

Contents

Introduction to the series	v
Preface	vii
List of tables	xv
List of figures	xvi
1. The problem of the multiproduct firm	1
1.1. A survey of existing work	2
1.2. The purpose of this research	7
1.3. The differential approach	10
2. The technology of production	13
2.1. Production functions	13
2.2. Distance functions and homogeneous production functions	15
2.3. Duality: Cost, revenue, and profit functions	21
2.4. Some specialized forms of the production function	24
3. Cost minimization	31
3.1. Conditions for a cost minimum	31
3.2. The elasticity of scale	32
3.3. Factor and product shares	34
3.4. Marginal shares of the inputs	36
3.5. Input demand equations	37
3.6. Comparative statics: Price changes	40
3.7. Comparative statics: Volume changes	43
3.8. Specialized forms	45
4. Profit maximization	51
4.1. Conditions for a profit maximum	51
4.2. The supply of the products	53

4.3. Comparative statics: Input price changes	54
4.4. Comparative statics: Output price changes	56
4.5. Properties of the cost function	59
4.6. Specialized forms	60
5. The revenue maximizing firm	67
5.1. Conditions for a revenue maximum	68
5.2. Shadow cost and input shares	70
5.3. Revenue maximizing supply equations	72
5.4. Comparative statics: Price changes	74
5.5. Comparative statics: Volume changes	81
5.6. Profit maximization	83
6. Relationships among cost minimization, revenue maximization, and profit maximization	89
6.1. Cost, revenue, and profit based systems	90
6.2. Properties of the revenue and profit functions	94
6.3. Specialized forms	96
6.4. Measures of interaction	99
7. Rational random behavior	103
7.1. The cost based system	104
7.2. The revenue and profit based systems	108
8. Econometric specification and estimation	111
8.1. Specification of an econometric model	111
8.2. Conditions to be tested	117
8.3. Techniques of estimation and testing	120
9. Application to hypothetical data	127
9.1. Four cost functions	128
9.2. Generation of hypothetical data	132
9.3. Numerical methods	148
9.4. Results of testing	150
9.5. Results of estimation	156

10. Conclusions and suggestions for further research	159
10.1. Summary and conclusions	159
10.2. Directions for future research	161
A. Appendix to Chapter 2	165
A.1. First-order derivatives of the output homogeneous production function	165
A.2. Second-order derivatives	166
A.3. Derivatives of the input homogeneous production function	169
A.4. Homotheticity in inputs	171
A.5. Homotheticity in outputs	173
A.6. Homogeneous production	175
A.7. Input–output homotheticity	176
B. Appendix to Chapter 3	177
B.1. The fundamental matrix equation	177
B.2. Allen partial elasticities of substitution	179
B.3. Derivation of eq. (3.41)	180
C. Appendix to Chapter 4	183
C.1. Derivatives of cost	183
C.2. Derivation of the supply equations	184
C.3. Output independence and input–output separability	186
C.4. Proof of lemma 2	188
D. Appendix to Chapter 5	191
D.1. The second-order condition for revenue maximization	191
D.2. The fundamental matrix equation of the revenue maximizing firm	192
D.3. The effects of using the input homogeneous production function	195
D.4. The derivatives of revenue	202
D.5. Derivation of the demand equations	203

E. Appendix to Chapter 6	205
E.1. The derivatives of profit	205
E.2. Properties of two measures of interaction	206
F. Appendix to Chapter 7	209
F.1. Cost minimization	209
F.2. Revenue maximization	211
F.3. Profit maximization	213
References	217
Index	223