Industrial Organization

Thoroughly revised according to classroom feedback, *Industrial Organization: Markets and Strategies* offers an up-to-date and rigorous presentation of modern industrial organization that blends theory with real-world applications and derives implications for firm strategy and competition policy. This comprehensive textbook acquaints readers with the most important models for understanding strategies chosen by firms with market power and shows how such firms adapt to different market environments. The second edition includes new and revised formal models and case studies. Formal models are presented in detail, and analyses are summarized in ‘lessons’, which highlight the main insights. Theories are complemented by numerous real-world cases that engage students and lead them to connect theories to real situations. Chapters include review questions, exercises and suggestions for further reading to enhance the learning experience, and an accompanying website offers additional student exercises, as well as teaching slides.

Online resources at www.cambridge.org/belleflamme2

**Paul Belleflamme** is Professor of Economics at the Université Catholique de Louvain, Belgium. He regularly publishes articles in leading economics journals on various topics related to industrial organization, with a special focus on innovation in the digital economy (which is also the main topic of his blog, www.IPdigIT.eu).

**Martin Peitz** is Professor of Economics at the University of Mannheim, Germany, a director of the Mannheim Centre for Competition and Regulation (MaCCI), Germany and an academic director of the Centre on Regulation in Europe (CERRE), Belgium. He has published widely in leading economics journals and, with Paul de Bijl, is author of the book *Regulation and Entry into Telecommunications Markets* (Cambridge University Press, 2003). His research focuses on theoretical industrial organization.
‘The second edition of Paul Belleflamme and Martin Peitz’s *Industrial Organization: Markets and Strategies* is encyclopedic in its coverage of modern industrial organization, including both seminal and new models. The authors present models with exactly the right level of formal detail to equip students and practitioners with what they need to understand a plethora of issues ranging from two-sided markets to price discrimination. I commend the authors for doing the impossible – improving their initial gem.’

**Michael Baye, Bert Elwert Professor of Business Economics, Kelley School of Business, Indiana University**

‘Industrial economists have been blessed with some significant texts over the centuries. However, until Belleflamme and Peitz, no one had attempted to cover it all. *Industrial Organization: Markets and Strategies* does that. It is all here. From monopoly to competition, from simple pricing to pricing with menus, from bundling to innovation. There is no topic left untouched. It is a must-have for teachers and students alike.’

**Joshua Gans, Professor of Strategic Management and Skoll Chair in Innovation and Entrepreneurship, Rotman School of Management, University of Toronto**

‘This second edition of Belleflamme and Peitz is a strong revision of what has emerged as the “go-to” book for those teaching industrial organization to advanced students. Moreover, it is a useful reference and resource for scholars. It deserves space on the bookshelves of all industrial organization economists.’

**Benjamin E. Hermalin, University of California, Berkeley**

‘Paul Belleflamme and Martin Peitz’s *Industrial Organization: Markets and Strategies* offers a fully up-to-date treatment of modern industrial organization, including recent work on intellectual property, new forms of price discrimination, competition policy and two-sided markets. Theoretically inclined, clearly written, and mathematically accessible to a wide audience (including advanced undergraduates), it usefully provides motivation through short business-strategy or competition-policy cases. A tour de force and a must-read for students, researchers and practitioners of the field.’

**Jean Tirole, Toulouse School of Economics, 2014 Nobel Laureate in Economic Sciences**

‘The revised version of the book provides an up-to-date treatment of the main topics in Industrial Organization analysis, including the advances of recent research as well as exercises. The authors take a theoretical perspective which is contrasted with a wealth of real-world cases and the analysis of issues relevant for the information economy, such as bundling, intellectual property and two-sided markets.’

**Xavier Vives, Professor of Economics, IESE Business School**
Contents

List of figures xiii
List of tables xv
List of cases xvi
Preface to the second edition xxi
Preface from the first edition xxiii

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’) 27
2.2.3 Dominant firm model 29
2.2.4 Imperfect competition 33
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

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 50
3.1.4 Asymmetric competition with differentiated products 53
3.2 Quantity competition 54
## Contents

3.2.1 The linear Cournot model  54  
3.2.2 Implications of Cournot competition  58  
3.3 Price vs. quantity competition  60  
3.3.1 Limited capacity and price competition  60  
3.3.2 Differentiated products: Cournot vs. Bertrand  65  
3.3.3 What is the appropriate modelling choice?  67  
3.4 Strategic substitutes and strategic complements  68  
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 Welfare properties of the Cournot model with free entry  83  
4.2.3 Welfare properties of price competition with free entry  86  
4.2.4 Welfare properties of monopolistic competition  88  
4.3 Industry concentration and firm turnover  91  
4.3.1 Exogenous vs. endogenous sunk costs  91  
4.3.2 Dynamic firm entry and exit  97  

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  114  
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  124  
5.4 Empirical analysis of product differentiation  126  
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  131  
5.4.4 Nested logit and other extensions  132  

6 Advertising and related marketing strategies  138  
6.1 Views on advertising  138  
6.2 Price and non-price strategies in monopoly  142
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2.1 Price–advertising decisions: Dorfman–Steiner model</td>
<td>142</td>
</tr>
<tr>
<td>6.2.2 A closer look at how advertising affects demand</td>
<td>144</td>
</tr>
<tr>
<td>6.3 Some welfare economics of advertising</td>
<td>145</td>
</tr>
<tr>
<td>6.4 Advertising and competition</td>
<td>148</td>
</tr>
<tr>
<td>6.4.1 Informative advertising</td>
<td>148</td>
</tr>
<tr>
<td>6.4.2 Persuasive advertising</td>
<td>153</td>
</tr>
<tr>
<td>7 Consumer inertia</td>
<td>162</td>
</tr>
<tr>
<td>7.1 Uninformed consumers and search costs</td>
<td>162</td>
</tr>
<tr>
<td>7.1.1 Price dispersion</td>
<td>163</td>
</tr>
<tr>
<td>7.1.2 Consumer search with homogeneous products</td>
<td>167</td>
</tr>
<tr>
<td>7.1.3 Empirical investigation of price dispersion</td>
<td>170</td>
</tr>
<tr>
<td>7.1.4 Sequential search and differentiated products</td>
<td>171</td>
</tr>
<tr>
<td>7.2 Switching costs</td>
<td>174</td>
</tr>
<tr>
<td>7.2.1 Competitive effects of switching costs</td>
<td>175</td>
</tr>
<tr>
<td>7.2.2 Coupons and endogenous switching costs</td>
<td>184</td>
</tr>
<tr>
<td>7.2.3 Estimating switching costs</td>
<td>187</td>
</tr>
<tr>
<td>7.2.1 Competitive effects of switching costs</td>
<td>175</td>
</tr>
<tr>
<td>7.2.2 Coupons and endogenous switching costs</td>
<td>184</td>
</tr>
<tr>
<td>7.2.3 Estimating switching costs</td>
<td>187</td>
</tr>
<tr>
<td>References for Part III</td>
<td>192</td>
</tr>
</tbody>
</table>

**Part IV Pricing strategies and market segmentation** 195

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Part IV</td>
<td>195</td>
</tr>
<tr>
<td>8 Group pricing and personalized pricing</td>
<td>197</td>
</tr>
<tr>
<td>8.1 Price discrimination</td>
<td>197</td>
</tr>
<tr>
<td>8.1.1 Price discrimination: a typology</td>
<td>197</td>
</tr>
<tr>
<td>8.1.2 ‘Know thy customers’</td>
<td>199</td>
</tr>
<tr>
<td>8.2 Group and personalized pricing in monopolies</td>
<td>200</td>
</tr>
<tr>
<td>8.3 Group and personalized pricing in oligopolies</td>
<td>204</td>
</tr>
<tr>
<td>8.3.1 Group pricing and localized competition</td>
<td>204</td>
</tr>
<tr>
<td>8.3.2 Personalized pricing and location decisions</td>
<td>208</td>
</tr>
<tr>
<td>8.3.3 Geographic price discrimination</td>
<td>209</td>
</tr>
<tr>
<td>9 Menu pricing</td>
<td>220</td>
</tr>
<tr>
<td>9.1 Menu pricing vs. group pricing</td>
<td>220</td>
</tr>
<tr>
<td>9.2 A formal analysis of monopoly menu pricing</td>
<td>222</td>
</tr>
<tr>
<td>9.2.1 Quality-dependent prices</td>
<td>222</td>
</tr>
<tr>
<td>9.2.2 Information goods and damaged goods</td>
<td>227</td>
</tr>
<tr>
<td>9.2.3 Extension to time- and quantity-dependent prices</td>
<td>229</td>
</tr>
<tr>
<td>9.3 Menu pricing under imperfect competition</td>
<td>230</td>
</tr>
<tr>
<td>9.3.1 Competitive quality-based menu pricing</td>
<td>231</td>
</tr>
<tr>
<td>9.3.2 Competitive quantity-based menu pricing</td>
<td>236</td>
</tr>
<tr>
<td>10 Intertemporal price discrimination</td>
<td>243</td>
</tr>
<tr>
<td>10.1 Durable-good monopoly without commitment</td>
<td>243</td>
</tr>
<tr>
<td>10.1.1 Small number of consumers</td>
<td>244</td>
</tr>
</tbody>
</table>
Contents

10.1.2 Large number of consumers 247
10.2 Durable-good monopoly with commitment 251
10.2.1 Fixed capacity 252
10.2.2 Flexible capacity 254
10.2.3 Intertemporal pricing and demand uncertainty 255
10.3 Behaviour-based price discrimination 259
10.3.1 Behaviour-based price discrimination by a monopolist 259
10.3.2 Customer poaching 261

11 Bundling 270
11.1 A formal analysis of monopoly bundling 271
11.1.1 Pure bundling as a device to offer a discount 272
11.1.2 Mixed bundling 275
11.1.3 Extensions 276
11.2 Tying and metering 281
11.3 Competitive bundling 283
11.3.1 Bundling as a way to soften price competition 284
11.3.2 When bundling intensifies price competition 286
References for Part IV 293

Part V Product quality and information 295
Introduction to Part V 295

12 Asymmetric information, price and advertising signals 297
12.1 Asymmetric information problems 297
12.1.1 Hidden information problem 297
12.1.2 Hidden action problem 301
12.2 Advertising and price signals 304
12.2.1 Advertising signals 304
12.2.2 Price signals 308
12.2.3 Joint price and advertising signals 314
12.3 Price signalling under imperfect competition 317

13 Marketing tools for experience goods 323
13.1 Warranties 323
13.1.1 Warranties as a reliability signal 324
13.1.2 Warranties and investment in quality control 326
13.2 Branding 328
13.2.1 Intertemporal branding and reputation 330
13.2.2 Reputation and competition 331
13.2.3 Umbrella branding 335
References for Part V 343

Part VI Theory of competition policy 345
Introduction to Part VI 345

References for Part VI 349
Contents ix

14 Cartels and tacit collusion 349
  14.1 Formation and stability of cartels 349
    14.1.1 Simultaneous cartel formation 351
    14.1.2 Sequential cartel formation 354
    14.1.3 Network of market-sharing agreements 355
  14.2 Sustainability of tacit collusion 357
    14.2.1 Tacit collusion: the basics 358
    14.2.2 Optimal punishment of deviating firms 363
    14.2.3 Collusion and multimarket contact 367
    14.2.4 Tacit collusion and cyclical demand 372
    14.2.5 Tacit collusion with unobservable actions 375
  14.3 Detecting and fighting collusion 378
    14.3.1 The difficulty in detecting collusion 379
    14.3.2 Leniency and whistleblowing programmes 382

15 Horizontal mergers 389
  15.1 Profitability of simple Cournot mergers 390
    15.1.1 Mergers between two firms 390
    15.1.2 Mergers between several firms 392
    15.1.3 Efficiency-increasing mergers 393
  15.2 Welfare analysis of Cournot mergers 397
    15.2.1 Linear Cournot model with synergies 398
    15.2.2 General welfare analysis 399
  15.3 Beyond simple Cournot mergers 402
    15.3.1 Successive mergers 402
    15.3.2 Mergers and entry 405
    15.3.3 Mergers under price competition 406
    15.3.4 Coordinated effects 408
  15.4 Empirical merger analyses 411
    15.4.1 Event studies and direct price comparisons 411
    15.4.2 Merger simulations 411

16 Strategic incumbents and entry 417
  16.1 Taxonomy of entry-related strategies 418
    16.1.1 Entry deterrence 418
    16.1.2 Entry accommodation 420
  16.2 Strategies affecting cost variables 423
    16.2.1 Investment in capacity as an entry deterrent 423
    16.2.2 Investment as an entry deterrent reconsidered 430
    16.2.3 Raising rivals’ costs 431
  16.3 Strategies affecting demand variables 433
    16.3.1 Brand proliferation 434
    16.3.2 Bundling and leverage of market power 436
    16.3.3 Switching costs as an entry deterrent 439
x  Contents

16.4 Limit pricing under incomplete information 442
16.5 Entry deterrence and multiple incumbents 446

17 Vertically related markets 452
17.1 The double-marginalization problem 452
17.1.1 Linear pricing and double marginalization 452
17.1.2 Contractual solutions to the double-marginalization problem 454
17.1.3 Double marginalization and retail services 455
17.2 Resale-price maintenance and exclusive territories 456
17.2.1 Resale-price maintenance 456
17.2.2 Exclusive territories 459
17.3 Exclusive dealing 462
17.3.1 Anticompetitive effects of exclusive dealing contracts? The Chicago critique 464
17.3.2 Vertical integration and long-term contracts as partial deterrence devices 465
17.3.3 Full exclusion and multiple buyers 469
17.3.4 Vertical foreclosure and secret contracts 471
17.3.5 Exclusive contracts and investment incentives 473
17.4 Vertical oligopoly and vertical mergers 476
17.4.1 Vertical oligopoly 476
17.4.2 Exclusionary effects of vertical mergers 479
17.4.3 Coordinated effects of vertical mergers 485

References for Part VI 490

Part VII R&D and intellectual property 495
Introduction to Part VII 495

18 Innovation and R&D 497
18.1 Market structure and incentives to innovate 498
18.1.1 Monopoly vs. perfect competition: the replacement effect 500
18.1.2 Incentives to innovate in oligopolies 502
18.1.3 Patent licensing 504
18.1.4 Licensing by an outside innovator 504
18.1.5 Licensing by an inside innovator 507
18.2 When innovation affects market structure 510
18.2.1 Monopoly threatened by entry: the efficiency effect 510
18.2.2 Asymmetric patent races: replacement and efficiency effects 512
18.2.3 Socially excessive R&D in a patent race 515
18.3 R&D cooperation and spillovers 517
18.3.1 Effects of strategic behaviour 519
18.3.2 Effects of R&D cooperation 521
18.3.3 Further analysis of R&D cooperation 524

19 Intellectual property 531
19.1 Innovation and IP: basics 532
19.1.1 Information and appropriability 532