

---

# Cooperative Microeconomics:

A GAME-THEORETIC  
INTRODUCTION

*Hervé Moulin*

PRINCETON UNIVERSITY PRESS

PRINCETON, NEW JERSEY

# Contents

---

<i>Acknowledgements</i>	1
<i>Overview of the Book</i>	3
CHAPTER 1	
The Three Modes of Cooperation:	
Agreements, Decentralization, and Justice	5
1.1. <i>Cooperation in Economic Theory</i>	5
1.2. <i>Cooperation in Political Theory</i>	8
1.3. <i>The Theme of This Book</i>	11
1.4. <i>Direct Agreements: The Efficiency Postulate         and the Core</i>	14
1.5. <i>The Justice Mode: End-state Justice</i>	19
1.6. <i>Decentralized Behavior</i>	26
1.7. <i>Procedural Justice</i>	36
CHAPTER 2	
Core and Competitive Equilibrium: One Good and Money	45
2.1. <i>Introduction</i>	45
2.2. <i>The Partial Equilibrium Model</i>	48
2.3. <i>Böhm-Bawerk's Horse Market</i>	49
2.4. <i>Oligopoly with Binary Demands</i>	52
2.5. <i>Existence of the Competitive Equilibrium         under Convex Preferences</i>	59
2.6. <i>Decreasing Marginal Costs: Efficiency</i>	66
2.7. <i>Decreasing Marginal Costs: The Core</i>	73
2.8. <i>Nonconvex Preferences and Empty Cores</i>	77
2.9. <i>Trading Games in the Böhm-Bawerk Market</i>	81
Appendix to Chapter 2	86
A2.1. <i>Proof of Lemma 2.1</i>	86
A2.2. <i>Proof of Lemma 2.2</i>	87
A2.3. <i>Proof of Lemma 2.5</i>	88
Exercises on Chapter 2	91
CHAPTER 3	
Core and Competitive Equilibrium: Multiple Goods	103
3.1. <i>Introduction</i>	103
3.2. <i>House Barter</i>	104

3.3.	<i>The Marriage Market</i>	111
3.4.	<i>Bilateral Assignment</i>	117
3.5.	<i>Assignment Economies</i>	123
3.6.	<i>Arrow–Debreu Economies: Divisible Goods and Convex Preferences</i>	129
3.7.	<i>The Edgeworth Proposition</i>	137
3.8.	<i>Trading Games</i>	139
	Appendix to Chapter 3	146
A3.1.	<i>Proof of Theorem 3.1</i>	146
A3.2.	<i>Proof of Theorem 3.3</i>	147
A3.3.	<i>A Heuristic Argument for the Edgeworth Proposition</i>	149
	Exercises on Chapter 3	150
CHAPTER 4		
	Fair Division: The No Envy Test	163
4.1.	<i>Introduction</i>	163
4.2.	<i>No Envy versus Stand Alone: Two Elementary Examples</i>	168
4.3.	<i>The Fair-Assignment Problem: No Envy Equals CEEI</i>	175
4.4.	<i>The Competitive Equilibrium with Equal Incomes</i>	183
4.5.	<i>Three Examples of the CEEI Solution</i>	188
4.6.	<i>The Egalitarian–Equivalent Solution</i>	195
4.7.	<i>Resource Monotonicity</i>	203
4.8.	<i>Divide and Choose, Moving Knives, and Auctions</i>	205
	Appendix to Chapter 4	213
A4.1.	<i>Proof of Statement (i) in Theorem 4.1</i>	213
A4.2.	<i>The Varian Proposition</i>	214
A4.3.	<i>The Egalitarian–Equivalent Solution in Fair Division with Money</i>	215
	Exercises on Chapter 4	218
CHAPTER 5		
	Fair Division: The Stand Alone Test	239
5.1.	<i>Models of Cooperative Production</i>	239
5.2.	<i>Increasing Marginal Costs: The CEEI Solution</i>	244
5.3.	<i>Increasing Marginal Costs: Stand Alone Test and Egalitarian Equivalence</i>	254
5.4.	<i>Decreasing Marginal Costs: The Stand Alone Core</i>	261
5.5.	<i>Decreasing Marginal Costs: Deterministic Solutions</i>	270
5.6.	<i>Public Goods: The Stand Alone Core</i>	277
5.7.	<i>Public Goods: The Ratio Equilibrium</i>	286
5.8.	<i>Public Goods: Two Egalitarian–Equivalent Solutions</i>	293

5.9. <i>Public Bads and Other Forms of Externalities</i>	301
Exercises on Chapter 5	305
CHAPTER 6	
Production Externality Games	324
6.1. <i>Introduction</i>	324
6.2. <i>Voting Over a Public Good: Majority versus Unanimity</i>	328
6.3. <i>Voluntary Contribution to a Public Good</i>	339
6.4. <i>The Average-Return Mechanism: The Tragedy of the Commons</i>	349
6.5. <i>The Average-Cost Mechanism: A Lesser Tragedy</i>	357
6.6. <i>Serial Cost- (or Output-) Sharing: Improving upon Voting</i>	364
6.7. <i>Serial Cost-Sharing of Partially Excludable Public Goods</i>	377
Appendix to Chapter 6	381
A6.1. <i>Strategy-Proof Voting in the Single-Peaked Context</i>	381
A6.2. <i>The Gibbard–Satterthwaite Theorem</i>	383
A6.3. <i>Strategy-Proof Voting and Condorcet Winners: The Case of Multiple Public Goods</i>	383
Exercises on Chapter 6	387
CHAPTER 7	
Cooperative Games	402
7.1. <i>Games in Characteristic Function Form</i>	402
7.2. <i>The Core: Definition</i>	403
7.3. <i>Universally Stable Families of Coalitions</i>	406
7.4. <i>Convex (Supermodular) Games</i>	408
7.5. <i>Balanced Games</i>	412
7.6. <i>The Shapley Value: Definition</i>	417
7.7. <i>The Shapley Value and the Core</i>	424
Appendix to Chapter 7	428
<i>Proof of Theorem 7.2</i>	428
Exercises on Chapter 7	430
<i>Bibliography</i>	441
<i>Index</i>	451