

Revealed Preference Theory

Christopher P. Chambers

Federico Echenique

DEPARTMENT OF ECONOMICS, UC SAN DIEGO

E-mail address: cpchambers@ucsd.edu

DIVISION OF THE HUMANITIES AND SOCIAL SCIENCE, CALTECH

E-mail address: fede@caltech.edu

Contents

Preface	xi
§0.1. What is revealed preference theory?	xii
§0.2. Different approaches in revealed preference	xiv
§0.3. What we do	xv
Chapter 1. Mathematical Preliminaries	1
§1.1. Basic definitions and notational conventions	2
1.1.1. Relations	2
1.1.2. Partially ordered sets	2
1.1.3. Euclidean spaces	3
§1.2. Preference and utility	4
1.2.1. Properties of preferences	4
1.2.2. Utility	4
§1.3. Order pairs, acyclicity, and extension theorems	6
§1.4. Cyclic monotonicity	10
§1.5. Theorem of the Alternative	12
§1.6. Chapter references	14
Chapter 2. Classical Abstract Choice Theory	15
§2.1. Strong rationalization	17
2.1.1. Weak Axiom of Revealed Preference	20
2.1.2. Maximal rationalizability	22
2.1.3. Quasi-transitivity	23
§2.2. Satisficing	24
§2.3. Weak rationalization	25
§2.4. Subrationalizability	29

§2.5. Experimental elicitation of choice	31
§2.6. Chapter references	32
Chapter 3. Rational Demand	35
§3.1. Weak rationalization	36
3.1.1. Proof of Afriat's Theorem	43
3.1.2. Constructive proof of Afriat's Theorem	46
3.1.3. General budget sets	47
§3.2. Revealed preference graphs	49
§3.3. Strong rationalization	50
3.3.1. Smooth utility	52
3.3.2. General budget sets	52
3.3.3. Partially observed prices and consumption	53
§3.4. Chapter references	55
Chapter 4. Topics in Rational Demand	59
§4.1. Discrete goods: supermodular and submodular rationalizations	60
§4.2. Divisible goods	62
4.2.1. Homotheticity	62
4.2.2. Separability	66
4.2.3. Quasilinear utility	67
4.2.4. Gross Complements and Substitutes	69
§4.3. Chapter references	72
Chapter 5. Practical Issues in Revealed Preference Analysis	73
§5.1. Measures of the severity of a violation on GARP	74
5.1.1. Afriat's efficiency index	74
5.1.2. Varian's version of AEI	75
5.1.3. The Money Pump Index	75
§5.2. Power of testing GARP	76
5.2.1. Bronars' index	77
5.2.2. Engel curve correction	78
§5.3. An overview of empirical studies	79
5.3.1. Panel data	80
5.3.2. Cross sectional data	80
5.3.3. Time series data	81
5.3.4. Experimental data	81
§5.4. Chapter references	83
Chapter 6. Production	85
§6.1. Cost minimization	86
§6.2. Profit maximization	89
6.2.0.1. Nonlinear pricing	92

6.2.1. Unobserved factors of production	93
6.2.2. Measuring violations from rationalizability	94
§6.3. Chapter references	95
Chapter 7. Stochastic Choice	97
§7.1. Stochastic Rationality	98
7.1.1. Proof of Theorem 7.2	101
§7.2. Luce's model	105
7.2.1. Proof of Theorem 7.6	106
7.2.2. Luce's model and the Logit model	107
§7.3. Random Expected Utility	110
§7.4. Chapter references	113
Chapter 8. Choice Under Uncertainty	115
§8.1. Objective probability	116
8.1.1. Notation	116
8.1.2. Choice over lotteries	116
8.1.3. State-contingent consumption	117
§8.2. Subjective probability	122
8.2.1. The Epstein Test	122
8.2.2. Subjective expected utility	123
§8.3. Complete class	124
§8.4. Subjective expected utility with an act-dependent prior	126
§8.5. Chapter references	127
Chapter 9. General Equilibrium Theory	131
§9.1. The Sonnenschein-Mantel-Debreu Theorem	133
9.1.1. Sketch of the proof of the Sonnenschein-Mantel-Debreu Theorem	135
§9.2. Homothetic Preferences	136
§9.3. Prices and endowments	138
§9.4. The core of exchange economies	142
§9.5. Chapter references	143
Chapter 10. Game Theory	145
§10.1. Nash equilibrium	146
10.1.1. Choice from all game forms	147
10.1.2. Choice from a subset of game forms	148
10.1.3. Zero-sum games	149
§10.2. Bayes' Nash Equilibrium	150
§10.3. Bargaining Theory	151
§10.4. Stable Matching Theory	156

§10.5. Chapter references	158
Chapter 11. Social Choice and Political Science	161
§11.1. Testable implications of preference aggregation functions	162
11.1.1. Utilitarian rationalizability	166
§11.2. Models in formal political science	167
11.2.1. Refuting Euclidean preferences	168
11.2.2. Rational voting when policy positions are known	171
§11.3. Chapter references	176
Chapter 12. Revealed Preference and Systems of Polynomial Inequalities	179
§12.1. Linear inequalities: the Theorem of the Alternative and revealed preference	180
12.1.1. Linear systems from first-order conditions	181
12.1.2. The existence of a rationalizing utility	183
§12.2. Polynomial inequalities: the Positivstellensatz	185
12.2.1. Application: Nash bargaining	186
§12.3. Chapter references	188
Chapter 13. Revealed Preference and Model Theory	191
§13.1. A model for observables, data, and theories	193
13.1.1. Empirical content	196
13.1.2. Relative theories	197
§13.2. Application: Status quo preferences	198
§13.3. Choice theory and empirical content	199
§13.4. Chapter references	202
Bibliography	203
Index	223