

Contents

Acknowledgements	xv
1 Introduction and Overview	1
1.1 What is Experimetrics?.....	1
1.2 Experimental Design.....	2
1.3 The Experimetrics of Theory Testing	3
1.4 Dependence in Experimental Data	5
1.5 Parametric versus Non-parametric Approaches	6
1.6 Structural Experimetrics	7
1.7 Modelling Subject Heterogeneity	9
1.8 Experimetrics of Other-regarding Preferences	10
1.9 Experimetrics of Bounded Rationality	11
1.10 Experimetrics of Learning	12
1.11 What is in this Book?	13
2 Statistical Aspects of Experimental Design in Experimental Economics.....	17
2.1 Introduction	17
2.2 The Average Treatment Effect	17
2.3 Randomisation Techniques.....	18
2.3.1 Completely randomised designs	19
2.3.2 Factorial designs	19
2.3.3 Block designs	20
2.3.4 Within-subject designs	20
2.3.5 Crossover designs	21
2.3.6 ABA designs	21
2.4 How Many Subjects? A Primer in Power Analysis	21
2.4.1 The case of one sample	21
2.4.2 Choosing the sample size in a treatment test	24
2.4.3 Treatments with unequal costs	26
2.4.4 Sample size in cluster designs	27
2.5 Four Very Popular Experiments	28

2.5.1	The ultimatum game	28
2.5.2	The dictator game	29
2.5.3	The trust game	29
2.5.4	The public goods game	29
2.6	Other Aspects of Design	30
2.6.1	The random lottery incentive (RLI) mechanism	30
2.6.2	The strategy method	31
2.6.3	“One-shot”, “partners”, and “strangers” designs	31
2.7	Summary and Further Reading	32
3	Treatment Testing	35
3.1	Introduction	35
3.2	The Mechanics of Treatment Testing	36
3.3	Testing with Discrete Outcomes	37
3.3.1	The binomial test	37
3.3.2	Fisher’s exact test	38
3.3.3	The chi-squared test	41
3.3.4	The chi-squared test on a real data set	43
3.4	Testing for Normality	46
3.5	Treatment Testing	48
3.5.1	Parametric tests of treatment effects	48
3.5.2	Non-parametric tests of treatment effects: the Mann-Whitney test	51
3.5.3	The bootstrap	52
3.5.4	Tests comparing entire distributions	55
3.6	Testing for Gender Effects	57
3.7	Within-subject Tests	60
3.7.1	The Allais paradox	61
3.7.2	Preference reversals	64
3.7.3	Continuous outcome	65
3.8	Summary and Further Reading	68
4	Theory Testing, Regression, and Dependence	71
4.1	Introduction	71
4.2	Experimental Auctions	73
4.2.1	Overview of auction theory	73
4.2.2	Carrying out an experimental auction	75
4.2.3	The simulated auction data	75
4.3	Tests of Auction Theory	78
4.3.1	A test of RNNE in a second-price common value auction ..	78
4.4	Tests of Comparative Static Predictions	80
4.4.1	Standard treatment tests	80
4.4.2	Treatment testing using a regression	82
4.4.3	Accounting for dependence: the ultra-conservative test	82
4.4.4	Accounting for dependence in a regression	84
4.4.5	Accounting for dependence: the block bootstrap	85

4.5	Multiple Regression with Auction Data	86
4.5.1	Introducing the effect of uncertainty	86
4.5.2	Introducing the effect of experience	88
4.5.3	Introducing the effect of cash balance	89
4.6	Panel Data Estimators	90
4.7	Multi-level Modelling	92
4.8	Modelling Data from Contest Experiments	97
4.8.1	The Tullock contest	97
4.8.2	A contest experiment	98
4.8.3	Analysis of data from contest experiment	99
4.9	Meta-analysis	102
4.10	Summary and Further Reading	105
5	Modelling of Decision Times Using Regression Analysis	107
5.1	Introduction	107
5.2	The Decision-time Data	108
5.3	A Theoretical Model of Effort Allocation	109
5.4	An Econometric Model of Effort Allocation	111
5.5	Panel Data Models of Effort Allocation	116
5.6	Discussion of Results	120
5.7	Post-estimation	121
5.8	Summary and Further Reading	123
6	Dealing with Discreteness in Experimental Data	125
6.1	Introduction	125
6.2	Binary Data	126
6.2.1	Likelihood and log-likelihood explained	126
6.2.2	Modelling choices between lotteries (the “house money effect”)	129
6.2.3	Marginal effects	133
6.2.4	Wald tests and LR tests	134
6.2.5	Analysis of ultimatum game data	135
6.2.6	The strategy method	138
6.3	The <code>m1</code> Routine in STATA	140
6.4	Structural Modelling	141
6.5	Further Structural Modelling	144
6.5.1	The heterogeneous agent model	144
6.5.2	The delta method	147
6.5.3	Another example using the delta method	148
6.6	Other Data Types	149
6.6.1	Interval data: the interval regression model	149
6.6.2	Continuous (exact) data	152
6.6.3	Censored data: the Tobit model	155
6.7	The Ultimatum Game: Further Analysis	160
6.7.1	Further tests of gender effects	160

6.7.2	The proposer's decision as a risky choice problem	161
6.8	Summary and Further Reading	164
7	Ordinal Data in Experimetrics	167
7.1	Introduction	167
7.2	Ordered Outcomes: The Case for Special Treatment	168
7.3	The Ordered Probit Model: Theory	169
7.4	Interpreting the Cut-point Parameters	171
7.5	Application to Data on Emotions	172
7.6	Application to Data on Strength of Preference	177
7.7	Summary and Further Reading	181
8	Dealing with Heterogeneity: Finite Mixture Models	183
8.1	Introduction	183
8.2	Mixture of Two Normal Distributions	184
8.2.1	Data and model	184
8.2.2	Posterior type probabilities	186
8.2.3	The estimation program	186
8.2.4	Results	187
8.3	The fmm Command in STATA	188
8.4	A Mixture Model for the "Acquiring a Company" Task	190
8.5	A Mixture Model for Giving in a Public Goods Experiment	193
8.5.1	Background	193
8.5.2	Experiment	194
8.5.3	The data	195
8.5.4	The finite mixture two-limit Tobit model with tremble	197
8.5.5	Program	201
8.5.6	Results	206
8.5.7	Posterior type probabilities	208
8.6	Summary and Further Reading	210
9	Simulating Experimental Data, and the Monte Carlo Method	211
9.1	Introduction	211
9.2	Random Number Generation in STATA	212
9.3	Simulating Data Sets	214
9.3.1	Simulating data from a linear model	214
9.3.2	Simulating panel data	216
9.3.3	Simulating dynamic panel data	217
9.3.4	Simulating binary panel data	219
9.4	Monte Carlo Investigation of the Hausman Test	220
9.5	Summary and Further Reading	224

10 Introduction to the Method of Maximum Simulated Likelihood (MSL)	227
10.1 Introduction	227
10.2 The Principle of Maximum Simulated Likelihood (MSL)	228
10.3 Halton Draws	229
10.3.1 The case for using Halton draws	229
10.3.2 Generating Halton draws in STATA	230
10.3.3 Halton draws for panel data estimation	233
10.4 The Random Effects Probit Model	234
10.4.1 Model	234
10.4.2 Simulation	236
10.4.3 Estimation by MSL	238
10.4.4 Preparation of data for estimation	239
10.4.5 The likelihood evaluator	240
10.4.6 Complete annotated code	244
10.4.7 Results	246
10.5 The Random Effects Two-limit Tobit Model	248
10.5.1 Construction of log-likelihood function	249
10.5.2 Estimation by MSL	250
10.5.3 STATA code	251
10.5.4 Results from random effects two-limit Tobit model	253
10.6 Summary and Further Reading	255
11 Dealing with Zeros: Hurdle Models	257
11.1 Introduction	257
11.2 Review of Tobit and Random Effects Tobit	258
11.3 The Need for Hurdle Models	260
11.4 The Double Hurdle Model and Variants	261
11.4.1 <i>p</i> -Tobit	261
11.4.2 Double hurdle	261
11.4.3 The single hurdle model	263
11.5 The Panel Hurdle Model	264
11.5.1 The basic model	264
11.5.2 The panel single hurdle model	265
11.5.3 Construction of likelihood function	265
11.5.4 Panel hurdle with upper censoring	266
11.5.5 Panel hurdle model with tremble	266
11.5.6 Panel hurdle model with dependence	267
11.5.7 Obtaining posterior probabilities	268
11.5.8 Estimation	269
11.5.9 STATA code and simulation	269
11.6 A Panel Hurdle Model of Dictator Game Giving	275
11.6.1 The experiment	275
11.6.2 Estimation	278
11.6.3 Results	279

11.7 A Panel Hurdle Model of Contribution in a Public Goods Game	282
11.8 Summary and Further Reading	288
12 Choice under Risk: Theoretical Issues	291
12.1 Introduction	291
12.2 Utility Functions and Risk Aversion	291
12.3 Lottery Choice	295
12.4 Stochastic Dominance	298
12.5 Non-expected Utility Models	299
12.5.1 Weighting functions	299
12.6 Stochastic Models of Choice under Risk	302
12.7 Summary and Further Reading	304
13 Choice under Risk: Econometric Modelling	307
13.1 Introduction	307
13.2 The Choice Models	310
13.2.1 The framework	310
13.2.2 Incorporating violations of EU	311
13.2.3 The Fechner model	312
13.2.4 The Random Preference (RP) model	312
13.2.5 Dominance problems in the RP model	313
13.2.6 The tremble parameter	313
13.2.7 The role of experience	314
13.2.8 Between-subject variation and the sample log-likelihood ..	315
13.2.9 Posterior estimation of risk attitude	316
13.3 Simulation and Estimation	316
13.3.1 Data generating process	316
13.3.2 The STATA code	317
13.3.3 The simulated data	325
13.3.4 Output from estimation routines	326
13.4 Results and Post-estimation	327
13.4.1 The model estimates	327
13.4.2 Vuong's non-nested likelihood ratio test	328
13.4.3 Clarke's non-parametric non-nested test	329
13.4.4 Obtaining individual risk attitudes	331
13.4.5 Obtaining closeness to indifference	331
13.4.6 Simulation of decision times	332
13.5 Summary and Further Reading	333
14 Optimal Design in Binary Choice Experiments	335
14.1 Introduction	335
14.2 Rudiments of Experimental Design Theory	337
14.2.1 The principle of D-optimal design	337
14.2.2 Simple linear regression	338
14.2.3 Simple probit and simple logit	339

14.3	The Random Preference (RP) Model Revisited	341
14.4	Application of D-optimal Design Theory to a Risky Choice Experiment	344
14.5	Optimal Design in the Presence of a Tremble Parameter	345
14.6	Optimal Design for a Sample of Subjects	347
14.6.1	Choice of design used in Chapter 13	348
14.7	Summary and Further Reading	349
15	Social Preference Models	351
15.1	Introduction	351
15.2	Estimation of Preference Parameters from Dictator Game Data	352
15.2.1	The framework	352
15.2.2	The Andreoni-Miller data	352
15.2.3	Estimating the parameters of a CES utility function	357
15.3	A Model of Altruism with Binding Non-negativity Constraints	360
15.3.1	Background	360
15.3.2	The model	360
15.3.3	Estimation	363
15.3.4	Results	366
15.4	Finite Mixture Models of Altruism	367
15.4.1	The experiment	368
15.4.2	The data	368
15.4.3	A mixture model of fairness	368
15.4.4	The “fairness ideals”	370
15.4.5	The econometric model	370
15.4.6	The program and results	371
15.5	Estimation of Social Preference Parameters Using Discrete Choice Models	374
15.5.1	The setting	374
15.5.2	Formalising the criteria for choosing between allocations	375
15.5.3	Data	376
15.5.4	The conditional logit model (CLM)	376
15.5.5	Results	378
15.5.6	The effect of subject characteristics	378
15.6	Summary and Further Reading	379
16	Repeated Games and Quantal Response Models	383
16.1	Introduction	383
16.2	Analysis of Repeated Game Data	384
16.2.1	Computing a mixed strategy Nash equilibrium	384
16.2.2	Non-parametric tests on repeated game data	385
16.3	Quantal Response Equilibrium (QRE)	389
16.3.1	Theory of QRE	389
16.3.2	Computing the probabilities in the QRE model	391
16.4	Estimation of the QRE Model	392
16.5	The Risk-averse QRE Model	397

16.6 QRE Applied to Contest Data	400
16.7 Summary and Further Reading	406
17 Depth of Reasoning Models	407
17.1 Introduction	407
17.2 A Level-k Model for the Beauty Contest Game	408
17.3 The Cognitive Hierarchy Model	413
17.4 Summary and Further Reading	418
18 Learning Models	419
18.1 Introduction	419
18.2 Directional Learning (DL)	420
18.3 Data Used for Estimation of RL, BL and EWA	423
18.4 Notation Used in RL, BL and EWA	423
18.5 Reinforcement Learning (RL)	424
18.5.1 Program and results for RL	425
18.6 Belief learning (BL)	427
18.6.1 Program and results for BL	429
18.7 The Experience Weighted Attraction (EWA) Model	431
18.7.1 Introduction to EWA	431
18.7.2 Simulation of data set using EWA	432
18.7.3 Estimation of EWA Model	434
18.7.4 Results from EWA Model	436
18.8 Summary and Further Reading	439
19 Summary and Conclusion	441
19.1 Experimental Design Issues	441
19.2 Experimetrics and Theory Testing	443
19.3 Data Features	443
19.4 Experimetrics of Social Preferences	444
19.5 Risk Experimetrics	445
19.6 The Experimetrics of Games	447
19.7 Heterogeneity	448
A List of Data Files and Other Files	451
B List of STATA Commands	453
C Choice Problems Used in Chapters 5 and 13	461
References	463
Index	473

CONTENTS

<i>Foreword</i>	v
<i>Preface</i>	ix
<i>List of Contributors</i>	xiii
<i>List of Abbreviations</i>	xv
Part A Introduction	1
1. Criminalising Cartels: Why Critical Studies?	3
<i>Caron Beaton-Wells and Ariel Ezrachi</i>	
Part B The US Experience with Criminal Cartel Enforcement	25
2. Punishment for Cartel Participants in the US: A Special Model?.....	27
<i>Donald I Baker</i>	
3. Criminal Enforcement Norms in Competition Policy: Insights from US Experience.....	45
<i>William E Kovacic</i>	
Part C Experiences Outside the US with Criminal Cartel Enforcement	75
4. Redesigning a Criminal Cartel Regime: The Canadian Conversion.....	77
<i>D Martin Low QC and Casey W Halladay</i>	
5. Competition Offences in Ireland: The Regime and its Results.....	105
<i>Patrick Massey and John D Cooke</i>	
6. DOA: Can the UK Cartel Offence be Resuscitated?.....	129
<i>Julian Joshua</i>	
7. What if all Bid Riggers Went to Prison and Nobody Noticed? Criminal Antitrust Law Enforcement in Germany.....	157
<i>Florian Wagner-von Papp</i>	
8. Cartel Criminalisation and the Australian Competition and Consumer Commission: Opportunities and Challenges	183
<i>Caron Beaton-Wells</i>	
Part D EU Perspectives on Cartel Criminalisation	201
9. Criminalising Cartels in the EU: Is There a Case for Harmonisation?	203
<i>Ingeborg Simonsson</i>	

10. Criminal Cartel Enforcement in the EU: Avoiding a Human Rights Trade-Off..... <i>Peter Whelan</i>	217
Part E Testing Orthodox Assumptions Underpinning Cartel Criminalisation.....237	
11. Criminal Cartel Sanctions and Compliance: The Gap between Rhetoric and RealityChristine Parker	239
12. Am I a Price Fixer? A Behavioural Economics Analysis of Cartels..... <i>Maurice E Stucke</i>	263
13. Cartels in the Criminal Law Landscape..... <i>Rebecca Williams</i>	289
14. Cartel Offences and Non-Monetary Punishment: The Punitive Injunction as a Sanction against Corporations..... <i>Brent Fisse</i>	313
Part F Exploring the Political Economy of Cartel Criminalisation339	
15. Cartel Criminalisation as Juridification: Political and Regulatory Dangers..... <i>Stephen Wilks</i>	341
16. The Anti-Cartel Enforcement Industry: Criminological Perspectives on Cartel Criminalisation..... <i>Christopher Harding</i>	359
17. 'The Battle for Hearts and Minds': The Role of the Media in Treating Cartels as Criminal..... <i>Andreas Stephan</i>	381
Part G Future Challenges Facing Cartel Criminalisation on an International Scale395	
18. International Cartels, Concurrent Criminal Prosecutions and Extradition: Law, Practice and PolicyMichael O'Kane	397
19. Cartels as Criminal? The Long Road from Unilateral Enforcement to International Consensus..... <i>Ariel Ezrachi and Jiří Kindl</i>	419
<i>Index</i>	435