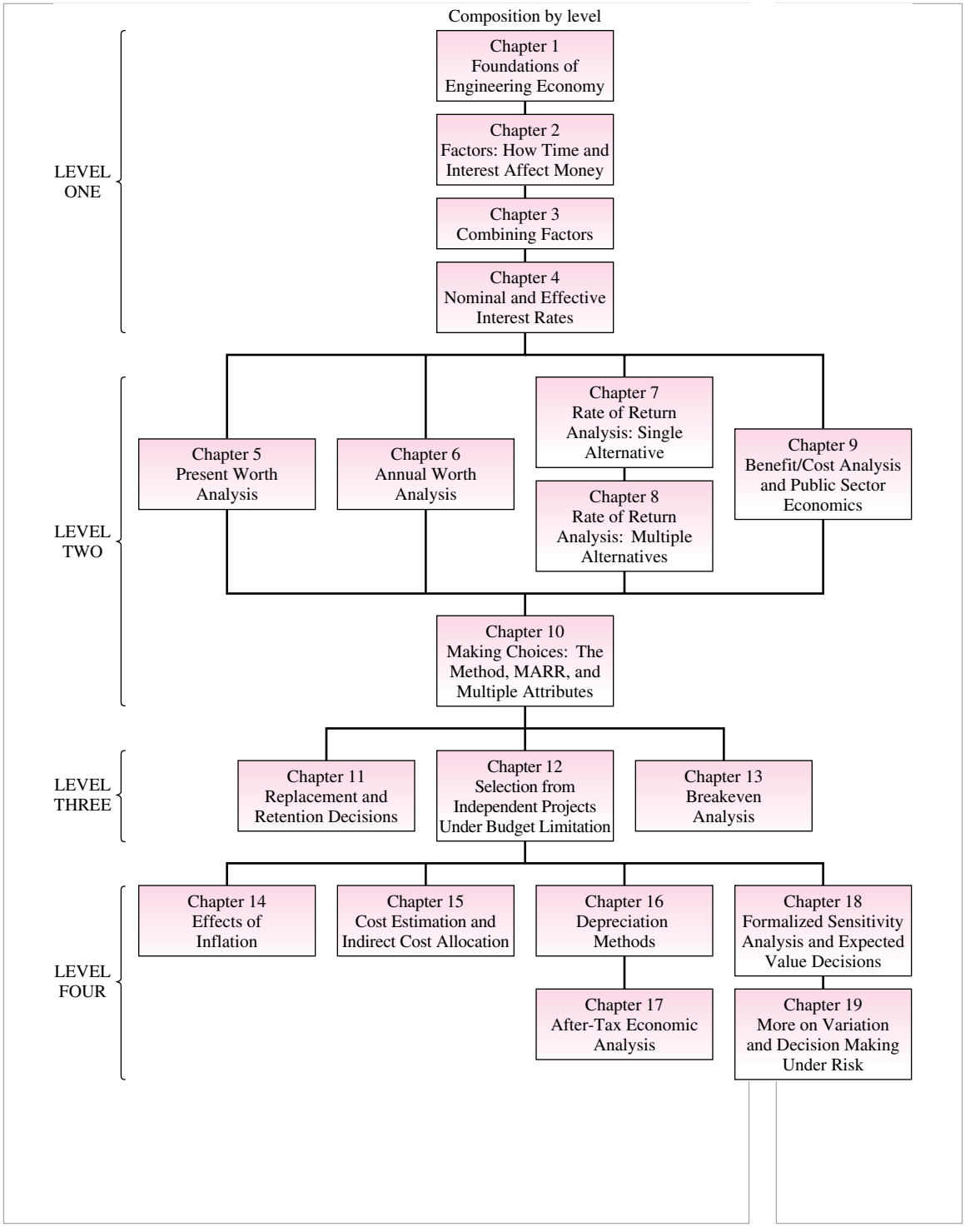
Organization of Chapters and End-of-Chapter Exercises Each chapter contains a purpose and a series of progressive learning objectives, followed by the study material. Section headings correspond to each learning objective; for example, Section 5.1 contains the material pertaining to the first objective of the chapter. Each section contains one or more illustrative examples solved by hand, or by both hand and computer methods. Examples are separated from the textual material and include comments about the solution and pertinent connections to other topics in the book. The crisp end-of-chapter summaries neatly tie together the concepts and major topics covered to reinforce the learner's understanding prior to engaging in the end-of chapter exercises.

The end-of-chapter unsolved problems are grouped and labeled in the same general order as the sections in the chapter. This approach provides an opportunity to apply material on a section-by-section basis or to schedule problem solving when the chapter is completed.

Appendices A and B contain supplementary information: a basic introduction to the use of spreadsheets (Microsoft Excel) for readers unfamiliar with them and the basics of accounting and business reports. Interest factor tables are located at the end of the text for easy access. Finally, the inside front covers offer a quick reference to factor notation, formulas, and cash flow diagrams, plus a guide to the format for commonly used spreadsheet functions. A glossary of common terms and symbols used in engineering economy appears inside the back cover.

bla18632_fm.qxd 09/13/2004 7:27 PM Page xvii

MASTER ①



bla18632_fm.qxd 09/13/2004 7:27 PM Page xviii

OPTIONS FOR PROGRESSION THROUGH CHAPTERS

Topics may be introduced at the point indicated or any point thereafter
(Alternative entry points are indicated by ←– – –)

Numerical progression through chapters	Inflation	Cost Estimation	Taxes and Depreciation	Additional Sensitivity Analysis and Risk
1. Foundations				
2. Factors				
3. More factors				
4. Effective *i*				
5. Present Worth				
6. Annual Worth				
7. Rate of Return				
8. More ROR				
9. Benefit/Cost				
10. Making Choices				
11. Replacement				
12. Capital Budgeting				
13. Breakeven				
14. Inflation				
15. Estimation				
16. Depreciation				
17. After-Tax				
18. Sensitivity Analysis				
19. Risk and Simulation				

APPRECIATION TO CONTRIBUTORS

Throughout this and previous editions, many individuals at universities, in industry, and in private practice have helped in the development of this text. We thank all of them for their contributions and the privilege to work with them. Some of these individuals are

Robyn Adams, 12th Man Foundation, Texas A&M University
Jeffrey Adler, MindBox, Inc., and formerly of Rensselaer Polytechnic Institute
Richard H. Bernhard, North Carolina State University
Stanley F. Bullington, Mississippi State University
Peter Chan, CSA Engineering, Inc.
Ronald T. Cutwright, Florida A&M University

bla18632_fm.qxd 09/13/2004 7:27 PM Page xix

MASTER ①

John F. Dacquisto, Gonzaga University
John Yancey Easley, Mississippi State University
Nader D. Ebrahimi, University of New Mexico
Charles Edmonson, University of Dayton, Ohio
Sebastian Fixson, University of Michigan
Louis Gennaro, Rochester Institute of Technology
Joseph Hartman, Lehigh University
John Hunsucker, University of Houston
Cengiz Kahraman, Istanbul Technical University, Turkey
Walter E. LeFevre, University of Arkansas
Kim LaScola Needy, University of Pittsburgh
Robert Lundquist, Ohio State University
Gerald T. Mackulak, Arizona State University
Mike Momot, University of Wisconsin, Platteville
James S. Noble, University of Missouri–Columbia
Richard Patterson, University of Florida
Antonio Pertence Jr., Faculdade de Sabara, Minas Gerais, Brazil
William R. Peterson, Old Dominion University
Stephen M. Robinson, University of Wisconsin–Madison
David Salladay, San Jose State University
Mathew Sanders, Kettering University
Tep Sastri, formerly of Texas A&M University
Michael J. Schwandt, Tennessee Technological University
Frank Sheppard, III, The Trust for Public Land
Sallie Sheppard, Texas A&M University
Don Smith, Texas A&M University
Alan Stewart, Accenture LLP
Mathias Sutton, Purdue University
Ghassan Tarakji, San Francisco State University
Ciriaco Valdez-Flores, Sielken and Associates Consulting
Richard West, CPA, Sanders and West

We would also like to thank Jack Beltran for his accuracy check of this and previous editions. His work will help make this text a success.

Finally, we welcome any comments or suggestions you may have to help improve the textbook or the Online Learning Center. You can reach us at l-blank@tamu.edu or lblank@aus.ac.ae and atarquin@utep.edu. We look forward to hearing from you.

Lee Blank
Tony Tarquin