Internet and Digital Economics
Principles, Methods and Applications

How are our societies being transformed by Internet and digital economics? This book provides an accessible introduction to the economics of the Internet and a comprehensive account of the mechanisms of the digital economy. Leading scholars examine the original economic and business models being developed as a result of the Internet system, and explore their impact on our economies and societies. Key issues are analyzed, including the development of open source software and online communities, peer-to-peer and online sharing of cultural goods, electronic markets and the rise of new information intermediaries, e-retailing and e-banking. The volume examines how Internet and digital economics have transformed the organization of firms, industries, markets, commerce, modes of distribution, money, finance, and innovation processes, and provides the analytical tools to understand both these recent transformations and the likely future directions of the “New Economy.”

ERIC BROUSSEAU is Professor of Economics at the University of Paris X.

NICOLAS CURIEN serves as Commissioner for the French Regulation Commission for Electronic Communications and Postal Services (ARCEP). He is also Professor of Economics at the Conservatoire National des Arts et Métiers, Paris.
Internet and Digital Economics

edited by

Eric Brousseau and Nicolas Curien
To Delphine
Contents

List of figures  page x
List of tables  xiii
Notes on contributors  xiv
Acknowledgements  xxv

1 Internet economics, digital economics
   ERIC BROUSSEAU AND NICOLAS CURIEN  1

Part I Toward a new economy?

2 Evolution of the new economy business model
   WILLIAM LAZONICK  59

3 Discourse on the new economy – passing fad or mobilizing ideology?
   PATRICE FLICHY  114

4 The Internet boom in a corporate finance retrospective
   ULRICH HEGE AND SÉBASTIEN MICHENAUD  142

Part II On-line communities

5 Information goods and online communities
   MICHEL GENSOLLEN  173

6 Online consumer communities: escaping the tragedy of the digital commons
   NICOLAS CURIEN, EMMANUELLE FAUCHART, GILBERT LAFFOND AND FRANÇOIS MOREAU  201

7 Network cooperation and incentives within online communities
   GODFROY DANG NGUYEN AND THIERRY PÈNARD  220
Contents

Part III Network externalities and market microstructures 237

8 The Internet and network economics
NICHOLAS ECONOMIDES 239

9 E-commerce, two-sided markets and info-mediation
ALEX GAUDEUL AND BRUNO JULLIEN 268

10 The economics and business models of prescription in the Internet
PIERRE-JEAN BENGHOZI AND THOMAS PARIS 291

Part IV Producing, distributing and sharing information goods 311

11 Bundling and competition on the Internet
YANNIS BAKOS AND ERIK BRYNJOLFSSON 313

12 Pricing information goods: free vs. pay content
MARC BOURREAU AND VIRGINIE LETHIAIS 345

13 Open software: knowledge openness and cooperation in cyberspace
DOMINIQUE FORAY, SYLVIE THORON AND JEAN-BENOIT ZIMMERMANN 368

14 Simulating code growth in Libre (open source) mode
JEAN-MICHEL DALLE AND PAUL A. DAVID 391

Part V How e-markets perform 423

15 Economic insights from Internet auctions
PATRICK BAJARI AND ALI HORTAŞCU 425

16 Consumer search and pricing behavior in Internet markets
MAARTEN C. W. JANSSEN, JOSÉ LUIS MORAGA-GONZÁLEZ AND MATTHIJS R. WILDENBEEST 460

17 Are neighbors welcome? E-buyer search, price competition and coalition strategy in Internet retailing
JACQUES LAYE AND HERVE TANGUY 484

18 Bidding and buying on the same site
MARC BOURREAU AND CHRISTIAN LICOPPE 510
### Contents

<table>
<thead>
<tr>
<th>Part VI</th>
<th>Evolving institutional infrastructures</th>
<th>537</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>An economic analysis of conflicts resolution in cyberspace</td>
<td>539</td>
</tr>
<tr>
<td></td>
<td>BRUNO DEFFAINS, YANNICK GABUTHY AND PHILIPPE FENOGLIO</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Payment and the Internet: issues and research perspectives in economics of banking</td>
<td>569</td>
</tr>
<tr>
<td></td>
<td>DAVID BOUNIE AND PIERRE GAZÉ</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Electronization of Nasdaq: will market makers survive?</td>
<td>588</td>
</tr>
<tr>
<td></td>
<td>DELPHINE SABOURIN AND THOMAS SERVAL</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Multi-level governance of the digital space: does a “second rank” institutional framework exist?</td>
<td>617</td>
</tr>
<tr>
<td></td>
<td>ERIC BROUSSEAU</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part VII</th>
<th>The impacts of the Internet at the macro level</th>
<th>649</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Mobile telephony and Internet growth: impacts on consumer welfare</td>
<td>651</td>
</tr>
<tr>
<td></td>
<td>GARY MADDEN, MICHAEL SCHIPP AND JOACHIM TAN</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Globalization, the Internet and e-business: convergence or divergence in cross-country trends?</td>
<td>663</td>
</tr>
<tr>
<td></td>
<td>KENNETH L. KRAEMER AND JASON DEDRICK</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>ICTs and inequalities: the digital divide</td>
<td>693</td>
</tr>
<tr>
<td></td>
<td>ALAIN RALLET AND FABRICE ROCHELANDET</td>
<td></td>
</tr>
</tbody>
</table>

References 718  
Index 777
Figures

2.1 Cisco’s stock options, 1990–2004  
2.2 Relative importance of objectives of ongoing stock option programs, ICT companies operating in the United States, 1996–2003  
2.3 Semiconductor employees (full-time) Silicon Valley, Route 128, Dallas, USA 1994–2002  
2.4 Average real annual earnings, full-time employees, semiconductors, Silicon Valley, Route 128, Dallas, USA 1994–2002  
2.5 Software publisher employees (full-time), Silicon Valley, Route 128, Dallas, USA 1994–2002  
2.6 Average real annual earnings, full-time employees, software publishers, Silicon Valley, Route 128, Dallas, USA 1994–2002  
2.7 IBM’s profit rate, rate of R&D spending, and payout behavior, 1981–2003  
2.8 US patenting, IBM, leading Japanese electronics companies, and other top 10 patenters, 1989–2004  
2.9 IBM’s stock options, 1982–2003  
2.10 Stock price movements, Cisco, Lucent, AT&T, and IBM compared with the S&P500 and Nasdaq indices  
4.1 Venture capital funding in the United States and share of Internet start-ups  
4.2 Total number of IPOs, share of Internet IPOs and first-day returns  
8.1 An information superhighway  
8.2 A simple star network  
8.3 A simple local and long-distance network  
8.4 A pair of vertically related markets  
8.5 Construction of the fulfilled expectations demand  
8.6 Monopolistic competition with network externalities and M compatible goods
8.7 Choice between compatibility and incompatibility 254
8.8 Mix-and-match compatibility 255
8.9 Compatibility decisions are less flexible than vertical integration decisions 258
8.10 Compatibility 258
8.11 Incompatibility 259
8.12 $AB$ is a bottleneck facility 262
8.13 Intermodal competition 262
8.14 Choice between old and new technology 265
9.1 Lizzeri vs. Guerra 284
10.1 The prescription markets: a three-pronged structure 295
10.2 Some configuration of prescription markets 296
10.3 Three forms of prescription 304
10.4 The three standard forms of prescription 305
11.1 Demand for bundles of 1, 2 and 20 information goods with i.i.d. valuations uniformly distributed in $[0,1]$ (linear demand case) 319
11.2 Competing imperfect substitutes 326
11.3 Good $A_1$, sold separately, competes with good $B_1$, part of a large bundle 328
11.4 Distribution of valuations for good $B_1$ (including an impulse at the origin), when good $A_1$ is priced at $p_{A1}$ 328
11.5 Correlated valuations: $v_A$ and $v_B$ cannot differ by more than $1 - n_i 0 \leq r \leq 1$ 332
11.6 Increase in sales by firm $B$ from a small decrease in $p_B$ 342
13.1 Pure contribution game with $\omega_i - n_i \leq 0$: each developer devotes all his ability to open software 381
13.2 Pure contribution game with $\omega_i - n_i > 0$: the less competent developers do not contribute at all 382
13.3 Contribution game with learning: contributions are a non-monotonic function of competencies – the most competent developers do not contribute at all 384
14.1 Graphical representation of a software system’s growth as an upwards-evolving tree 407
14.2 A simulation of the growth of a software project 414
14.3 Gini coefficient for module size distribution 416
14.4 Social utility (without maintainers) 420
15.1 Bidder uncertainty and winning bids 439
16.1 Buyers randomize between one search and no search ($\lambda = \frac{1}{2}$) 469
16.2 Buyers randomize between one search and two searches 470
16.3 Equilibrium conditions 471
16.4 The impact of lower search cost $\epsilon$ 477
16.5 The impact of the search engine rate of adoption $\lambda$ 481
17.1 Coalition structures 494
17.2 Profits comparison 498
19.1 The impact of $\delta$ on the defendant’s equilibrium strategy 550
19.2a The first-period settlement zone in Cybersettle 552
19.2b The last-period settlement zone in Cybersettle 552
21.1 The organization of Nasdaq 596
21.2 Comparison of ask price-quantity schedules within the pure DM and the pure ELOB 605
21.3 Private-value buyer segmentation within the pure DM and the pure ELOB for different values of $\epsilon$ and $M$ 606
21.4 Illustration of Result 4 when the trader buys shares 608
22.1 Internet governance: the current institutional framework 642
23.1 Compensating variation CV 653
24.1 Conceptual framework 665
24.2 E-business diffusion and wealth 671
24.3 Degree of globalization of each economy 671
24.5 Firm uses of e-business 679
24.6 B2B and B2C e-business in highly local and highly global firms 681
24.7 E-business uses across economies 683
24.8 Firm impacts from e-business 685
24.9 Competitive impacts of e-business 686
24.10 Performance impacts of e-business in different economies 687
Tables

2.1 Employment, 1996–2003, at the top 20 "Old Economy" companies by 2003 sales
2.2 Employment, 1996–2003, at the top 20 "New Economy" companies by 2003 sales
2.3 Top five companies by worldwide sales in computer hardware sectors, 1984
2.4 Cisco Systems acquisitions, by value, employees, and mode of payment, 1993–2004
6.1 A typology of online consumers communities
6.2 Contribution and trust issues in experience-sharing and user communities
10.1 Sources of revenue for prescribers
10.2 Types of prescriber
10.3 Prescription business models
11.1 Equilibrium quantities, prices, and revenues in different settings
12.1 Content spending by category
14.1 Gini coefficient for module size distribution
14.2 Social utility
16.1 Summary of comparative statics results
20.1 Typology and characteristics of electronic payment systems
21.1 ELOB illustration: ECN Island
21.2 Market share by venue in December 2002
23.1 Network, price and income coefficients estimates
23.2 Direct welfare gain by telecommunications service
23.3 Indirect welfare gain by telecommunications service
23.4 Mobile and fixed-line service price ratio
24.1 GEC survey sample
24.2 Firm drivers of e-business adoption
24.3 Firm barriers to e-business adoption
24.4 B2B and B2C sales and services
Notes on contributors

PATRICK BAJARI is Professor at the University of Minnesota. He received his PhD from the University of Minnesota in 1997. He teaches in the areas of industrial organization and applied econometrics. His current research includes the econometrics of strategic interactions, demand estimation in differentiated product markets, and the empirical analysis of asymmetric information. He is Managing Editor of the International Journal of Industrial Organization and Associate Editor for the Journal of Business and Economic Statistics.

YANNIS BAKOS is Associate Professor of Management at the Leonard N. Stern School of Business at New York University where he teaches courses on the economic and business implications of information technology, the Internet, and online media. Professor Bakos pioneered research on the impact of information technology on markets, and in particular on how Internet-based electronic marketplaces will affect pricing and competition. He holds PhD, MBA, Masters and Bachelors degrees from MIT.

PIERRE-JEAN BENGHOZI is presently Research Director at the National Center for Scientific Research (CNRS) and is directing the Pole for Research in Economics and Management at Ecole Polytechnique (Paris). He developed a research group on information technology, telecommunications, media, and culture. His current projects draw attention to adoption and uses of ITC in large organizations, structuring of e-commerce and ITC-supported markets and supply chains. Pierre-Jean Benghozi publishes on these topics in French and English. He teaches regularly at Paris University.

DAVID BOUNIE is Assistant Professor of Economics at Télécom Paris. He completed his graduate work at the University of Paris I Panthéon-Sorbonne in public economics and received his PhD in economics from ENST. His research interests include economics of payment systems and Internet economics. He is currently working on
economics of payment and econometrics of consumer payment behavior. Prior to this affiliation with Télécom Paris, he served for three years as an economist with the Groupement des Cartes Bancaires (CB), the leading interbank payment and cash withdrawal system in France.

MARC BOURREAU is Assistant Professor at Ecole Nationale Supérieure des Télécommunications (ENST, Paris) and member of the Laboratory of Industrial Economics (LEI) of the Center for Research in Economics and Statistics (CREST). His main research interests are economic and policy issues relating to broadcasting, telecommunications, and the Internet.

ERIC BROUSSEAU is Professor of Economics at the University of Paris X, and Director of EconomiX, a joint research center between the CNRS (French National Science Foundation) and the University of Paris X. He is also Co-Director of the GDR TICS (Research Consortium “Information Technologies and the Society”) of the CNRS. His research agenda focuses on the economics of institutions and the economics of contracts, with two main applied fields: the economics of intellectual property rights and the economics of the Internet and digital activities. On this last issue he works both on digital business models and on the governance of the Internet and of the information society.

ERIK BRYNJOLFSSON is Director of the MIT Center for Digital Business, the Schussel Professor of Management at the MIT Sloan School, and director or advisor of several technology-intensive firms. His research focuses on the economics of information and information technology, including productivity, organizational change, and the pricing of digital goods. Professor Brynjolfsson previously taught at Stanford Business School and Harvard Business School. He holds Bachelors and Masters degrees from Harvard University and a PhD from MIT.

NICOLAS CURIEN serves as Commissioner for the French Regulation Commission for Electronic Communications and Postal Services (ARCEP). He held several positions as an economist in the Administration (France Telecom, Ministry of Defence, Institute of Statistics and Economic Studies) and as an academic (Professor of Economics at the Conservatoire National des Arts et Métiers and at the École Polytechnique). He is also a member of the French Academy of Technology and a member of the International Telecommunications Society (ITS). He has published several books and many scientific articles in the field of telecommunications and Internet economics.
JEAN-MICHEL DALLE is Professor with University Pierre et Marie Curie and an associate researcher with IMRI-Dauphine (Paris, France). He works on the economics of innovation and has notably focused since 1998 on the economics of software and open source software. He is an alumnus from Ecole Polytechnique and ENSAE, and holds a PhD in economics from Ecole Polytechnique. He is also the Managing Director of Agoranov, a major non-profit science-based incubator located in Paris.

GODEFROY DANG NGUYEN is Deputy Scientific Director at ENST Bretagne, an engineer’s school in France, and Professor at the College of Europe in Bruges. His research focuses on Internet and telecommunications economics, on which he has written two books, and on institutional issues related to ICT. He is the scientific director of a network of seven universities and institutions located in Brittany. This network carries out statistical and case studies on adoption and usage of ICT. Professor Dang Nguyen has been an expert with the European Commission since 1983, and has been consultant for many institutions including the World Bank and ITU.

PAUL A. DAVID is known internationally for contributions to economic history, economic and historical demography, and the economics of science and technology. He divides his working life equally between Stanford University in California, where he is Professor of Economics and Senior Fellow of the Stanford Institute for Economic Policy Research, and the University of Oxford, where he is Senior Fellow of the Oxford Internet Institute and Emeritus Fellow of All Souls College. In 2003 he edited (with M. Thomas) The Economic Future in Historical Perspective.

JASON DEDRICK is Co-Director of the Personal Computing Industry Center and Senior Research Fellow at the Center for Research on Information Technology and Organizations (CRITO), at the University of California, Irvine. His research is focused on the globalization of information technology production and use, and the economic impacts of IT at the firm, industry, and national levels. He is co-author of Global E-Commerce: Impacts of National Environment and Policy, Cambridge University Press, 2006.

BRUNO DEFFAINS is Professor of Economics at University of Nancy, France. For the past few years, he has been Vice-President for research activities there and he developed a new program in law and economics which is now associated to the CNRS. He is the author of articles and books in law and economics. His research has focused on
NICHOLAS ECONOMIDES is Professor of Economics at the Stern School of Business of New York University and Executive Director of the NET Institute. His fields of specialization and research include the economics of networks, especially of telecommunications, computers, and information, the economics of technical compatibility and standardization, industrial organization, the structure and organization of financial markets, application of public policy to network industries, and strategic analysis of markets. He has published widely in the areas of networks, telecommunications, oligopoly, antitrust, product positioning, and on liquidity and the organization of financial markets and exchanges. His website on the economics of networks at http://www.stern.nyu.edu/networks/ has been ranked by The Economist as one of the top four economics sites worldwide.

EMMANUELLE FAUCHART is Assistant Professor of Economics at the Laboratory of Econometrics at CNAM, France. Her interest in research is the field of industrial organization, and more particularly information-sharing patterns, industrial dynamics, firm demography, and the economics of online communities.

PHILIPPE FENOGLIO is Assistant Professor of Economics at University of Nancy (France). His research interests include industrial organization (oligopolistic competition, product differentiation) and economics of innovation and new technology. He is also working on the economics of alcohol, tobacco, and illegal drugs and is the co-author of several reports on this topic for public organizations.

PATRICE FLICHY is Professor of Sociology at Marne la Vallée University, LATTS. His main research topics include online computerization movements and technological utopianism.

DOMINIQUE FORAY holds the Chair of Economics and Management of Innovation at the Swiss Federal Institute of Technology in Lausanne (EPFL). He is also Director of the Collège du Management at EPFL. His research interests include all topics and issues related to economic policy in the context of the new knowledge-based economy. This broad field covers the economics of science, technology, and innovation. Intellectual property and competition policy, information technology and the new economy, capital market and entrepreneurship, national systems of innovation, education, and training policy are fields of high relevance in his research. In 2004 he published The Economics of Knowledge.
Yannick Gabuthy is Assistant Professor of Economics at the University of Nancy and member of the BETA research laboratory (CNRS) since 2005. He received his PhD in economics from the University of Lyon in 2003 and was a visitor at the University of Essex in 2001. His main area of research is law and economics, with special interest in dispute resolution (bargaining and arbitration). He conducts experimental research on these topics.

Alex Gauduél is a lecturer at the School of Economics, University of East Anglia and a faculty member at the Centre for Competition Policy. He holds a PhD from the University of Toulouse, France and is an industrial economist with an interest in the Internet, open source software and media industries. Current work examines the open source software production model in order to evaluate its impact on traditional methods of software production. He is also working on how intermediaries regulate competition on the Internet between the firms they intermediate.

Pierre Gazé is Assistant Professor of Economics at the University of Orléans since 1999. He received his PhD in economics from the University of Orléans. His research interests are in economics of banking and industrial organization. His recent works include bundling and tying practices in the banking industry and retail payments innovations.

Michel Gensollen was trained as an economist and an engineer in telecommunications. From 1990 to 2000 he was Chief Economist at France Telecom, in charge of the Economic and Strategic Studies department. He is currently working at the SES (Economics and Social Sciences) department at Télécom Paris. His recent publications focus on electronic commerce, network-based firms, information economy, and the new business models triggered by the development of the Internet and ICT.

Ulrich Hegé is Associate Professor in Finance at HEC School of Management in Paris. He has previously taught at Tilburg University and ESSEC and holds a PhD from Princeton University. His research interests are in corporate finance, on questions related to venture capital, corporate governance, joint ventures, bankruptcy, credit risk and credit structure, and internal capital markets.

Ali Hortacsu is Assistant Professor of Economics at the University of Chicago. He is interested in the theory and econometrics of auction and matching markets, product markets with search frictions and
information asymmetries, and the vertical arrangement of industries. He conducts empirical research on Internet auctions and matchmaking sites, government securities markets, electricity markets, the mutual fund industry, and the cement/concrete industry.

MAARTEN JANSSSEN is Professor of Microeconomics at Erasmus University Rotterdam and Director of the Tinbergen Institute. He has published numerous articles in internationally refereed journals such as the Review of Economic Studies, International Economic Review, Journal of Economic Theory and Games, and Economic Behavior. His current research interests are in incomplete information in markets and auctions.

BRUNO JULLIEN is Director of Research at CNRS and a senior member at IDEI. He graduated from Ecole Polytechnique and ENSAE, and holds a PhD in economics from Harvard University. His contributions cover a wide range of topics, with a particular strength in industrial organization, contract theory, network economics, competition policy and regulation, and the economics of risk.

KENNETH L. KRAEMER is Professor of Management and Computer Science and Director of the Center for Research on IT and Organizations, University of California, Irvine. His research includes the socio-economic implications of IT, national policies for IT production and use, and the contribution of IT to productivity and economic development. His most recent book, co-authored with Jason Dedrick, is Asia’s Computer Challenge (1998). He recently published a book based on a five-year study of the global diffusion of the Internet and e-commerce (Cambridge University Press, 2006) and is starting a new study of the offshoring of knowledge work.

GILBERT LAFFOND is Professor of Economics and Statistics at the Conservatoire National des Arts et Métiers (Paris) and Head of the Laboratory of Econometrics. His main research concerns are in game theory, public choice, and evolutionary economics, fields where he has published several major theoretical contributions. He is also interested in industrial organization and has worked more specifically on applications to the telecommunications industry and to the Internet.

JACQUES LAYE has a PhD in economics from the Laboratory of Econometrics (Ecole Polytechnique) and is a researcher at the Laboratory of Forestal Economics (LEF, Inra Nancy, France) where he works on industrial organization and computational economics (oligopolistic competition, vertical relationships, product differentiation, coalition theory) applied to sectors like the wine industry, the
wood industry, or Internet retailing. Other fields of research concern operations research (stochastic control) applied to the management of renewable resources, and computational economics.

**WILLIAM LAZONICK** is University Professor at the University of Massachusetts Lowell and Distinguished Research Professor at INSEAD. Previously he was Assistant and Associate Professor of Economics at Harvard University (1975–1984) and Professor of Economics at Barnard College of Columbia University (1985–1993). He specializes in the analysis of industrial development and international competition.

**VIRGINIE LETHIAIS** is a lecturer in economics at the ENST-Bretagne, a French graduate engineering school in telecommunications. She is a member of the CREM, the CNRS Research Laboratory on Economics and Management of the Universities of Rennes and Caen. She uses industrial economics and applied econometrics to study pricing on the Internet and to analyze diffusion and uses of information and communication technologies.

**CHRISTIAN LICOPPE**, PhD, trained in the history of science and technology, is developing a research program on the uses of information and communication technologies and the ways they are embedded in various forms of activity, such as commerce and service relationships, mobility and displacements, and forms of interpersonal communication. He is currently Professor of Sociology of Technology at the Social Science department of the Ecole Nationale Supérieure des Télécommunications in Paris.

**GARY MADDEN** is Director of the Communication Economics and Electronic Markets Research Centre and Professor at the Department of Economics of the Curtin University of Technology, Australia. He is editor of the *International Handbook of Telecommunications Economics* series, and serves on the board of management of the International Telecommunications Society. He is also a member of the editorial board of the *Journal of Media Economics*.

**SÉBASTIEN MICHENAUD** is a PhD candidate in finance at HEC School of Management, in Paris, and is affiliated with GREGHEC. He has previously worked at Bankers Trust International in mergers and acquisitions and as a consultant at Arkwright Enterprises where he was an active observer of the Internet development. His research interests are in corporate finance and behavioral finance.

**JOSE´ LUIS MORAGA-GONZÁLEZ** is Professor of Industrial Organization at the University of Groningen. He obtained a PhD in Economics.
from University Carlos III Madrid. His research focuses mainly on information economics and R&D. His work has been published in journals including the *Review of Economic Studies*, *Rand Journal of Economics*, *European Economic Review* and *International Journal of Industrial Organization*.

**FRANÇOIS MOREAU** is Associate Professor in Economics at the Conservatoire National des Arts et Métiers in Paris, France. His main current fields of research are the economics of the Internet and media economics.

**THOMAS PARIS** is Affiliated Professor at HEC School of Management, Paris, and Associate Researcher at CRG Ecole Polytechnique. His research focuses on the management, the economics, and the regulation of creative and immaterial industries. He has written a book on the system of author’s rights (*Le Droit d’auteur – L’idéologie et le système*, PUF, Paris, 2002) and has edited one about the challenges of the television industry (*La Libération audiovisuelle – Enjeux technologiques, économiques et réglementaires*, Dalloz, Paris, 2004).

**THIERRY PÉNARD** is Professor of Economics at the University of Rennes 1 and is Director of the Industrial Organization department at the Center for Research in Economics and Management (CREM). His main fields of interest are the economics of networks (Internet, telecommunication), the economics of contract (franchising), game theory, and antitrust policy.

**ALAIN RALLET** is Full Professor of Economics at the University of Paris South and researcher at ADIS, research center in economics there. His fields of interest are Internet economics (e-commerce, emergence of online multimedia markets on the Internet, the impact of ICTs on organizations) and regional and urban economics (ICTs and localization of economic activities, network infrastructure, and local development).

**FABRICE ROCHELANDET** holds a PhD from the University of Paris Panthéon-Sorbonne. His dissertation addressed the question of copyright in the digital economy. He is currently Assistant Professor of Economics at the University of Paris 11. His research focuses on the economic impact of digital technologies through topics such as electronic delivery of cultural good, broadcasting, intellectual property, and digital divide. He has published several papers on the digital protection of contents, the efficiency of copyright collecting societies, and the European copyright harmonisation.
DELPHINE SABOURIN was a PhD student at CEREMADE, Paris Dauphine University, Research Fellow at CREST, and teaching assistant at Paris Dauphine University. Her research interests included the microstructure of securities markets, with emphasis on the competition between alternative trading mechanisms and corporate finance.

MICHAEL SCHIPP is Research Associate at the Communication Economics and Electronic Markets research centre (CEEM) at the Curtin University of Technology. His research focus is network economics. This interest led Michael to empirically measure the magnitude of the Internet network effect. Michael is currently developing his expertise in e-market competition modelling. An early outcome of this research program is a model of network investment contained in a competitive game between an incumbent firm and a virtual entrant.

THOMAS SERVAL is a graduate from Ecole Normale Supérieure in Paris and Ecole Nationale de la Statistique et de l’Administration Economique. He focused his PhD work on Internet economics with a special interest in transformation of electronic capital market (ECN), law and economics (software patent), and value creation in cyberspace. Thomas is the President and CEO of Baracoda and Vice President of the French chapter of the Internet Society.

JOACHIM TAN is Research Associate at the Communication Economics and Electronic Markets Research Center (CEEM) at the Curtin University of Technology. His research orientation is in the empirical modelling of aspects of electronic, information, and communications markets in the search for dynamic regularities. Data examined include circuit- and packet-switched traffic, product adoption, and telecommunications company share price data. He is currently working on developing methods to enable reliable long-horizon forecasts based on short time series.

HERVÉ TANGUY is Director of Research at INRA/LORIA and at the Laboratory of Econometry of Ecole Polytechnique. He performs research in industrial economy applied to problems of strategy, finance, and business organization. He has participated in the conception and realization of new business software systems in several organizations (multinational firms, public companies, wine industry, etc.).

SYLVIE THORON is a maître de conférences at the University of Toulon and a researcher at the GREQAM, a CNRS research group in economics in Marseille. Her research fields are public economics and the formation of coalitions and agreements in economics. In the framework

© Cambridge University Press  www.cambridge.org
of cooperative and non-cooperative game theory, she studies the incentives and behavior of individuals and groups of individuals when deciding whether to contribute to public goods.

MATTHIJS WILDENBEEST is a PhD student at the Tinbergen Institute and the Erasmus School of Economics. His major field of interest is industrial organization. His current research interests include consumer search and the structural estimation of equilibrium models.

JEAN-BENOît ZIMMERMANN is CNRS Research Director at GREQAM (Groupement de Recherche en Economie Quantitative d’Aix-Marseille) and IDEP (Institut d’Economie Publique) in Marseille. His main topics of interest are economics of interactions and networks, proximity dynamics, innovation, and intellectual property economics (open source software).
Acknowledgements

This work draws from a process of interactions among the contributors, which led to a consistent set of chapters that have been written interactively. This book is therefore really a collective one, and the editors would like to warmly thank the authors who accepted the discipline needed to produce such an outcome. These interactions were initiated in a seminar held in 1999–2000 which led to the edition of a special issue of the *Revue Economique* entitled “L’Economie de l’Internet” in 2001. This publication set the basis of the contributions to this entirely new book that was elaborated in the frame of a working group of the CNRS Research Consortium “Information Technologies and the Society” (GDR TICS) in 2003–2004. This working group organized in particular two workshops held in 2004 at GREQAM (a joint research center from the French CNRS, the Universities of Marseille and EHESS) and at the Laboratory of Econometrics of the CNAM (Paris).

The editors are grateful to the organizers of these events, and in particular to Jean-Benoît Zimmermann (GREQAM) and to François Moreau (CNAM), as well as to the CNRS for its financial support. They would also like to thank the President of the *Revue Economique*, Jean-Paul Polin (University of Orléans), for his support to the project.

The editors are also indebted to Marie-Line Priot (EconomiX, CNRS-University of Paris X) for secretarial support.

While this book was being published, Delphine Sabourin passed away. Delphine was the youngest contributor to this book, but she was far from being the least brilliant scientist on the team. All of us will miss her brightness and kindness, and we are all so sad that she has been deprived of such a promising future.

Since this book aims at providing the reader with an up-to-date synthesis of what is essential in digital and Internet economics, some of the contributors decided it would be preferable to reprint (Chapters 11 and 15) or publish a revised version (Chapter 8) of papers they had already published in journals. The editors and the publishers would like to thank the American Economic Association (Chapter 15), Elsevier...
(Chapter 8), and the Institute for Operation Research and Management Sciences (Chapter 11) for permissions to reprint papers that were originally published respectively, in the *Journal of Economic Literature* (vol. 42, pp. 457–486, 2004), in *Marketing Science* (vol. 19, pp. 63–82, 2000), and in the *International Journal of Industrial Organization* (vol. 14, no. 6, pp. 673–699, 1996).