

Contents

List of Figures	xv
List of Tables	xvii
Preface	xix
1 Microeconomic Foundations	1
1.1 Microeconomics	1
1.1.1 Allocation, Feasibility, Optimality	1
1.1.2 Competitive Equilibrium	2
1.1.3 Walras's Law	2
1.1.4 Fundamental Theorems of Welfare Economics	3
1.2 Primitives	4
1.2.1 Event Tree	4
1.2.2 Preferences	4
1.2.3 Technology	6
1.3 Bibliographic Notes	8
2 Consumption and Saving	11
2.1 Consumption Smoothing	11
2.1.1 Two Periods	11
2.1.2 More Periods	14
2.1.3 Infinite Horizon	19
2.2 Extensions	21
2.2.1 Borrowing Constraint	21
2.2.2 Nongeometric Discounting and Time Consistency	22
2.2.3 Multiple Goods	23
2.3 Bibliographic Notes	24

3	Dynamic Competitive Equilibrium	25
3.1	Representative Agent and Capital Accumulation	25
3.1.1	Economy	25
3.1.2	Firms	26
3.1.3	Households	26
3.1.4	Market Clearing	27
3.1.5	General Equilibrium	27
3.1.6	Social Planner Allocation and Pareto Optimality	28
3.1.7	Analysis	28
3.1.8	Population Growth	32
3.2	Overlapping Generations and Capital Accumulation	33
3.2.1	Economy	33
3.2.2	Firms	34
3.2.3	Households	34
3.2.4	Market Clearing	34
3.2.5	General Equilibrium	34
3.2.6	Analysis	35
3.2.7	Pareto Optimality	36
3.2.8	Population Growth	37
3.3	Bibliographic Notes	38
4	Risk	39
4.1	Consumption, Saving, and Insurance	39
4.1.1	Incomplete Markets	39
4.1.2	Complete Markets	44
4.1.3	General Case	47
4.2	Risk Sharing	49
4.2.1	Borch's Rule	49
4.2.2	Aggregate and Idiosyncratic Risk	50
4.3	Uninsurable Labor Income Risk and Capital Accumulation	50
4.3.1	Economy	50
4.3.2	Households	51
4.3.3	General Equilibrium	52
4.4	Bibliographic Notes	53

5	Asset Returns and Asset Prices	55
5.1	Euler Equation	55
5.2	Excess Returns	56
5.2.1	C-CAPM	56
5.2.2	CAPM	57
5.3	Asset Prices	58
5.3.1	Fundamental Value	59
5.3.2	Bubble	60
5.4	Term Structure of Interest Rates	61
5.5	Equilibrium Asset Prices in an Endowment Economy	62
5.5.1	Economy	62
5.5.2	General Equilibrium	62
5.6	Bibliographic Notes	63
6	Labor Supply, Growth, and Business Cycles	65
6.1	Goods versus Leisure Consumption	65
6.1.1	One Period	65
6.1.2	More Periods	67
6.1.3	Wage Inequality and Risk Sharing	68
6.2	Growth	71
6.2.1	Exogenous Growth	71
6.2.2	Endogenous Growth	74
6.3	Business Cycles	77
6.3.1	Real Business Cycles	77
6.3.2	Sunspot-Driven Business Cycles	84
6.4	Bibliographic Notes	86
7	The Open Economy	89
7.1	Current Account and Net Foreign Assets	89
7.2	Real Exchange Rate	91
7.3	Gains From Trade	94
7.4	International Risk Sharing	95
7.5	Bibliographic Notes	96

8	Frictions	97
8.1	Capital Adjustment Frictions	97
8.1.1	Convex Adjustment Costs and Tobin's q	97
8.1.2	Nonconvex Adjustment Costs	101
8.1.3	Irreversibility and the Option Value of Waiting	102
8.2	Labor Market Frictions	104
8.2.1	Economy	104
8.2.2	Firms	104
8.2.3	Households	105
8.2.4	Market Clearing and Wage Determination	107
8.2.5	Equilibrium	108
8.2.6	Constrained Pareto Optimality	108
8.2.7	The Case without Capital	110
8.2.8	A Model without Capital and Leisure	111
8.3	Financial Frictions	113
8.3.1	Net Worth and External Finance Premium	113
8.3.2	Collateral and Asset Prices	116
8.3.3	Pecuniary Externalities and Constrained Inefficiency	121
8.4	Bibliographic Notes	125
9	Money	129
9.1	Unit of Account	130
9.1.1	Fisher Equation	130
9.1.2	Interest Parity and Nominal Exchange Rate	131
9.2	Store of Value	133
9.2.1	Overlapping Generations	133
9.2.2	Borrowing Constrained, Infinitely Lived Households	134
9.3	Medium of Exchange	136
9.3.1	Matching Frictions	136
9.3.2	Money in the Utility Function	137
9.3.3	Cash-in-Advance Constraint	140
9.4	The Price of Money	142
9.5	Bibliographic Notes	144

10	Price Setting and Price Rigidity	147
10.1	Price Setting	147
10.2	Staggered Price Setting	150
10.3	Price Rigidity in General Equilibrium	151
10.3.1	Firms	152
10.3.2	Households	152
10.3.3	Market Clearing	153
10.3.4	General Equilibrium	153
10.3.5	Analysis	155
10.4	Bibliographic Notes	159
11	The Government	161
11.1	Taxation and Government Consumption	161
11.2	Government Debt and Social Security	163
11.2.1	Government Debt with a Representative Agent	164
11.2.2	Government Debt with Overlapping Generations	166
11.2.3	Pay-as-You-Go Social Security	166
11.3	Equivalence of Policies	168
11.3.1	General Equivalence Result	170
11.3.2	Applications	170
11.4	Fiscal-Monetary Policy Interaction	172
11.4.1	Consolidated Government Budget Constraint	172
11.4.2	Seignorage Needs as Driver of Inflation	174
11.4.3	Inflation Effects of Government Financing	175
11.4.4	Game of Chicken	179
11.4.5	Fiscal Theory of the Price Level	179
11.4.6	Stability under Policy Rules	182
11.5	Determinate Inflation and Output	184
11.5.1	Flexible Prices	184
11.5.2	Rigid Prices	186
11.6	Real Effects of Monetary Policy	187
11.6.1	Flexible Prices	187
11.6.2	Rigid Prices	188
11.7	Bibliographic Notes	189

12	Optimal Policy	191
12.1	Tax Smoothing	191
12.1.1	Complete Markets	191
12.1.2	Incomplete Markets	196
12.1.3	Capital Income Taxation	202
12.1.4	Heterogeneous Households	204
12.2	Social Insurance and Saving Taxation	206
12.3	Monetary Policy	208
12.3.1	Friedman Rule	208
12.3.2	Dealing with Price Rigidity	210
12.4	Bibliographic Notes	213
13	Time Consistent Policy	215
13.1	Time Consistency and the Role of State Variables	215
13.2	Credible Tax Policy	217
13.3	Capital Income Taxation	218
13.3.1	Commitment Benchmark	219
13.3.2	No Commitment	219
13.4	Sovereign Debt and Default	222
13.4.1	Insurance	222
13.4.2	Borrowing with Contingent Debt	224
13.4.3	Borrowing with Noncontingent Debt	224
13.4.4	Loan Size Determinants	225
13.4.5	Debt Laffer Curve and Debt Overhang	228
13.4.6	Multiple Equilibria	229
13.4.7	Financial Autarky as Deterrent	229
13.5	Redistribution in Politico-Economic Equilibrium	230
13.5.1	Probabilistic Voting	230
13.5.2	Politico-Economic Equilibrium	230
13.5.3	Support for Redistribution	233
13.6	Monetary Policy	235
13.6.1	Stabilization Bias	235
13.6.2	Inflation Bias	236
13.7	Bibliographic Notes	239

A	Mathematical Tools	241
A.1	Constrained Optimization	241
A.2	Infinite-Horizon Dynamic Programming	241
A.2.1	Principle of Optimality	242
A.2.2	Uniqueness of V	242
A.2.3	Properties of V	242
A.3	Systems of Linear Difference Equations	243
A.4	Bibliographic Notes	243
B	Technical Discussions	245
B.1	Transversality Condition in Infinite-Horizon Saving Problem	245
B.2	Representative Household	245
B.3	Transversality Condition in Infinite-Horizon Planner Problem	247
B.4	Unexpected Utility	248
B.5	Linear Rational Expectations Models	251
B.5.1	Single Equation Model	251
B.5.2	Multiple Equation Model	252
B.6	Ramsey Taxation	254
B.6.1	Primal Approach	254
B.6.2	Dual Approach	256
B.7	Probabilistic Voting	258
B.8	Bibliographic Notes	259
	Bibliography	261
	Author Index	283
	Subject Index	289

Contents

List of Figures	xv
List of Tables	xvii
Preface	xix
1 Microeconomic Foundations	1
1.1 Microeconomics	1
1.1.1 Allocation, Feasibility, Optimality	1
1.1.2 Competitive Equilibrium	2
1.1.3 Walras's Law	2
1.1.4 Fundamental Theorems of Welfare Economics	3
1.2 Primitives	4
1.2.1 Event Tree	4
1.2.2 Preferences	4
1.2.3 Technology	6
1.3 Bibliographic Notes	8
2 Consumption and Saving	11
2.1 Consumption Smoothing	11
2.1.1 Two Periods	11
2.1.2 More Periods	14
2.1.3 Infinite Horizon	19
2.2 Extensions	21
2.2.1 Borrowing Constraint	21
2.2.2 Nongeometric Discounting and Time Consistency	22
2.2.3 Multiple Goods	23
2.3 Bibliographic Notes	24

3	Dynamic Competitive Equilibrium	25
3.1	Representative Agent and Capital Accumulation	25
3.1.1	Economy	25
3.1.2	Firms	26
3.1.3	Households	26
3.1.4	Market Clearing	27
3.1.5	General Equilibrium	27
3.1.6	Social Planner Allocation and Pareto Optimality	28
3.1.7	Analysis	28
3.1.8	Population Growth	32
3.2	Overlapping Generations and Capital Accumulation	33
3.2.1	Economy	33
3.2.2	Firms	34
3.2.3	Households	34
3.2.4	Market Clearing	34
3.2.5	General Equilibrium	34
3.2.6	Analysis	35
3.2.7	Pareto Optimality	36
3.2.8	Population Growth	37
3.3	Bibliographic Notes	38
4	Risk	39
4.1	Consumption, Saving, and Insurance	39
4.1.1	Incomplete Markets	39
4.1.2	Complete Markets	44
4.1.3	General Case	47
4.2	Risk Sharing	49
4.2.1	Borch's Rule	49
4.2.2	Aggregate and Idiosyncratic Risk	50
4.3	Uninsurable Labor Income Risk and Capital Accumulation	50
4.3.1	Economy	50
4.3.2	Households	51
4.3.3	General Equilibrium	52
4.4	Bibliographic Notes	53

5	Asset Returns and Asset Prices	55
5.1	Euler Equation	55
5.2	Excess Returns	56
5.2.1	C-CAPM	56
5.2.2	CAPM	57
5.3	Asset Prices	58
5.3.1	Fundamental Value	59
5.3.2	Bubble	60
5.4	Term Structure of Interest Rates	61
5.5	Equilibrium Asset Prices in an Endowment Economy	62
5.5.1	Economy	62
5.5.2	General Equilibrium	62
5.6	Bibliographic Notes	63
6	Labor Supply, Growth, and Business Cycles	65
6.1	Goods versus Leisure Consumption	65
6.1.1	One Period	65
6.1.2	More Periods	67
6.1.3	Wage Inequality and Risk Sharing	68
6.2	Growth	71
6.2.1	Exogenous Growth	71
6.2.2	Endogenous Growth	74
6.3	Business Cycles	77
6.3.1	Real Business Cycles	77
6.3.2	Sunspot-Driven Business Cycles	84
6.4	Bibliographic Notes	86
7	The Open Economy	89
7.1	Current Account and Net Foreign Assets	89
7.2	Real Exchange Rate	91
7.3	Gains From Trade	94
7.4	International Risk Sharing	95
7.5	Bibliographic Notes	96

8	Frictions	97
8.1	Capital Adjustment Frictions	97
8.1.1	Convex Adjustment Costs and Tobin's q	97
8.1.2	Nonconvex Adjustment Costs	101
8.1.3	Irreversibility and the Option Value of Waiting	102
8.2	Labor Market Frictions	104
8.2.1	Economy	104
8.2.2	Firms	104
8.2.3	Households	105
8.2.4	Market Clearing and Wage Determination	107
8.2.5	Equilibrium	108
8.2.6	Constrained Pareto Optimality	108
8.2.7	The Case without Capital	110
8.2.8	A Model without Capital and Leisure	111
8.3	Financial Frictions	113
8.3.1	Net Worth and External Finance Premium	113
8.3.2	Collateral and Asset Prices	116
8.3.3	Pecuniary Externalities and Constrained Inefficiency	121
8.4	Bibliographic Notes	125
9	Money	129
9.1	Unit of Account	130
9.1.1	Fisher Equation	130
9.1.2	Interest Parity and Nominal Exchange Rate	131
9.2	Store of Value	133
9.2.1	Overlapping Generations	133
9.2.2	Borrowing Constrained, Infinitely Lived Households	134
9.3	Medium of Exchange	136
9.3.1	Matching Frictions	136
9.3.2	Money in the Utility Function	137
9.3.3	Cash-in-Advance Constraint	140
9.4	The Price of Money	142
9.5	Bibliographic Notes	144

10	Price Setting and Price Rigidity	147
10.1	Price Setting	147
10.2	Staggered Price Setting	150
10.3	Price Rigidity in General Equilibrium	151
10.3.1	Firms	152
10.3.2	Households	152
10.3.3	Market Clearing	153
10.3.4	General Equilibrium	153
10.3.5	Analysis	155
10.4	Bibliographic Notes	159
11	The Government	161
11.1	Taxation and Government Consumption	161
11.2	Government Debt and Social Security	163
11.2.1	Government Debt with a Representative Agent	164
11.2.2	Government Debt with Overlapping Generations	166
11.2.3	Pay-as-You-Go Social Security	166
11.3	Equivalence of Policies	168
11.3.1	General Equivalence Result	170
11.3.2	Applications	170
11.4	Fiscal-Monetary Policy Interaction	172
11.4.1	Consolidated Government Budget Constraint	172
11.4.2	Seignorage Needs as Driver of Inflation	174
11.4.3	Inflation Effects of Government Financing	175
11.4.4	Game of Chicken	179
11.4.5	Fiscal Theory of the Price Level	179
11.4.6	Stability under Policy Rules	182
11.5	Determinate Inflation and Output	184
11.5.1	Flexible Prices	184
11.5.2	Rigid Prices	186
11.6	Real Effects of Monetary Policy	187
11.6.1	Flexible Prices	187
11.6.2	Rigid Prices	188
11.7	Bibliographic Notes	189

12	Optimal Policy	191
12.1	Tax Smoothing	191
12.1.1	Complete Markets	191
12.1.2	Incomplete Markets	196
12.1.3	Capital Income Taxation	202
12.1.4	Heterogeneous Households	204
12.2	Social Insurance and Saving Taxation	206
12.3	Monetary Policy	208
12.3.1	Friedman Rule	208
12.3.2	Dealing with Price Rigidity	210
12.4	Bibliographic Notes	213
13	Time Consistent Policy	215
13.1	Time Consistency and the Role of State Variables	215
13.2	Credible Tax Policy	217
13.3	Capital Income Taxation	218
13.3.1	Commitment Benchmark	219
13.3.2	No Commitment	219
13.4	Sovereign Debt and Default	222
13.4.1	Insurance	222
13.4.2	Borrowing with Contingent Debt	224
13.4.3	Borrowing with Noncontingent Debt	224
13.4.4	Loan Size Determinants	225
13.4.5	Debt Laffer Curve and Debt Overhang	228
13.4.6	Multiple Equilibria	229
13.4.7	Financial Autarky as Deterrent	229
13.5	Redistribution in Politico-Economic Equilibrium	230
13.5.1	Probabilistic Voting	230
13.5.2	Politico-Economic Equilibrium	230
13.5.3	Support for Redistribution	233
13.6	Monetary Policy	235
13.6.1	Stabilization Bias	235
13.6.2	Inflation Bias	236
13.7	Bibliographic Notes	239

A	Mathematical Tools	241
	A.1 Constrained Optimization	241
	A.2 Infinite-Horizon Dynamic Programming	241
	A.2.1 Principle of Optimality	242
	A.2.2 Uniqueness of V	242
	A.2.3 Properties of V	242
	A.3 Systems of Linear Difference Equations	243
	A.4 Bibliographic Notes	243
B	Technical Discussions	245
	B.1 Transversality Condition in Infinite-Horizon Saving Problem	245
	B.2 Representative Household	245
	B.3 Transversality Condition in Infinite-Horizon Planner Problem	247
	B.4 Nonexpected Utility	248
	B.5 Linear Rational Expectations Models	251
	B.5.1 Single Equation Model	251
	B.5.2 Multiple Equation Model	252
	B.6 Ramsey Taxation	254
	B.6.1 Primal Approach	254
	B.6.2 Dual Approach	256
	B.7 Probabilistic Voting	258
	B.8 Bibliographic Notes	259
	Bibliography	261
	Author Index	283
	Subject Index	289