

Contents

List of Figures	<i>page</i> x
List of Matrices	xi
Preface	xiii
1 Introduction	1
1.1 What Are Common Pool Resources?	1
1.2 Differences between CPRs and Other Goods	1
1.3 Overexploiting the Commons	3
1.4 The “Tragedy of the Commons” – Static and Dynamic Components	4
1.5 The “Tragedy of the Commons” under Incomplete Information	5
2 Common Pool Resources in a Static Setting	7
2.1 Introduction	7
2.2 Modeling the CPR	7
2.3 Finding Equilibrium Appropriation	9
2.3.1 Comparative Statics	12
2.3.2 Extension – What if Fishermen Have Some Market Power?	14
2.4 Common Pool Resources – Socially Optimal Appropriation	16
2.4.1 Socially Optimal Appropriation When only Profits Matter	18
2.4.2 Socially Optimal Appropriation with Consumers and Profits Matter	20
2.5 Facing Our First Inefficiency	21
2.6 Inefficient Exploitation with More General Functions	22
2.7 Policy Instruments	26

2.7.1	Quotas	26
2.7.2	Appropriation Fees	27
2.8	Exercises	29
3	Common Pool Resources in a Dynamic Setting	34
3.1	Introduction	34
3.2	Modeling CPRs in a Dynamic Setting	35
3.3	Finding Equilibrium Appropriation	36
3.3.1	Equilibrium Appropriation in the Second Period	36
3.3.2	Equilibrium Appropriation in the First Period	38
3.4	Socially Optimal Appropriation	40
3.5	Static and Dynamic Inefficiencies	43
3.6	Equilibrium vs. Socially Optimal Number of Firms	44
3.6.1	Equilibrium Entry	44
3.6.2	Socially Optimal Entry	46
3.6.3	No Entry Costs	47
3.7	Exercises	48
4	Entry Deterrence in the Commons	52
4.1	Introduction	52
4.2	Modeling Entry Deterrence	53
4.2.1	Second-Period Appropriation – No Entry	54
4.2.2	Second-Period Appropriation – Entry	55
4.2.3	Second-Period Appropriation – Enter or Not?	56
4.2.4	First-Period Appropriation – Entry Deterrence	58
4.3	A Greater Dynamic Inefficiency	60
4.4	Exercises	61
5	Repeated Interaction in the Commons	64
5.1	Introduction	64
5.2	Modeling Repeated Interaction	65
5.3	Finite Repetitions	68
5.4	Infinite Repetitions	69

5.5	Experimental Studies of Repeated Interaction in the Commons	75
5.5.1	Experimental Design	75
5.5.2	Experimental Results	76
5.6	Exercises	77
6	Commons under Incomplete Information	81
6.1	Introduction	81
6.2	Symmetrically Uninformed Firms – Everyone is in the Dark	82
6.2.1	Comparing Equilibrium Appropriation in Different Information Contexts – I	84
6.2.2	Comparative Statics	85
6.3	Asymmetrically Uninformed Firms – Only Some Firms Are in the Dark	86
6.3.1	Comparing Equilibrium Appropriation in Different Information Contexts – II	90
6.3.2	Efficiency Properties	93
6.4	Exercises	93
7	Signaling in the Commons	95
7.1	Introduction	95
7.2	Modeling Signals in the Commons	96
7.2.1	Prior and Posterior Beliefs	97
7.3	Separating Equilibrium	100
7.3.1	Separating Effort	104
7.3.2	Efficiency Properties	106
7.4	Pooling Equilibrium	107
7.4.1	Pooling Effort	110
7.4.2	Efficiency Properties	111
7.5	What if the Regulator Is Uninformed?	112
7.5.1	Welfare Comparisons	114
7.6	Exercises	114

Appendix A	Game Theory Tools	118
A.1	Background	118
A.2	Strictly Dominated Strategies	119
A.3	Iterative Deletion of Strictly Dominated Strategies	120
A.4	Weakly Dominated Strategies	122
A.5	Nash Equilibrium	123
A.6	Subgame Perfect Equilibrium	125
A.7	Bayesian Nash Equilibrium	126
A.8	Perfect Bayesian Equilibrium	128
Appendix B	Solutions to Selected End-of-Chapter Exercises	130
Chapter 2	– Common Pool Resources in a Static Setting	130
Exercise 2.1	– Allowing for Different Cost Externalities	130
Exercise 2.3	– Finding Socially Optimal Appropriation in a CPR with N Firms	131
Exercise 2.5	– Profit-Enhancing Appropriation Fees – I	133
Exercise 2.7	– Finding Appropriation Fees	135
Exercise 2.9	– Equity Shares; Based on Ellis (2001) and Heintzelman et al. (2009)	138
Chapter 3	– Common Pool Resources in a Dynamic Setting	141
Exercise 3.1	– Firms Facing Downward Sloping Demand Curve	141
Exercise 3.3	– Alternative Second-Period Cost Function	143
Exercise 3.5	– Finding Socially Optimal Appropriation When N Firms Compete in the Second Period	146
Exercise 3.7	– Two Firms Competing in Both Periods	149
Exercise 3.9	– Asymmetric Discount Factors	152
Chapter 4	– Entry Deterrence in the Commons	152
Exercise 4.1	– Firms Facing a Downward-Sloping Demand Curve	152
Exercise 4.3	– Using a Different Welfare Function to Measure Inefficiencies	155

Exercise 4.5 – Two Incumbent Firms Seeking to Deter Entry	158
Chapter 5 – Repeated Interaction in the Commons	162
Exercise 5.1 – Asymmetric Payoffs	162
Exercise 5.3 – Altering Players' Payoffs – II	164
Exercise 5.5 – N Firms Exploiting the Commons	167
Exercise 5.7 – Temporary Punishments	168
Chapter 6 – Commons under Incomplete Information	170
Exercise 6.1 – Socially Optimal Appropriation	170
Exercise 6.3 – Two-Period Interaction, but only One of Them Facing Uncertainty	174
Exercise 6.5 – Allowing for Market Power - Asymmetrically Informed Players	176
Chapter 7 – Signaling in the Commons	180
Exercise 7.1 – Separating Equilibrium When the Potential Entrant Enjoys a Cost Advantage	180
Exercise 7.3 – Considering a Different Second-Period Cost Function	186
Exercise 7.5 – Pooling Equilibrium with Market Power	193
 Bibliography	 199
Index	203