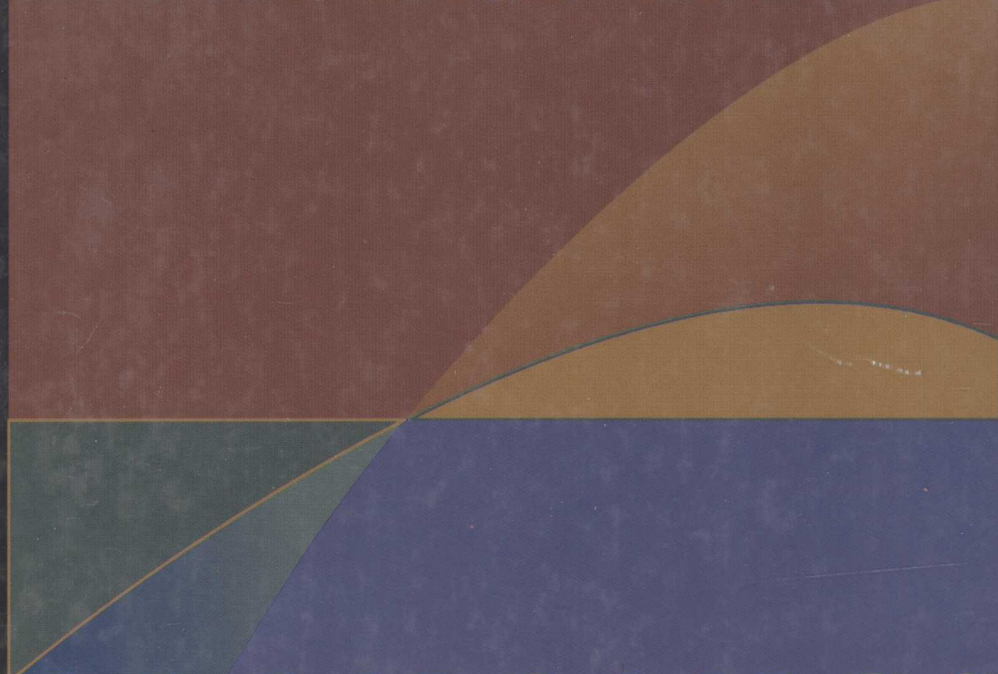


Seventh Edition

MANAGERIAL



ECONOMICS

ANALYSIS • PROBLEMS • CASES

Truett + Truett

SEVENTH EDITION

Managerial Economics

ANALYSIS, PROBLEMS, CASES

Lila J. Truett

*Professor of Economics
The University of Texas at San Antonio*

Dale B. Truett

*Ashbel Smith Professor of Economics
The University of Texas at San Antonio*



South-Western College Publishing
Thomson Learning

Australia • Canada • Mexico • Singapore • Spain • United Kingdom • United States

Managerial Economics: Analysis, Problems, Cases, 7e, by Lila J. Truett & Dale B. Truett

Vice President/Publisher: Jack W. Calhoun

Acquisitions Editor: Keri L. Witman

Senior Developmental Editor: Dennis Hanseman

Senior Marketing Manager: Lisa L. Lysne

Production Editor: Elizabeth A. Shipp

Media Production Editor: Peggy Buskey

Media Technology Editor: Kurt Gerdenich

Manufacturing Coordinator: Charlene Taylor

Internal Design: Carolyn Deacy Design, San Francisco

Cover Design: Imbue Design, Cincinnati

Production House: Pre-Press Company, Inc.

Printer: R.R. Donnelley & Sons Company, Crawfordsville Manufacturing Division

COPYRIGHT ©2001 by South-Western College Publishing, a division of Thomson Learning. The Thomson Learning logo is a registered trademark used herein under license.

All Rights Reserved. No part of this work covered by the copyright hereon may be reproduced or used in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems—without the written permission of the publisher.

Printed in the United States of America

2 3 4 5 03 02 01 00

For more information contact South-Western College Publishing, 5101 Madison Road, Cincinnati, Ohio, 45227 or find us on the Internet at <http://www.swcollege.com>

For permission to use material from this text or product, contact us by

- **telephone:** 1-800-730-2214
- **fax:** 1-800-730-2215
- **web:** <http://www.thomsonrights.com>

Library of Congress Cataloging-in-Publication Data

Truett, Lila J. (Lila Jean)

Managerial economics : analysis, problems, cases / Lila J. Truett, Dale B. Truett.—7th ed.
p. cm.

Includes index.

ISBN 0-324-01907-6 (alk. paper)

1. Managerial economics. I. Truett, Dale B. II. Title.

HD30.22 .T78 2000

338.5'024'658—dc21

00-030771

This book is printed on acid-free paper.

Preface

The seventh edition marks a milestone for this book—over twenty years in the marketplace. During the past two decades, we have made many changes in our coverage and presentation of materials as we have tried to keep it current, concise, and clear. The most important of these changes are outlined below.

The book remains primarily for use by business administration students who have done some introductory-level work in economics. As our title suggests, the objective of the book is to enhance students' understanding of how economic analysis can be applied to managerial decisions. We believe this goal can best be accomplished by providing a clear and brief statement of the principles of microeconomic decision making and supplementing this material with problems, examples, and cases that illustrate how those principles are applied.

Throughout each chapter, you will find numerical examples, applications, and minicases dispersed among discussions of decision criteria and rules. Chapters 2 through 14 end with questions and problems related to the materials covered. Answers to selected odd-numbered problems appear at the end of the book. In addition, we have provided Integrating Cases at the end of each of the book's five major parts. Each case is somewhat longer than the typical end-of-chapter problem and integrates a number of concepts developed in the preceding chapters.

SEVENTH EDITION FEATURES AND CHANGES

In this edition, *Managerial Economics* has undergone some reorganization and improvement. Here is a list of some key features and important changes:

- *Updated Throughout.* Business students learn best from current, concrete examples. Consequently, we have thoroughly updated the text and added many new real-world examples and references to current events.
- *Coverage of game theory.* An expanded appendix on game theory follows our discussion of oligopoly in Chapter 9. Both normal and extensive form games are covered. One-shot, repeated, and sequential games are included in the discussion, and there is a short problem set at the end of the appendix.
- *Coverage of information economics.* A second appendix to Chapter 9 covers key topics of information economics, including search, asymmetric information, adverse selection, and moral hazard. A short problem section appears at the end of this appendix.
- *Applications Boxes.* Two pedagogical devices introduced in a previous edition—Managerial Perspectives and Numerical Examples—have been retained and updated. The Managerial Perspectives are high-interest, current illustrations of how real-world firms have grappled with the kinds of issues and decision problems discussed in the book. The Numerical Examples are set off from the running text and call attention to the steps that must be taken to solve specific types of problems (arc elasticity, cost minimization, profit maximization, present value, etc.) that students will encounter repeatedly in the end-of-chapter and *Study Guide* problems. We believe that students can much improve their abilities to handle these related kinds of problems if they take the time to work through the Numerical Examples.
- *International Applications.* International applications of managerial economics are now more important than ever. Over the past 15 years, we have had the good fortune to be able to travel and study abroad in countries ranging from Russia and China to England, Australia, Korea, Spain, Italy, and South Africa. These experiences, coupled with research and consulting related to a broad range of industries in the United States, Canada, and Mexico, have much enhanced our understanding of business and public sector operations and decision making. We hope that what we have learned from these activities has helped to make this a better book, one that provides a unique, global perspective. That perspective is reinforced in the book's strategically-placed International Capsules, designed to make students think about how operating in a global environment affects economic decision making.
- *Comparison of Market Structures.* Adopters familiar with previous editions of this book will find a significant addition to Chapter 9. At the request of reviewers, we have added a summary table and discussion comparing product market structures. This should help to consolidate students' thinking about the various possible situations that firms might encounter in the markets where they sell their output.

- *Glossary and Marginal Definitions.* As in previous editions, we have provided a Glossary at the end of the book. This one is somewhat expanded, partially as a result of our decision to style the text with running definitions in the body of each chapter. The aim of the running definitions, of course, is to make it easier for students to learn the precise language so necessary to understanding the analytical side of our discipline.
- *Mathematical Appendix.* A Mathematical Appendix at the end of the text will serve as an important learning tool for many students.
- *Updated End-of-Chapter Problems.* In this edition, we have retained the set of end-of-chapter problems from the previous edition, but have changed some of the data to reflect typical early twenty-first century magnitudes. These changes do not affect the results but do make the problems more realistic.

COURSE DESIGN

Our own experience in teaching managerial economics leads us to caution both students and professors that this book contains more material than can normally be covered in a three-credit-hour, one-semester course. Students with an average level of preparation in economic principles should be able to cover Chapters 1 and 2, 5 through 7, and 8 through 11 in a one-term course. Students with more advanced backgrounds may progress swiftly enough to allow inclusion of Chapters 3 and 4 in the preceding list.

The book allows for some variation in emphasis. For example, to orient a course toward both private and public sector capital project analysis, Chapters 12, 13, and 14 could be substituted for the materials on demand estimation, forecasting, and complex pricing problems covered in Chapters 3, 4, and 10. For this kind of course, probably all of Part 5 should be covered.

For a two-course sequence, we suggest coverage of the basic materials (Chapters 1 through 3, 5 through 9, 11, and 15) in the first course. The second course, which might well be launched as an elective if it is not possible to include it in the core requirements of a program, could include economic forecasting (Chapter 4), linear programming (Appendix 7), advanced topics in pricing (Chapter 10 and its two appendices), project analysis (Chapter 12, its appendix, and Chapter 13), and public sector decision making (Chapter 14).

APPENDICES

As mentioned earlier, at the end of the book, we have provided a Mathematical Appendix that can be used either for student review or to give the course a more quantitative slant. Appendix 1, following our introductory chapter, presents a brief explanation of basic demand and supply analysis using the example of a competitive market. The appendices to Chapters 2

and 5 provide compact coverage, respectively, of indifference curves and constrained optimization in production analysis. Appendix 9A, completely rewritten for this edition, provides an introduction to game theory, and Appendix 9B covers information economics. The final appendix is on compounding and discounting and follows Chapter 12.

STUDY GUIDE, INSTRUCTOR'S MANUAL, AND TEST BANK

Student analytical skills in managerial economics can be enhanced by using the *Study Guide*, a learning tool that complements the problem-solving approach employed in the text. Virtually all of the *Study Guide* problems have been classroom tested, and step-by-step solutions are provided at the back of the guide. A unique feature is a prompting device called "Getting Started" that verbally walks the student through the steps that must be taken to solve a specific type of problem. The *Study Guide* is closely tied to the book by means of a cross-referencing system that indicates the specific end-of-chapter problem or problems that are similar to a given *Study Guide* problem. Finally, for most chapters, the *Study Guide* contains a set of Hand-In Problems that can be used as out-of-class or homework assignments.

Solutions for the Hand-In Problems are found in the *Instructor's Manual*. Many of the Hand-In Problems are set up in a way that allows the instructor to change the value of a key number to generate a variety of different answers. This allows instructors to vary the solutions from section to section of a given course or from one semester to another. The *Instructor's Manual* explains how to use this feature and provides some of the alternative values for the key numbers. The *Instructor's Manual* also contains step-by-step solutions to the end-of-chapter problems and all cases that appear in the book. We hope that instructors and students will use the problems and cases to the fullest possible extent: in our opinion, problem-solving experiences constitute the best way to develop an understanding of managerial economics.

This edition of *Managerial Economics* is accompanied by an improved and updated *Test Bank* prepared by Vincent DiMartino, who has many years' experience in business consulting and in teaching managerial economics. The *Test Bank* includes a substantial number of problems that are similar to those found in the text and the *Study Guide*, as well as multiple choice and true/false questions. Note that the Hand-In Problems in the *Study Guide* can also be used as testing materials by changing the key numbers as explained here and in the *Instructor's Manual*.

ACKNOWLEDGMENTS

For our backgrounds in microeconomics, we certainly owe debts of gratitude to James Jeffers and Gerald Nordquist of the University of Iowa. We

also owe debts to some of our mentors who have passed on: H. H. Liebhafsky, Wendell C. Gordon, and Cliff Lloyd. Our colleagues, Robert E. Langley and Vincent DiMartino, are to be commended for their diligent work on various editions of the *Test Bank* and certain other materials. We thank our colleague, Robert Collinge, for reviewing and commenting on our new materials on the economics of information. The faculty, staff, and students of the Division of Economics and Finance at the University of Texas at San Antonio helped us immeasurably while the book was in preparation.

Thanks are due as well to our reviewers. Wherever possible, we have tried to take advantage of their experience and their helpful suggestions.

Krishna Akkina	James Henderson
Kansas State University	Baylor University
Thomas Cate	David Kreutzer
Northern Kentucky University	James Madison University
Stephen Conroy	Jodey Lingg
University of Southern California	City University
Audrey Davidson	Edward Millner
University of Louisville	Virginia Commonwealth University
Cliff Dobitz	Jose Pagan
North Dakota State University	University of Texas, Pan American
Richard Evans	Kang Park
University of Memphis	Southeast Missouri State University
Sherman Folland	Kent Saunders
Oakland University	Le Moyne College
Soumendra Ghosh	Charles Upton
New Mexico State University	Kent State University

We also owe a debt to all the instructors at other institutions who took the time to provide their comments on previous editions.

Lila J. Truett
Dale B. Truett

Note to Students

In the short run (the present), playing your cards right gets you good grades. Over the long run (in the future), playing them right can get you success. We want to help you do both, and we wrote this book with that in mind.

Your immediate problem is going to be to cope with the course that goes with this book. Here's how.

1. Read your assignments *before* your instructor covers them in class. (If at first you do not understand the material, read through it again.)
2. Pay attention to the Numerical Examples that occasionally appear in the chapters. Work your way through them step by step with pencil and paper to make sure you understand them. It will help you to solve end-of-chapter, *Study Guide*, and exam problems.
3. Go down the list of questions at the end of each chapter. If there are some that you cannot answer, *review* the chapter and find the answer. Ask your instructor if you still are not sure.
4. Work *all* of the problems you are assigned, and do this *before* your instructor solves them for you.
5. When you think you understand a concept or method, make up a problem of your *own* (like the ones at the end of each chapter) and solve it.

We hope this book will help you develop useful skills for solving business or public economic problems or at least for evaluating the solutions or advice of others. These kinds of skills will likely be important to you long after your present course is over.

Much of what we discuss here is not too difficult if you put some thought into your study of it. One way to sharpen your economic IQ is to

keep an eye on the news and on business periodicals such as *The Wall Street Journal* or *Business Week*. You will find, as we have, that the success or failure of many business undertakings hinges on how well management has understood many of the concepts we discuss in the chapters to follow. In fact, we cite some experiences of real businesses in almost every chapter, and as you work your way through the book, we expect that you will develop some definite opinions about which firms have played their cards wisely and which ones have not. All of this, we hope, will help you to play yours well in the future.

About the Authors

Lila J. Truett (Ph.D., University of Iowa) has had an unusually long tenure as Director of the Division of Economics and Finance at The University of Texas at San Antonio. Her husband, Dale B. Truett, has been honored with an Ashbel Smith Professorship, the University's highest distinction for scholarship and research. Dale Truett received his doctorate from The University of Texas at Austin and served as founding chairman of the Department of Economics at Florida International University and founding Director of the Division of Economics and Finance at the University of Texas at San Antonio. The Truetts have a wealth of consulting experience, and include among their clients a number of Fortune 500 and Fortune 100 firms.

Lila and Dale Truett have written three economics textbooks. In addition, jointly and separately, they have contributed many articles to scholarly journals, among them the *American Economic Review*, the *Southern Economic Journal*, *Applied Economics*, the *Journal of Productivity Analysis*, the *Journal of Risk and Insurance*, the *Journal of Development Economics*, and the *Journal of Economic Education*. In addition to managerial economics and microeconomic theory, their research interests include industrial development and international trade. These have taken them to more than 30 countries in the past 15 to 20 years and given them an especially broad perspective on business and economic problem solving.

Brief Contents

PART 1 THE FIRM AND ITS ENVIRONMENT 1

- 1 Introduction, Environment, and Methodology 2
- 2 Revenue of the Firm 28
- 3 Topics in Demand Analysis and Estimation 90
- 4 Economic Forecasting 136

PART 2 PRODUCTION, COST, AND PROFIT MAXIMIZATION 171

- 5 Theory of Production 172
- 6 Cost of Production 220
- 7 Profit Analysis of the Firm 284

PART 3 MARKETS AND THE BEHAVIOR OF THE FIRM 353

- 8 Perfect Competition and Monopoly: The Limiting Cases 354
- 9 Monopolistic Competition, Oligopoly, and Related Topics 384
- 10 Selected Topics in Pricing and Profit Analysis 451
- 11 Factor Markets and Profit-Maximizing Employment of Variable Inputs 516

PART 4 ANALYSIS OF PROJECT DECISIONS 557

- 12 Fundamentals of Project Evaluation 558
- 13 Risk in Project Analysis 593

PART 5 THE FIRM AND THE PUBLIC SECTOR 635

- 14 Economics of Public Sector Decisions 636
- 15 Legal and Regulatory Environment of the Firm 666

Contents

PART 1 THE FIRM AND ITS ENVIRONMENT 1

1 Introduction, Environment, and Methodology 2

Managerial Economics and the Global Economy 2

Economics and the Management of Organizations 3

Our Approach to Problem Solving 11

Organization of this Book 12

Appendix 1 Demand, Supply, and Market Price: A Brief Review 18

Demand and the Demand Curve 18

Supply and the Supply Curve 22

Determination of Market Price 24

Carryover to Analysis of Other Markets 27

2 Revenue of the Firm 28

Advertising, Consumer Demand, and Business Research 33

The Demand Function 36

Determinants of Demand 46

A Note on Determinants of Supply 48

Elasticity of Demand 49

Summary: Elasticity of Demand, Revenue, and the Firm 67

Appendix 2 Theory of Consumer Behavior 78

Cardinal Utility Approach 78

Ordinal Utility Theory 81

Marginal Rate of Substitution 83

Consumer Equilibrium 85

Deriving a Demand Curve 87

3 Topics in Demand Analysis and Estimation 90

Market Surveys 92

Demand Estimation with Regression Analysis 93

Market Experiments 102

Summary: Techniques of Demand Estimation 106

Appendix 3 Linear Regression Analysis 109

The Linear Regression Model and Underlying Assumptions 109

Logarithmic Transformations 127

Summary: The Linear Regression Model 130

4 Economic Forecasting 136

Types of Economic Forecasts 136

Two Major Kinds of Data 139

Factors Affecting Economic Variables 139

Forecasting Methods 140

Accuracy of Forecasts 156

Summary: Economic Forecasting and the Firm 162

Integrating Case 1A Are There Two Markets for Microwave Ovens? 165

Integrating Case 1B Omega Distributing Company I 168

PART 2 PRODUCTION, COST, AND PROFIT MAXIMIZATION 171

5 Theory of Production 172

The Production Function and the Long Run 177

Total Product Curves and the Short Run 196

Summary: Production and the Firm's Profit 205

**Appendix 5 Mathematics of Determining
the Least Cost Combination of Inputs 217**

6 Cost of Production 220

Types of Costs 224

Costs in the Long Run 226

Costs in the Short Run 233

Relationship of Short-Run Cost Curves to Short-Run Product Curves 239

	Relation of Short-Run to Long-Run Average Costs	247
	The Learning Effect	251
	Economies of Scope	251
	Choosing the Optimal Plant Size: An Example	252
	Estimation of Cost	257
	Summary: Costs and the Firm	261
	International Capsule I Some International Dimensions of Demand, Production, and Cost	274
	The Basis for International Trade	274
	Payment for Exports	276
	The Problem of Trade Barriers	278
7	Profit Analysis of the Firm	284
	Profit Maximization	289
	Shut-Down Point	295
	Break-Even Analysis	299
	Profit Maximization Versus Break-Even Analysis	303
	Incremental Profit Analysis	303
	Summary: Profit Maximization and the Real World	307
	Appendix 7 Linear Programming and the Firm	321
	Relationship Between Linear Programming and Calculus Techniques	321
	The Primal Program	323
	The Dual Program	336
	Summary: Linear Programming as an Optimizing Tool	343
	Integrating Case 2A Frontier Concrete Products Company	347
	Integrating Case 2B Shanghai Magnificent Harmony Foundry I	350

PART 3 MARKETS AND THE BEHAVIOR OF THE FIRM 353

8	Perfect Competition and Monopoly: The Limiting Cases	354
	Perfect Competition and its Setting	355
	Monopoly and its Setting	367
	Summary: Competition, Monopoly, and Analysis of the Firm	375
9	Monopolistic Competition, Oligopoly and Related Topics	384
	Monopolistic Competition: A Case of Many Firms	386
	Duopoly: An Oligopoly with Two Firms	392

The Question of Entry	397
The Kinked Oligopoly Demand Curve:	
Price Rigidity without Collusion	400
Tacit Collusion and Price Leadership	406
Perfect Collusion—The Cartel	413
Production with Multiple Plants	414
Product Market Structures: Recap and Comparison	417
Summary: Oligopoly Analysis and Business Behavior	418
Appendix 9A Strategy and Game Theory in Oligopoly Analysis	429
Some Game Theory Examples	430
Multiple Equilibria, Sequencing, and First-Mover Advantage	433
Cooperative Games	431
Repeated Games	436
Trees and Sequential Games	439
Appendix 9B Decision Making and the Economics of Information	444
Searching and Search Costs	444
Asymmetric Information	445
Adverse Selection and Guarantees Against Loss	446
Moral Hazard and Business Decision Making	447
Managing Problems Related to Information and Moral Hazard	447
10 Selected Topics in Pricing and Profit Analysis	451
Markup Pricing	451
Decisions Involving Multiple Products	454
Price Discrimination	469
Two-Part Pricing (Access Fees)	478
Alternatives to Profit Maximization	485
Summary: Multiple Products, Segmented Markets, and Pricing Strategies	487
Appendix 10A Transfer Pricing with a Less-Than-Perfectly Competitive Market for the Intermediate Product	498
Appendix 10B Mathematics of Price Discrimination	501
Solution Procedure if Discrimination is Permitted	502
Solution Procedure if Discrimination is Not Permitted	504
International Capsule II Markets and Pricing Strategy in International Trade	507
Market Segmentation in International Trade	507
The Problem of Dumping	509
Webb-Pomerene and Export Trading Companies	510