Industrial Organization

*Industrial Organization: Markets and Strategies* provides an up-to-date account of modern industrial organization that blends theory with real-world applications. Written in a clear and accessible style, it acquaints the reader with the most important models for understanding strategies chosen by firms with market power and shows how such firms adapt to different market environments. It covers a wide range of topics including recent developments on product bundling, branding strategies, restrictions in vertical supply relationships, intellectual property protection and two-sided markets, to name just a few. Models are presented in detail and the main results are summarized as lessons. Formal theory is complemented throughout by real-world cases that show students how it applies to actual organizational settings. The book is accompanied by a website containing a number of additional resources for lecturers and students, including exercises, solutions to exercises and slides.

Companion website at www.cambridge.org/belleflamme.

**Paul Belleflamme** is Professor of Economics at the Université catholique de Louvain, Belgium. He has published several articles in leading economics journals and teaches courses in the fields of industrial organization and managerial economics.

**Martin Peitz** is Professor of Economics at the University of Mannheim, Germany. He has published widely in leading economics journals and, with Paul de Bijl, is the author of *Regulation and Entry into Telecommunications Markets* (Cambridge University Press, 2003).
Contents

List of figures xi
List of tables xv
List of cases xvi
Preface xix

Part I Getting started 1

Introduction to Part I 1

1 What is Markets and Strategies? 3
1.1 Markets 3
1.2 Strategies 6
1.3 Models and material of Markets and Strategies 8
1.4 Level, scope and organization of the book 9

2 Firms, consumers and the market 13
2.1 Firms and consumers 13
2.1.1 The firm 14
2.1.2 Looking inside the black box of a firm 16
2.1.3 Consumers and rational man 21
2.1.4 Welfare analysis of market outcomes 24
2.2 Market interaction 26
2.2.1 The perfectly competitive paradigm 26
2.2.2 Strategies in a constant environment (‘monopoly’) 26
2.2.3 Dominant firm model 29
2.2.4 Imperfect competition 32
2.3 Market definition and market performance 33
2.3.1 How to define a market? 33
2.3.2 How to assess market power? 34

Notes for Part I 38
References for Part I 39

Part II Market power 41

Introduction to Part II 41

3 Static imperfect competition 45
3.1 Price competition 45
3.1.1 The standard Bertrand model 45
3.1.2 Price competition with uncertain costs 47
3.1.3 Price competition with differentiated products 49
3.1.4 Asymmetric competition with differentiated products 52
## Contents

3.2 Quantity competition 54  
3.2.1 The linear Cournot model 54  
3.2.2 Implications of Cournot competition 58  
3.3 Price versus quantity competition 59  
3.3.1 Limited capacity and price competition 60  
3.3.2 Differentiated products: Cournot versus Bertrand 64  
3.3.3 What is the appropriate modelling choice? 66  
3.4 Strategic substitutes and strategic complements 67  
3.5 Estimating market power 70  

4 Dynamic aspects of imperfect competition 75  
4.1 Sequential choice: Stackelberg 75  
4.1.1 One leader and one follower 76  
4.1.2 One leader and an endogenous number of followers 79  
4.1.3 Commitment 80  
4.2 Free entry: endogenous number of firms 81  
4.2.1 Properties of free-entry equilibria 82  
4.2.2 The Cournot model with free entry 83  
4.2.3 Price competition with free entry 85  
4.2.4 Monopolistic competition 87  
4.3 Industry concentration and firm turnover 91  
4.3.1 Exogenous versus endogenous sunk costs 91  
4.3.2 Dynamic firm entry and exit 97  

Notes for Part II 103  
References for Part II 104  

Part III Sources of market power 107  
Introduction to Part III 107  

5 Product differentiation 111  
5.1 Views on product differentiation 112  
5.2 Horizontal product differentiation 113  
5.2.1 A simple location model 113  
5.2.2 The linear Hotelling model 115  
5.2.3 The quadratic Hotelling model 118  
5.3 Vertical product differentiation 120  
5.3.1 Quality choice 120  
5.3.2 Natural oligopolies 123  
5.4 Empirical analysis of product differentiation 125  
5.4.1 Probabilistic choice and the logit model 126  
5.4.2 Empirical analysis of horizontal product differentiation 129  
5.4.3 Empirical analysis of vertical product differentiation 130  
5.4.4 Nested logit and other extensions 131

© in this web service Cambridge University Press  www.cambridge.org
## Contents

6 Advertising and related marketing strategies 135
   6.1 Views on advertising 135
   6.2 Price and non-price strategies in monopoly 139
      6.2.1 Price–Advertising decisions: the Dorfman–Steiner model 139
      6.2.2 A closer look at how advertising affects demand 141
   6.3 Some welfare economics of advertising 142
   6.4 Advertising and competition 144
      6.4.1 Informative advertising 144
      6.4.2 Persuasive advertising 149

7 Consumer inertia 157
   7.1 Uninformed consumers and search costs 157
      7.1.1 Price dispersion 158
      7.1.2 Consumer search 163
      7.1.3 Empirical investigation of price dispersion 165
   7.2 Switching costs 167
      7.2.1 Competitive effects of switching costs 167
      7.2.2 Coupons and endogenous switching costs 176
      7.2.3 Estimating switching costs 179
   7.3 Customer poaching 181

Notes for Part III 188
References for Part III 190

Part IV Pricing strategies and market segmentation 193

8 Group pricing and personalized pricing 195
   8.1 Price discrimination 195
      8.1.1 Price discrimination: a typology 195
      8.1.2 ‘Know thy customers’ 197
   8.2 Group and personalized pricing in monopoly 198
   8.3 Group and personalized pricing in oligopolies 201
      8.3.1 Group pricing and localized competition 201
      8.3.2 Personalized pricing and location decisions 207
      8.3.3 Geographic price discrimination 208

9 Menu pricing 217
   9.1 Menu pricing versus group pricing 217
   9.2 A formal analysis of monopoly menu pricing 219
      9.2.1 Quality-dependent prices 219
      9.2.2 Information goods and damaged goods 224
      9.2.3 Extension to time- and quantity-dependent prices 226
   9.3 Menu pricing under imperfect competition 227
      9.3.1 Competitive quality-based menu pricing 228
      9.3.2 Competitive quantity-based menu pricing 234
10 Intertemporal price discrimination 239
  10.1 Durable good monopoly without commitment 239
    10.1.1 Small number of consumers 240
    10.1.2 Large number of consumers 243
  10.2 Durable good monopoly with commitment 247
    10.2.1 Fixed capacities 248
    10.2.2 Flexible capacity 250
    10.2.3 Intertemporal pricing and demand uncertainty 251
  10.3 Behaviour-based price discrimination 255

11 Bundling 259
  11.1 A formal analysis of monopoly bundling 260
    11.1.1 Pure bundling as a device to offer a discount 261
    11.1.2 Mixed bundling 264
    11.1.3 Extensions 265
  11.2 Tying and metering 269
  11.3 Competitive bundling 272
    11.3.1 Bundling as a way to soften price competition 272
    11.3.2 When bundling intensifies price competition 274

Notes for Part IV 279
References for Part IV 280

Part V Product quality and information 283

12 Asymmetric information, price and advertising signals 285
  12.1 Asymmetric information problems 285
    12.1.1 Hidden information problem 285
    12.1.2 Hidden action problem 289
  12.2 Advertising and price signals 292
    12.2.1 Advertising signals 292
    12.2.2 Price signals 296
    12.2.3 Joint price and advertising signals 303
  12.3 Price signalling under imperfect competition 305

13 Marketing tools for experience goods 309
  13.1 Warranties 309
    13.1.1 Warranties as a reliability signal 310
    13.1.2 Warranties and investment in quality control 312
  13.2 Branding 314
    13.2.1 Intertemporal branding and reputation 316
    13.2.2 Reputation and competition 317
    13.2.3 Umbrella branding 320

Notes for Part V 327
References for Part V 328
## Part VI Theory of competition policy

**Introduction to Part VI**  331

### 14 Cartels and tacit collusion  335

14.1 Formation and stability of cartels  336
   - 14.1.1 Simultaneous cartel formation  337
   - 14.1.2 Sequential cartel formation  339
   - 14.1.3 Network of market-sharing agreements  341

14.2 Sustainability of tacit collusion  343
   - 14.2.1 Tacit collusion: the basics  343
   - 14.2.2 Optimal punishment of deviating firms  349
   - 14.2.3 Collusion and multimarket contact  353
   - 14.2.4 Tacit collusion and cyclical demand  358
   - 14.2.5 Tacit collusion with unobservable actions  361

14.3 Detecting and fighting collusion  363
   - 14.3.1 The difficulty in detecting collusion  365
   - 14.3.2 Leniency and whistleblowing programs  367

### 15 Horizontal mergers  373

15.1 Profitability of simple Cournot mergers  374
   - 15.1.1 Mergers between two firms  374
   - 15.1.2 Mergers between several firms  376
   - 15.1.3 Efficiency-increasing mergers  377

15.2 Welfare analysis of Cournot mergers  381
   - 15.2.1 Linear Cournot model with synergies  382
   - 15.2.2 General welfare analysis  384

15.3 Beyond simple Cournot mergers  386
   - 15.3.1 Successive mergers  387
   - 15.3.2 Mergers and entry  389
   - 15.3.3 Mergers under price competition  390
   - 15.3.4 Coordinated effects  392

15.4 Empirical merger analyses  395
   - 15.4.1 Event studies and direct price comparisons  395
   - 15.4.2 Merger simulations  395

### 16 Strategic incumbents and entry  399

16.1 Taxonomy of entry-related strategies  400
   - 16.1.1 Entry deterrence  400
   - 16.1.2 Entry accommodation  402

16.2 Strategies affecting cost variables  405
   - 16.2.1 Investment in capacity as an entry deterrent  405
   - 16.2.2 Investment as an entry deterrent reconsidered  411
   - 16.2.3 Raising rivals’ costs  412

16.3 Strategies affecting demand variables  415
   - 16.3.1 Brand proliferation  415
Contents

16.3.2 Bundling and leverage of market power 417
16.3.3 Switching costs as an entry deterrent 420
16.4 Limit pricing under incomplete information 423
16.5 Entry deterrence and multiple incumbents 427

17 Vertically related markets 433
17.1 The double-marginalization problem 433
17.1.1 Linear pricing and double marginalization 433
17.1.2 Contractual solutions to the double-marginalization problem 435
17.1.3 Double marginalization and retail services 436
17.2 Resale-price maintenance and exclusive territories 437
17.2.1 Resale-price maintenance 437
17.2.2 Exclusive territories 440
17.3 Exclusive dealing 443
17.3.1 Anticompetitive effects of exclusive dealing contracts? The Chicago critique 445
17.3.2 Vertical integration and long-term contracts as partial deterrence devices 446
17.3.3 Full exclusion and multiple buyers 450
17.3.4 Exclusive contracts and investment incentives 452
17.4 Vertical oligopoly and vertical mergers 454
17.4.1 Vertical oligopoly 455
17.4.2 Exclusionary effects of vertical mergers 457
17.4.3 Coordinated effects of vertical mergers 463
Notes for Part VI 466
References for Part VI 470

Part VII R&D and intellectual property 475
Introduction to Part VII 475

18 Innovation and R&D 479
18.1 Market structure and incentives to innovate 480
18.1.1 Monopoly versus perfect competition: the replacement effect 481
18.1.2 Incentives to innovate in oligopolies 484
18.2 When innovation affects market structure 486
18.2.1 Monopoly threatened by entry: the efficiency effect 486
18.2.2 Asymmetric patent races: replacement and efficiency effects 487
18.2.3 Socially excessive R&D in a patent race 490
18.3 R&D cooperation and spillovers 492
18.3.1 Effects of strategic behaviour 493
18.3.2 Effects of R&D cooperation 497
18.3.3 Further analysis of R&D cooperation 499

19 Intellectual property 505
19.1 Remedies to the appropriability problem 506
19.1.1 Information and appropriability 506
19.1.2 Intellectual property protection 507
# Contents

19.1.3 Subsidization and secrecy 512  
19.1.4 Protection of IP in practice 514  
19.2 Optimal patent design 517  
19.2.1 Optimal patent length 517  
19.2.2 Optimal patent breadth 520  
19.3 Patent licensing and pooling 523  
19.3.1 Licensing to rival firms 523  
19.3.2 Licensing and cumulative innovations 526  
19.4 Intellectual property in the digital economy 530  
19.4.1 Digital music and end-user piracy 530  
19.4.2 Economics of open source 533  

Notes for Part VII 540  
References for Part VII 542  

## Part VIII Networks, standards and systems 545

Introduction to Part VIII 545  

20 Markets with network goods 549  
20.1 Network effects 549  
20.1.1 Direct and indirect network effects 549  
20.1.2 Network effects and switching costs 550  
20.1.3 Empirical evidence on network effects 552  
20.2 Markets for a single network good 554  
20.2.1 Modelling the demand for a network good 554  
20.2.2 Provision of a network good 563  
20.3 Markets for several network goods 566  
20.3.1 Demand for incompatible network goods 567  
20.3.2 Oligopoly pricing and standardization 575  

21 Strategies for network goods 581  
21.1 Choosing how to compete 581  
21.1.1 A simple analysis of standardization 582  
21.1.2 A full analysis of standardization 584  
21.2 Strategies in standards wars 591  
21.2.1 Building an installed base for preemption 591  
21.2.2 Backward compatibility and performance 596  
21.2.3 Expectations management 599  
21.3 Public policy in network markets 601  
21.3.1 Ex ante interventions 601  
21.3.2 Ex post interventions 603  

Notes for Part VIII 606  
References for Part VIII 607
Part IX  Market intermediation  609
Introduction to Part IX  609

22  Markets with intermediated goods  613
22.1  Intermediaries as dealers  613
  22.1.1  Intermediated versus nonintermediated trade  614
  22.1.2  Dealer versus pure platform operator  616
22.2  Intermediaries as matchmakers  622
  22.2.1  Divide-and-conquer strategies  623
  22.2.2  Sorting by an intermediary in a matching market  625
22.3  Intermediaries as two-sided platforms  628
  22.3.1  The price structure for intermediation services  628
  22.3.2  Competing intermediaries  632
  22.3.3  Implications for antitrust and regulation  639

23  Information and reputation in intermediated product markets  647
23.1  Intermediation and information  647
  23.1.1  Information overload  647
  23.1.2  ‘Infomediaries’ and competition in search markets  650
  23.1.3  Information and recommendation networks  655
23.2  Intermediation and reputation  662
  23.2.1  Certifying intermediaries  662
  23.2.2  Reputation systems  668

Notes for Part IX  674
References for Part IX  676

Appendices  679

A  Game theory  679
A.1  Games in normal form and Nash equilibrium  679
A.2  Games in extensive form and subgame perfection  682
A.3  Static asymmetric information games and Bayesian Nash equilibrium  684
A.4  Dynamic asymmetric information games and perfect Bayesian Nash equilibrium  685

B  Competition Policy  689
B.1  A brief historical perspective  689
B.2  Competition laws  691
  B.2.1  Antitrust legislation in the United States  692
  B.2.2  Competition legislation in the European Union  693
B.3  Competition policy in the EU and in the US  694

Notes for Appendices  697
References for Appendices  698

Index  699
## Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Consumer surplus</td>
<td>25</td>
</tr>
<tr>
<td>3.1</td>
<td>Reaction functions and equilibrium in the Bertrand duopoly (with homogeneous product, and identical and constant marginal costs)</td>
<td>46</td>
</tr>
<tr>
<td>3.2</td>
<td>Residual demand for a Cournot oligopolist</td>
<td>55</td>
</tr>
<tr>
<td>3.3</td>
<td>Cournot duopoly</td>
<td>57</td>
</tr>
<tr>
<td>3.4</td>
<td>Efficient rationing with limited capacities</td>
<td>61</td>
</tr>
<tr>
<td>3.5</td>
<td>Setting $p_2 &gt; p^*$ is not a profitable deviation</td>
<td>63</td>
</tr>
<tr>
<td>3.6</td>
<td>Reaction functions for price vs. quantity competition (when firms produce substitutable goods)</td>
<td>69</td>
</tr>
<tr>
<td>4.1</td>
<td>Equilibrium number of firms in an endogenous sunk cost industry</td>
<td>95</td>
</tr>
<tr>
<td>4.2</td>
<td>The lower bound of concentration in endogenous vs. exogenous sunk cost industries</td>
<td>96</td>
</tr>
<tr>
<td>5.1</td>
<td>Consumer choice in the linear Hotelling model</td>
<td>116</td>
</tr>
<tr>
<td>5.2</td>
<td>Profit function in the linear Hotelling model</td>
<td>117</td>
</tr>
<tr>
<td>5.3</td>
<td>Profit function under vertical differentiation</td>
<td>121</td>
</tr>
<tr>
<td>5.4</td>
<td>The consumer choice problem on Internet shopbots</td>
<td>133</td>
</tr>
<tr>
<td>6.1</td>
<td>Demand with informative advertising</td>
<td>146</td>
</tr>
<tr>
<td>7.1</td>
<td>Period-2 demand in the model with customer poaching</td>
<td>183</td>
</tr>
<tr>
<td>8.1</td>
<td>Uniform pricing vs. group pricing with two segments</td>
<td>200</td>
</tr>
<tr>
<td>8.2</td>
<td>Effect of increased segmentation on the division of welfare under monopoly group pricing</td>
<td>201</td>
</tr>
<tr>
<td>8.3</td>
<td>Partition of the unit interval</td>
<td>202</td>
</tr>
<tr>
<td>8.4</td>
<td>Profits of a typical firm at stage 1</td>
<td>206</td>
</tr>
<tr>
<td>8.5</td>
<td>Firm’s profits under perfect price discrimination for given locations</td>
<td>208</td>
</tr>
<tr>
<td>8.6</td>
<td>Pricing policy choices at equilibrium</td>
<td>214</td>
</tr>
<tr>
<td>10.1</td>
<td>‘Concavified’ profit function</td>
<td>249</td>
</tr>
<tr>
<td>10.2</td>
<td>Optimal intertemporal pricing in the presence of two consumers</td>
<td>243</td>
</tr>
<tr>
<td>11.1</td>
<td>Separate selling vs. pure bundling</td>
<td>261</td>
</tr>
<tr>
<td>11.2</td>
<td>Effect of price reduction under separate selling and pure bundling</td>
<td>262</td>
</tr>
<tr>
<td>11.3</td>
<td>Consumer surplus under pure bundling vs. separate selling</td>
<td>263</td>
</tr>
<tr>
<td>11.4</td>
<td>Demand under mixed bundling</td>
<td>264</td>
</tr>
<tr>
<td>11.5</td>
<td>Separate selling vs. pure bundling with correlated values</td>
<td>267</td>
</tr>
<tr>
<td>11.6</td>
<td>Bundling an increasing number of goods</td>
<td>268</td>
</tr>
<tr>
<td>11.7</td>
<td>Bundling in a duopoly</td>
<td>273</td>
</tr>
<tr>
<td>11.8</td>
<td>Preferences for systems</td>
<td>275</td>
</tr>
<tr>
<td>12.1</td>
<td>Expected quality under asymmetric information</td>
<td>287</td>
</tr>
<tr>
<td>12.2</td>
<td>Price distortion to signal high quality</td>
<td>301</td>
</tr>
<tr>
<td>14.1</td>
<td>Stick-and-carrot strategy in the linear Cournot duopoly</td>
<td>352</td>
</tr>
<tr>
<td>15.1</td>
<td>Levels of synergies necessary for a Cournot merger to be profitable ($\Phi_p$), to enhance welfare ($\Phi_o$) or consumer surplus ($\Phi_c$)</td>
<td>383</td>
</tr>
<tr>
<td>16.1</td>
<td>Best responses in an entry model with capacity commitment</td>
<td>407</td>
</tr>
<tr>
<td>16.2</td>
<td>The incumbent’s profit function in an entry model with capacity commitment</td>
<td>407</td>
</tr>
<tr>
<td>16.3</td>
<td>Possible equilibria in an entry model with capacity commitment</td>
<td>408</td>
</tr>
<tr>
<td>16.4</td>
<td>Demand in the duopoly model with bundling by firm 1</td>
<td>418</td>
</tr>
<tr>
<td>17.1</td>
<td>A two-region model with exclusive territories</td>
<td>441</td>
</tr>
<tr>
<td>17.2</td>
<td>Exclusive dealing contracts as a barrier of entry: the incumbent seller’s profit</td>
<td>449</td>
</tr>
</tbody>
</table>
# List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1</td>
<td>Drastic and nondrastic process innovations</td>
<td>482</td>
</tr>
<tr>
<td>18.2</td>
<td>Incentives to innovate as a function of market structure</td>
<td>483</td>
</tr>
<tr>
<td>18.3</td>
<td>Strategic effect of R&amp;D investments</td>
<td>495</td>
</tr>
<tr>
<td>19.1</td>
<td>Trade-off between dynamic and static efficiency</td>
<td>509</td>
</tr>
<tr>
<td>20.1</td>
<td>A simple star network</td>
<td>555</td>
</tr>
<tr>
<td>20.2</td>
<td>Fulfilled expectations demand when consumers value network benefits differently</td>
<td>560</td>
</tr>
<tr>
<td>20.3</td>
<td>Fulfilled expectations demand when consumers value stand-alone benefits differently</td>
<td>562</td>
</tr>
<tr>
<td>20.4</td>
<td>Network provision under monopoly and perfect competition</td>
<td>565</td>
</tr>
<tr>
<td>20.5</td>
<td>Technology adoption with network effects</td>
<td>569</td>
</tr>
<tr>
<td>20.6</td>
<td>Potential coordination failures in the adoption of incompatible network goods</td>
<td>570</td>
</tr>
<tr>
<td>20.7</td>
<td>Symmetric bandwagon equilibrium</td>
<td>574</td>
</tr>
<tr>
<td>21.1</td>
<td>Nash equilibria (NE) in the standardization game</td>
<td>587</td>
</tr>
<tr>
<td>21.2</td>
<td>Entry deterrence through installed base building (c = 0.4)</td>
<td>593</td>
</tr>
<tr>
<td>22.1</td>
<td>Intermediaries’ business models: dealer and platform operator</td>
<td>617</td>
</tr>
<tr>
<td>22.2</td>
<td>Equilibrium trade under dealer and platform intermediation</td>
<td>621</td>
</tr>
<tr>
<td>23.1</td>
<td>Information overload on an open access platform</td>
<td>649</td>
</tr>
<tr>
<td>23.2</td>
<td>Information overload and the role of an information gatekeeper</td>
<td>650</td>
</tr>
<tr>
<td>23.3</td>
<td>Product choice of a single consumer</td>
<td>659</td>
</tr>
<tr>
<td>A.1</td>
<td>Extensive form of the simplified Stackelberg model</td>
<td>683</td>
</tr>
</tbody>
</table>
Tables

2.1 Herfindahl indices in the US manufacturing sector ............................ page 36
6.1 Informative advertising in the Yoplait 150 case .............................. 138
6.2 Advertising for the top 10 US marketers ........................................ 140
16.1 Payoffs in the brand proliferation game ........................................ 417
16.2 Payoffs in the noncooperative entry deterrence game ...................... 427
18.1 Expected profits in a patent race .................................................. 491
19.1 Comparative overview of patent and copyright protection in the EU and in the US ...................................................... 510
20.1 Consumers’ utility ........................................................................ 567
20.2 A typical coordination game .......................................................... 570
20.3 Outcomes when opponent plays a bandwagon strategy .................. 573
21.1 A simple standardization game ...................................................... 582
21.2 Payoffs in standardization game – Scenario 1 ................................. 586
21.3 Payoffs in standardization game – Scenario 2 ................................. 590
21.4 Installed base and penetration pricing ............................................ 593
23.1 Expected utility according to signal and match ............................... 658
Cases

1.1 Alcoa’s natural monopoly
2.1 The market for generics
2.2 Using supply-side substitutability to define the relevant market
2.3 How concentration differs across industries and over time
3.1 Bananas and oranges
3.2 Airbus vs. Boeing and the market for wide-bodied aircrafts
3.3 When capacity choices condition pricing decisions in the DVD-by-mail industry
3.4 Digital revolution in the publishing industry
4.1 Entry in small cities in the US
4.2 Socially excessive entry of radio stations in the US
4.3 Endogenous sunk costs for supermarkets in the US
4.4 Entry and exit of hair salons in Sweden
5.1 Coffee differentiation
5.2 Product positioning in the VLJ industry: the ‘battle of bathrooms’
5.3 Probabilistic modelling of individual behaviour and Apple’s iPhone
5.4 Nested logit in the US car market
5.5 Nested logit for Internet bookshops: brand matters
6.1 US 2006 media spending on advertising
6.2 Yoplait 150
6.3 Advertising Heinz ketchup
6.4 Joint advertising campaign to promote private healthcare
7.1 Does search intensity affect price dispersion?
7.2 Examples of switching costs
7.3 Coupons in the ready-to-eat breakfast cereals market
7.4 Direct econometric methods to estimate switching costs in the market for mobile telephony
7.5 Pay-to-switch in the business automation software market
8.1 Price discrimination in airline fares
8.2 Data mining
8.3 International price discrimination in airline fares
8.4 International price discrimination in the car market
8.5 Pricing by supermarkets in the United Kingdom
9.1 Examples of menu pricing in the information economy
9.2 Geographical pricing by low cost carriers
9.3 Damaged goods and fighting brands
9.4 Empirical studies of price discrimination
9.5 Add-on pricing
10.1 Durable good monopoly and the Microsoft case
10.2 Planned obsolescence of textbooks
10.3 Zara and the clothing industry
11.1 Examples of bundling in the information economy
11.2 Why does popcorn cost so much at the movies?
11.3 Triple play
12.1 Why did prices plunge on the Mumbai second-hand car market after July 2005?
12.2 Adverse selection in the second-hand car market
12.3 Selling used products over eBay
List of cases

12.4 Quality management systems
12.5 Empirical examination of advertising as a signal of quality
12.6 When low quality poses as high quality
12.7 Price signalling for Bordeaux wines
13.1 Warranties in the market for new cars
13.2 The birth of brands in the Indus valley
13.3 Twin cars and brand names
13.4 Virtues of the Virgin brand
13.5 Umbrella branding in the market of oral hygiene products
14.1 The vitamin cartels
14.2 The vitamin cartels (2)
14.3 Multimarket contact in the US airline industry
14.4 Market-sharing agreements in Europe and the US
14.5 The vitamin cartels (3)
14.6 The Joint Executive Committee
14.7 The vitamin cartels (4)
14.8 The beer cartel in the Netherlands
15.1 Mergers and acquisitions in Europe
15.2 The ‘efficiency defence’ in the Superior Propane case
15.3 Potential consolidation in the US airline industry
15.4 Coordinated effects in the Nestlé Perrier merger
15.5 Merger simulation in mobile telephony in Portugal
15.6 The proposed merger between the European truck manufacturers Volvo and Scania
16.1 Kodak vs. Fuji – Act I
16.2 Entry deterrence in hospital procedure markets
16.3 Regulatory entry deterrence in the professions
16.4 Entry deterrence in the ready-to-eat cereal industry
16.5 The European Microsoft case
16.6 Kodak vs. Fuji – Act II
16.7 Entry deterrence in the airline industry: the threat by Southwest Airlines
16.8 Kodak vs. Fuji – Act III
17.1 Double marginalization in US cable TV
17.2 RPM for German books in Germany
17.3 Exclusive territories in European car dealerships
17.4 Beer distribution in Chicago
17.5 Selling spices in Belgium
17.6 Spontaneous ice cream purchases in Germany
17.7 Vertical merger in the US shoe industry
17.8 Vertical integration in cements and ready-mixed industries in the US
18.1 Microsoft’s incentives to innovate
18.2 The race for cleaner cars
18.3 Antitrust provisions related to R&D cooperation
18.4 Research joint ventures and collusion
19.1 Should software be protected by patents or by copyright?
19.2 The ‘H-Prize’
19.3 Patents in the pharmaceutical sector
19.4 Patent indicators
19.5 Arguments against the extension of copyright terms in the US
# List of cases

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.6</td>
<td>MercExchange vs. eBay: a fatal blow to patent trolls?</td>
<td>527</td>
</tr>
<tr>
<td>19.7</td>
<td>Why share IP?</td>
<td>535</td>
</tr>
<tr>
<td>20.1</td>
<td>Network effects: cause or consequence of switching costs?</td>
<td>551</td>
</tr>
<tr>
<td>20.2</td>
<td>Empirical evidence on network effects in software markets</td>
<td>552</td>
</tr>
<tr>
<td>20.3</td>
<td>Empirical evidence on network effects in systems markets using the nested logit approach</td>
<td>553</td>
</tr>
<tr>
<td>20.4</td>
<td>Heterogeneous adopters for network goods</td>
<td>558</td>
</tr>
<tr>
<td>20.5</td>
<td>The failure of quadraphonic sound</td>
<td>572</td>
</tr>
<tr>
<td>20.6</td>
<td>Compatibility, incompatibility and partial compatibility in telephony</td>
<td>576</td>
</tr>
<tr>
<td>20.7</td>
<td>Trying to build a wall to protect the bricks</td>
<td>579</td>
</tr>
<tr>
<td>21.1</td>
<td>Standard battle for high-definition DVDs</td>
<td>583</td>
</tr>
<tr>
<td>21.2</td>
<td>VirginMega wants Apple to open its FairPlay DRM</td>
<td>583</td>
</tr>
<tr>
<td>21.3</td>
<td>(In)compatibility and excess inertia in the diffusion of PCs and of mobile telephony</td>
<td>589</td>
</tr>
<tr>
<td>21.4</td>
<td>Commitment in the VCR standards war</td>
<td>596</td>
</tr>
<tr>
<td>21.5</td>
<td>Making Drupal backward compatible or not?</td>
<td>597</td>
</tr>
<tr>
<td>21.6</td>
<td>Expectations management in the high-definition DVDs arena</td>
<td>599</td>
</tr>
<tr>
<td>21.7</td>
<td>Novell sues over ‘cereal box’ ad campaign</td>
<td>600</td>
</tr>
<tr>
<td>21.8</td>
<td>EU’s inquiries in network markets</td>
<td>604</td>
</tr>
<tr>
<td>22.1</td>
<td>Dealers and platform operators in the digital economy</td>
<td>617</td>
</tr>
<tr>
<td>22.2</td>
<td>The ‘no surcharge rule’ in the credit card industry</td>
<td>629</td>
</tr>
<tr>
<td>22.3</td>
<td>Pricing access to night clubs</td>
<td>631</td>
</tr>
<tr>
<td>22.4</td>
<td>Singlehoming environments</td>
<td>633</td>
</tr>
<tr>
<td>22.5</td>
<td>Multihoming environments</td>
<td>637</td>
</tr>
<tr>
<td>22.6</td>
<td>Market definition for satellite radio services</td>
<td>640</td>
</tr>
<tr>
<td>22.7</td>
<td>Exclusive contracting in the videogame industry</td>
<td>642</td>
</tr>
<tr>
<td>22.8</td>
<td>The Travelport/Worldspan EC case</td>
<td>644</td>
</tr>
<tr>
<td>22.9</td>
<td>The waterbed effect in mobile telephony</td>
<td>645</td>
</tr>
<tr>
<td>23.1</td>
<td>Black Friday ads websites</td>
<td>655</td>
</tr>
<tr>
<td>23.2</td>
<td>Book reviews on Amazon and Barnes &amp; Noble in the US</td>
<td>656</td>
</tr>
<tr>
<td>23.3</td>
<td>Copurchase links on Amazon.com and the long tail</td>
<td>661</td>
</tr>
<tr>
<td>23.4</td>
<td>Quality certification by UK tour operators</td>
<td>665</td>
</tr>
<tr>
<td>23.5</td>
<td>Reputation on Amazon Marketplace</td>
<td>668</td>
</tr>
<tr>
<td>23.6</td>
<td>Reputation on eBay</td>
<td>672</td>
</tr>
<tr>
<td>B.1</td>
<td>Virgin/British Airways cases</td>
<td>694</td>
</tr>
</tbody>
</table>
Preface

A large part of economic transactions takes place through markets. On these markets, firms take decisions in response to prevailing market conditions that affect the well-being of market participants. Such decisions are relevant to the field of Industrial Organization (IO) and their analysis lies at the heart of this book. Industrial Organization: Markets and Strategies indeed aims at presenting the role of imperfectly competitive markets for private and social decisions.

Among the numerous decisions taken by firms is the make-or-buy decision, whereby firms compare the costs and benefits of manufacturing a product or service against purchasing it. Typically, the firm will prefer the ‘make’ option over the ‘buy’ option if the purchase price is higher than the in-house manufacturing cost or if outside suppliers are unreliable. Naturally, the firm must also have the necessary skills and equipment to meet its own product standards.

There is a clear analogy between this generic dilemma and the decision process that led us to write this book. As industrial organization teachers since the start of our academic careers, we have both long relied on existing textbooks to support our courses. Yet, through the years, our needs became different from the offers of outside suppliers. That is, the ‘make’ option started to become more tempting than the ‘buy’ option.

At the end of 2004 we firmly took our decision to ‘make’ a new textbook. At that time (and this still holds today), we could not find on the market any textbook in industrial organization that suited the type of courses at the advanced undergraduate or master level we were teaching. We knew that many of our colleagues shared our views. Our objective was thus to produce a new text that would greatly simplify the work of teachers who, thus far, had to combine material from different books and look for applications to meet their students’ needs. Naturally, benefits to teachers are meant to spill over to their students. Although we believe in formal modelling, we also believe that it is important not to overload students with techniques and to motivate the analysis with real-world cases. So, we endeavoured to write a book that blends up-to-date theoretical developments and real-life applications.

The concretization of our efforts currently lies in your hands. To convince you that the best option for you is the ‘buy’ decision, we propose three main reasons for which Industrial Organization: Markets and Strategies is your choice.

- We have produced a book that is easy to read, while maintaining a high level of rigour and conciseness. We intend to be exact and clearly state assumptions and results. As a consequence, you will be able to see easily where a new model starts, what are its assumptions and results, and what are the arguments that lead to those results.

- Our book covers a wide range of topics as it includes recent developments in the IO literature, as well as topical issues (related, e.g., to the digital economy).

- Many of the arguments made in IO theory are arguments at the margin; to formalize them we cannot rely on ‘calculus-free theory’. Hence, we present and analyse

As it took us four years to complete the redaction of this book, we can provide proof that we largely underestimated the costs of this ‘make’ decision. Firms, as analysed in this book, are not subject to such a bias.
simple and hopefully elegant models. We summarize the main results as lessons. We also illustrate the relevance of these models by relating them to real-world cases.

The targeted audience of the book is advanced Bachelor or Master students taking a course in industrial organization. The book is also a useful reference for an IO course at the Ph.D. level as well as for an advanced course for Business School teaching. In any case, to learn effectively from this book, students need to have a course of intermediate microeconomics or business economics in their academic background. Note that selected chapters of the book can also serve as support for courses in business and managerial economics, in management strategy, in strategic pricing, in economics of innovation, in the theory of competition policy or in oligopoly theory. It is also possible to focus on topics and cases to outline a course of industrial organization in the digital economy.

The specific features of the book help to address a number of learning challenges usually faced by industrial organization students.

• **Students often struggle to connect theory with practice.** The integration of real-world cases in the text, showing how theories relate to real applications, greatly reduces this problem. In addition, this helps students to understand better the relevance of topics.

• **Students often struggle to understand the working of models.** To address this issue, we carefully develop the models we present and we make their assumptions explicit. We want students to see models at work and we make sure that they do not spend their time uncovering hidden calculus.

• **Students may be overwhelmed by a large variety of models and lose track.** To avoid or, at least, reduce this risk, we have introduced a large number of lessons that guide the reader through the book and summarize the main insights of the analysis.

• **Students may become bored by constructed examples.** As a consequence, we draw many real-world cases from industries that students consider to be important, notably in consumer goods industries and in the digital economy. This makes students more involved and curious about how to address additional issues that appear in the cases.

• **Students often have trouble relating different topics with one another.** The book is carefully organized to make sure that students do not ‘close’ a topic (and forget its analysis) when moving to the next one. Each part of the book contains several chapters covering related topics and starts with a general introduction that gives a bird’s-eye view of the part material and explains the links between the various chapters. Multiple cross-references between chapters are made throughout the text. As a result, students should acquire a deeper and more transversal understanding of the various issues of industrial organization.

• **The needs of different types of students may be in conflict.** In particular, students who want to dig deeper may have problems finding the right material, while those who simply want to read the textbook may be distracted by many references in the text or in footnotes. To solve this dilemma, we minimize the number of footnotes and provide access to the relevant literature through endnotes. Moreover, the
bibliography is sorted by the parts in which the respective work is cited. Hence, the book adequately combines access to the scientific literature for those who need it, and uninterrupted reading for those who do not.

A number of supplementary resources accompany the book and help instructors teach and students learn. Exercises are posted on the textbook website. Solutions to these exercises are made available to instructors. Additional exercises can be uploaded by other researchers. On the website also slides are posted. These come in two different sets (two files per chapter). The first set provides a quick overview on the different topics. Instructors can use this set to motivate a particular topic, establish key insights, provide some intuition, and some reality check. The second set presents the most important models in-depth. Each instructor can make his or her preferred blend from the slides provided by the authors.

Students at Barcelona, Frankfurt, Liège, Louvain, Luxembourg, Manchester, Mannheim and Munich (from the advanced undergraduate to the Ph.D. level) have seen parts of this book at various stages of completion. We thank them for their feedback. Several people – colleagues and students – dedicated their precious time reading parts of this book and helped us to make this book a reality with comments and suggestions on previous drafts and exercises for the textbook website. At the risk of forgetting some of them, we want to mention Francesca Barigozzi (Bologna), Giuseppe De Feo (Glasgow), Estelle Derclaye (Nottingham), Vincenzo Denicolo (Bologna), Roman Inderst (Frankfurt), Heiko Karle (Brussels), Johannes Koenen (Mannheim), Florian Köpke (Mannheim), Christian Lambertz (Mannheim), Marco Marinucci (Louvain), Yann Ménière (Paris), Jeanine Miklós-Thal (Rochester), Volker Nocke (Mannheim), Pierre M. Picard (Luxembourg), Thomas Roende (Copenhagen), Isabel Ruhmer (Mannheim), Markus Reisinger (Munich), Maarten Pieter Schinkel (Amsterdam), Yossi Spiegel (Tel Aviv), Cecilia Vergari (Bologna), Georg von Graevenitz (Munich) and Xavier Wauthy (Brussels). We should add to this list the various anonymous referees who conscientiously reviewed and commented initial drafts of several chapters. We want to thank them all for their contributions, support and encouragement. Over the whole period, Chris Harrison from Cambridge University Press was supportive and, perhaps due to our incomplete information disclosure about the progress of the book, optimistic that this book project will come to a happy end. We kept going because we could not disappoint him after all these years. We thank the team at Cambridge University Press for their dedication to produce this book.