Contents

Preface xi

1 Preferences and Utility 1
   1.1 Preference and Choice: The Preference-Based Approach 2
   1.2 Utility Function 10
   1.3 Desirability 11
   1.4 Indifference Sets, Upper Contour Sets, and Lower Contour Sets 16
   1.5 Convexity of Preferences 17
   1.6 Interpretation of Convexity 20
   1.7 Quasi-Concavity 23
   1.8 Common Utility Functions in Economics 33
   1.9 Properties of Preference Relations 39
   1.10 Continuous Preferences 48
   1.11 Existence of a Utility Function 50
   1.12 Behavioral Economics—Two Utility Functions 51
   1.13 Choice-Based Approach 59
   1.14 Consistency on Choices: The Weak Axiom of Revealed Preference (WARP) 60
   1.15 Consumption Sets 63
Appendix: Rational Preference Relations Satisfy the WARP 68
Exercises 69
References 74

2 Demand Theory 77
   2.1 The Utility Maximization Problem 78
   2.2 Walrasian Demand—Comparative Statics 89
2.3 Indirect Utility Function 94
2.4 WARP and Demand 99
2.5 Slutsky Matrix 109
2.6 Expenditure Minimization Problem 117
2.7 Relationships between the Expenditure Function and Hicksian Demand 128
2.8 Relationship between the Walrasian and Hicksian Demand 129
2.9 Relationship between the Walrasian Demand and the Indirect Utility Function 133
2.10 Summary of Relationships 134
Appendix A: Duality in Consumption 139
Appendix B: Relationship between the Expenditure Function and Hicksian Demand 146
Appendix C: Generalized Axiom of Revealed Preference 148
Exercises 153
References 161

3 Demand Theory—Applications 163
3.1 Measuring the Welfare Effects of a Price Change 164
3.2 Measuring the Welfare Change Associated with the Introduction of a Tax 172
3.3 What If We Use the Walrasian Demand to Measure Welfare Changes? 173
3.4 When Can We Use the Walrasian Demand as a Measure of Welfare Change? 179
3.5 Application of Income and Substitution Effects—I 182
3.6 Application of Income and Substitution Effects—I: The Consumer as a Labor Supplier 184
3.7 Application of Income and Substitution Effects—I: Income and Substitution Effects among Different Goods 194
3.8 Aggregate Demand 202
Appendix: Applying Euler’s Theorem to the Hicksian Demand 208
Exercises 210
References 220

4 Production Theory 221
4.1 Production Sets 222
4.2 Properties of Production Sets 229
4.3 Elasticity of Substitution 244
4.4 Profit Maximization 249
4.5 Cost Minimization 264
4.6 Cost Function 274
4.7 Conditional Factor Demand Correspondence, \( z(w, q) \) 275
4.8 Production Function, \( f(z) \) 282
4.9 Alternative Representation of the PMP 283
4.10 Average and Marginal Costs with a Single Output 289
4.11 Aggregation in Production 294
4.12 Efficient Production 297
Appendix A: Graphical Representation of Cost Functions 304
Appendix B: Output and Cost Elasticity 311
Exercises 316
References 321

5 Choice under Uncertainty 323
5.1 Simple and Compound Lotteries 324
5.2 Preferences over Lotteries 329
5.3 Violations of the IA 341
5.4 Behavioral Theories That Modify Expected Utility Theory 345
5.5 Money Lotteries 348
5.6 Measuring Risk Preferences 353
5.7 Arrow–Pratt Coefficients of Absolute and Relative Risk Aversion 360
5.8 Prudence 366
5.9 Prospect Theory and Reference-Dependent Utility 368
5.10 Comparison of Payoff Distributions 372
5.11 Subjective Probability Theory 381
5.12 Alternatives to SEU: Ambiguity Aversion (MEU), Capacities (CEU), and Smooth Ambiguity Aversion (SAA) 384
Appendix A: State-Dependent Utility 391
Appendix B: “Extended” Expected Utility Representation 393
Exercises 398
References 408

6 Partial and General Equilibrium 411
6.1 Partial Equilibrium Analysis 412
6.2 Comparative Statics 419
6.3 Welfare Analysis 424
6.4 General Equilibrium 428
6.5 Comparative Statics 460
6.6 Introducing Taxes 466
Appendix A: Large Economies and the Core 468
Appendix B: Marshall–Hicks Four Laws of Derived Demand 477
Exercises 479
References 487

7 Monopoly 489
7.1 Barriers to Entry 490
7.2 Profit-Maximizing Output under Monopoly 491
7.3 Welfare Loss of Monopoly 499
7.4 Comparative Statics 504
7.5 Multiplant Monopolist 506
7.6 Price Discrimination 509
7.7 Advertising in Monopoly 529
7.8 Regulation of Natural Monopolies 531
7.9 Monopsony 536
Exercises 539
References 546

8 Game Theory and Imperfect Competition 547
8.1 Game Theory Tools 548
8.2 Bertrand Model of Price Competition with Homogeneous Products 580
8.3 Cournot Model of Quantity Competition 584
8.4 Product Differentiation 594
8.5 Dynamic Competition 598
8.6 Reconciling Cournot and Bertrand: Introducing Capacity Constraints 606
8.7 Endogenous Entry 610
8.8 Repeated Interaction 614
Appendix A: Cournot Model with Asymmetric Costs 625
Appendix B: Cournot Competition with \( J \geq 2 \) Firms 627
Exercises 629
References 638
Mathematical Appendix 803

A.1 Sets 803
A.2 Intervals of Real Numbers 805
A.3 Inequalities 806
A.4 Sequences 808
A.5 Functions 812
A.6 Limits 816
A.7 Continuity 818
A.8 Differentiation 825
A.9 Integration 832
A.10 Introduction to Topology 835
A.11 Compactness 842
A.12 Fixed Point Theorems 845
A.13 Optimization 848
A.14 Comparative Statics 853
A.15 Monotone Comparative Statics: An Introduction 856
A.16 Introduction to Mathematical Proofs 857

Index 861