

Contents

Preface to Second Edition	xv
1 Introduction	1
1.1 Equilibrium Theory as an Approach to Macroeconomics	1
1.2 Preview of the Argument	3
1.3 Example	4
1.3.1 Regular Case	6
1.3.2 Irregular Case	7
1.4 Concluding Remarks	9
1.5 Problems	9
2 Linear Difference Equations: Part 1	11
2.1 Introduction	11
2.2 Linearizing Nonlinear Models	11
2.2.1 Nonlinear Models to Represent Economies	11
2.2.2 Linearizing Autonomous Equations	12
2.2.3 Linearizing Nonautonomous Equations	13
2.2.4 Example of Linearization: The Solow Model	14
2.3 Solving First-Order Linear Models	17
2.3.1 First-Order Deterministic Equations	18
2.3.2 First-Order Stochastic Equations	18
2.3.3 Sequences of Probability Distributions	21
2.3.4 The Solow Model Revisited	22
2.4 Solving Higher-Order Linear Models	25
2.4.1 Eigenvalues and Eigenvectors	27
2.4.2 Higher-Order Deterministic Equations	29
2.4.3 Diagonalizing Systems of Nonstochastic Equations	32
2.4.4 Stochastic Vector Difference Equations	33
2.4.5 Example of a Vector System—The Behavior of the Solow Residual	34
2.5 Concluding Remarks	38
2.6 Problems	39
3 Linear Difference Equations: Part 2	41
3.1 Introduction	41
3.2 Linear Rational Expectations Models	42

3.2.1	Optimal Growth as an Illustration of a Rational Expectations Model	44
3.3	Solving Linear Rational Expectations Models	47
3.3.1	Different Types of Rational Expectations Models	47
3.3.2	Case of a Regular Equilibrium	49
3.3.3	Solving a Rational Expectations Model by Iterating into the Future	50
3.3.4	Completing the Solution by Solving Equations that Depend on the Past	51
3.3.5	Optimal Growth Model and the Solow Model Compared	52
3.4	Cross-equation Restrictions and the Lucas Critique	53
3.4.1	Dynamics of a Monetary Model—A Second Example	53
3.4.2	Solving the Example Explicitly	55
3.4.3	Lucas Critique and the Cross-equation Restrictions	57
3.4.4	Irregular Solutions	57
3.5	Concluding Remarks	58
3.6	Problems	59
4	General Equilibrium Theory under Certainty	63
4.1	Introduction	63
4.2	Idea of Equilibrium	67
4.3	Theory of Consumer Choice	68
4.3.1	Assumptions about Preferences	68
4.3.2	Consumer's Problem	70
4.4	Excess Demand Functions	71
4.4.1	Individual Excess Demand Functions	71
4.4.2	Aggregate Excess Demand Functions	72
4.5	Equilibria and Their Properties	74
4.5.1	Some Definitions and Development of Notation	75
4.5.2	Geometry of Equilibrium	76
4.5.3	Debreu-Sonnenschein-Mantel Theorem	78
4.6	General Equilibrium Theory and Efficient Allocations of Resources	79

4.6.1	First Welfare Theorem	79
4.6.2	Second Welfare Theorem	80
4.7	Concluding Remarks	82
4.8	Problems	83
5	Infinite Horizon Economies and Representative Agents	85
5.1	Introduction	85
5.2	Representative Agent Economy	88
5.2.1	Assumptions about Structure	88
5.2.2	Assumptions about Preferences	90
5.2.3	Budget Sets and Market Structure	92
5.2.4	Consumer's Problem	94
5.3	Competitive Equilibrium and the Planner's Problem	95
5.3.1	Competitive Equilibrium	95
5.3.2	Planner's Problem	96
5.4	Using the Representative Agent Model to Explain Time Series Data	99
5.4.1	Removing the Trend from Data	99
5.4.2	Simple RBC Model and Its Implications	102
5.4.3	Regression on a Common Trend: What the Model Tells Us to Do	103
5.4.4	Hodrick-Prescott Filter: What RBC Economists Actually Do	106
5.4.5	Calibration and Summary Statistics: How RBC Theorists Measure Success	108
5.5	Concluding Remarks	109
5.6	Appendix: Transversality Condition	110
5.7	Problems	112
6	Infinite Horizon Economies and Overlapping Generations	115
6.1	Introduction	115
6.2	Structure of the Overlapping Generations Economy	116
6.3	Consumer's Problem	117
6.3.1	Problem of a Young Agent	117
6.3.2	Problem of an Old Agent	118

6.4	Example of a Pareto Inferior Equilibrium	119
6.4.1	Case of Early Endowments	119
6.4.2	Case of Late Endowments	120
6.5	Institutions that May Improve Allocations	120
6.6	Set of Equilibria in the Overlapping Generations Model	122
6.6.1	Equilibria as Solutions to Difference Equations	122
6.6.2	Stationary Equilibria	124
6.6.3	Classifying Economies by Types of Stationary Equilibria	125
6.6.4	Dynamic Equilibria	127
6.7	Some Questions about the Model	128
6.7.1	Why Does the First Welfare Theorem Break Down?	129
6.7.2	When Does Indeterminacy Occur?	129
6.7.3	When Are Equilibria Efficient?	130
6.8	More General Examples of Overlapping Generations Economies	132
6.8.1	Kehoe-Levine Approach	134
6.8.2	Indeterminacy in the OG Model	135
6.9	Concluding Remarks	135
6.10	Problems	136
7	Infinite Horizon Economies with Nonconvexities	141
7.1	Introduction	141
7.2	Growth Model with Increasing Returns	142
7.2.1	Equations That Characterize an Equilibrium	142
7.2.2	Behavior of the Representative Family	143
7.2.3	Interpretation 1: Externalities in Production	144
7.2.4	Interpretation 2: Monopolistic Competition	145
7.3	Empirical Evidence for Increasing Returns	149
7.4	Equilibria in the Increasing Returns Economy	152
7.4.1	Finding a Balanced Growth Path	152
7.4.2	Approximate Linear Model	154
7.5	Comparing the Theoretical Properties of RA and IR Models	155
7.5.1	Why Does the IR Model Display Different Dynamics?	155

7.5.2	RA Model: An Example of a Regular Equilibrium	157
7.5.3	IR Model: An Example of an Irregular Equilibrium	158
7.6	Comparing Some Empirical Predictions of RA and IR Models	160
7.6.1	Contemporaneous Statistics	160
7.6.2	Dynamic Responses—The Impulse Response Function	163
7.7	Concluding Remarks	164
7.8	Problems	166
8	Some Recent Developments	171
8.1	Introduction	171
8.2	New Evidence against Big Increasing Returns	171
8.3	Nonseparable Preferences	173
8.3.1	Households	173
8.3.2	Technology	174
8.3.3	Solving the Consumer's Problem	175
8.3.4	Equations That Characterize Equilibrium	176
8.3.5	Example	178
8.4	Two-Sector Models	180
8.4.1	Technology	180
8.4.2	Production Possibilities Frontier	181
8.4.3	Behavior of the Representative Family	183
8.4.4	Indeterminacy and the Two-Sector Model	185
8.4.5	Procyclical Consumption	185
8.4.6	Calibrated Two-Sector Model	187
8.5	Concluding Remarks	187
8.6	Problems	188
9	General Equilibrium Theory and Uncertainty	191
9.1	Introduction	191
9.2	Debreu's Formulation of the Problem	191
9.2.1	Preferences under Uncertainty	191
9.2.2	Budget Constraints	196
9.3	Arrow's Formulation of the Problem	197
9.3.1	Trade in Financial Securities	197

9.3.2	Complete and Incomplete Markets	199
9.3.3	Multiple Budget Constraints and Incomplete Markets	201
9.4	Infinite Horizon Economies with Uncertainty	202
9.4.1	Asset Pricing in Lucas Tree Economies	202
9.4.2	Digression on Market Structure	204
9.4.3	Asset Pricing in the Representative Agent Case	206
9.5	Concluding Remarks	208
9.6	Problems	209
10	Sunspots	211
10.1	Introduction	211
10.2	Do Sunspots Matter?	212
10.2.1	Complete and Incomplete Participation	212
10.2.2	Setting up the Environment	213
10.2.3	Sunspot Theorems	215
10.3	Example of a Macroeconomic Model Where Sunspots Matter	217
10.3.1	Description of the Environment	217
10.3.2	Set of Equilibria	220
10.3.3	Supporting Sunspot Equilibria with Beliefs	223
10.3.4	Sunspots, Bubbles, and Regular Equilibria	226
10.4	Concluding Remarks	228
10.5	Problems	229
11	Macroeconomic Models of Money	231
11.1	Introduction	231
11.1.1	Rate of Return Dominance and Legal Restrictions Theory	231
11.1.2	Some Quick Fixes to Rate of Return Dominance	232
11.2	Models of Money	233
11.2.1	Budget Sets: the Opportunity Cost of Holding Money	234
11.2.2	Objective Functions: Cash in Advance and Its Relationship to Money in the Utility Function	237

11.3	Dynamics of a Cash-in-Advance Model	239
11.3.1	Different Types of Monetary Policy	239
11.3.2	Government's Budget Constraints	240
11.3.3	Typology of Policy Regimes	242
11.4	Equilibrium under Interest Rate Control	243
11.4.1	Policy Mix A: Fixed Interest Rates and Zero Debt	243
11.4.2	Equilibrium of the Real Economy under Interest Rate Control	246
11.4.3	Equilibrium Rates of Change of Nominal Variables under Interest Rate Control	247
11.4.4	Indeterminacy of the Nominal Scale of the Economy under Interest Rate Control	248
11.4.5	Economics of Indeterminacy under Interest Rate Control	249
11.5	Equilibrium under a Fixed Money Growth Rate Rule	250
11.5.1	Policy Mix B: Fixed Money Growth Rate and Zero Debt	251
11.5.2	Equilibrium of the Real Economy with a Fixed Money Growth Rate	251
11.5.3	Example of Indeterminate Equilibria in a Simple Economy	252
11.6	Concluding Remarks	254
11.7	Problems	255
12	Applied Monetary Theory	259
12.1	Introduction	259
12.2	Monetary Facts: What There Is to Explain	260
12.3	Simple Monetary Model: Using Equilibrium Theory to Explain the Facts	263
12.3.1	Modeling the Exchange Process	265
12.3.2	Formalizing the Exchange Technology	266
12.3.3	How to Describe an Equilibrium	267
12.4	How Do Equilibria Behave?	270
12.4.1	Choosing Functional Forms	270
12.4.2	What Do Equilibria Look Like?	271

12.4.3	Alternative Views of the Money-Income Correlation?	275
12.4.4	What Does All of This Have to Do with Sticky Prices?	276
12.5	Concluding Remarks	277
12.6	Problems	278
	Notes	281
	Bibliography	289
	Index	295