Standards and Public Policy

Technological standards are a cornerstone of the modern information economy, affecting firm strategy, market performance and, by extension, economic growth. While there is general agreement that swift movement to superior technological standards is a worthwhile goal, there is much less agreement on the central policy questions: do markets choose efficient standards? How do standards organizations affect the development of standards? And finally, what constitutes appropriate public policy toward standards? In this volume, leading researchers in public policy on standards, including both academics and industry experts, focus on these key questions. Given the dearth of applied work on standards and public policy, this volume significantly advances the frontier of knowledge in this critical but understudied area. It will be essential reading for academic and industrial researchers as well as policymakers.

Shane Greenstein is the Elinor and Wendell Hobbs Professor of Management and Strategy at the Kellogg School of Management, Northwestern University.

Victor Stango is an Associate Professor of Economics at the Tuck School of Business at Dartmouth.
# Contents

<table>
<thead>
<tr>
<th>List of figures</th>
<th>page vii</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of tables</td>
<td>viii</td>
</tr>
<tr>
<td>List of contributors</td>
<td>x</td>
</tr>
</tbody>
</table>

## Introduction

*Shane Greenstein and Victor Stango*

1. Standard setting in markets: the browser war
   *Timothy F. Bresnahan and Pai-Ling Yin*

2. Competition through institutional form: the case of cluster tool standards
   *Richard N. Langlois*

3. The economic realities of open standards: black, white, and many shades of gray
   *Joel West*

4. Coordination costs and standard setting: lessons from 56K modems
   *Shane Greenstein and Marc Rysman*

5. Promoting e-business through vertical IS standards: lessons from the US home mortgage industry
   *Charles W. Steinfield, Rolf T. Wigand, M. Lynne Markus, and Gabe Minton*

6. Intellectual property and standardization committee participation in the US modem industry
   *Neil Gandal, Nataly Gantman, and David Genesove*

7. Manipulating interface standards as an anticompetitive strategy
   *Jeffrey K. MacKie-Mason and Janet S. Netz*
Contents

8 Delay and de jure standardization: exploring the slowdown in Internet standards development
Timothy Simcoe 260

9 Standardization: a failing paradigm
Carl Cargill and Sherrie Bolin 296

10 Standards battles and public policy
Luís M. B. Cabral and Tobias Kretschmer 329

11 Switching to digital television: business and public policy issues
Norbert Maier and Marco Ottaviani 345

12 Should competition policy favor compatibility?
Joseph Farrell 372

Index 389
Figures

1.1 Slide from Microsoft marketing presentation  page 38
1.2 Aggregate shares of IE and Netscape browser usage  45
1.3 Browser brand shares on different operating systems  46
1.4 Windows 98, OS installed base, and IE4 usage  48
1.5 Usage of IE browsers by Macintosh users  49
2.1 A parallel-processing configuration  71
2.2 A hypothetical modular integrated-processing system  72
2.3 Modular cluster tool market, actual and forecast  78
2.4 Standards adherents as a competitor to Applied Materials, 2003  79
3.1 Implicit causal model of open standards  89
3.2 Process model for stakeholders in creation and adoption of standards  95
5.1 SMART doc structure (MISMO 2001)  178
5.2 Illustration of the three views of a SMART doc in a “California Deed of Trust”  179
6.1 Patents with the word *modem* in the title: 1976–99  215
6.2 Average attendance per TR-30 meeting: 1990–9  218
7.1 Telecom interface protocol  242
7.2 Telecom interface with translator  243
8.1 Size and scope of the IETF  265
8.2 IETF output  266
8.3 Affiliation of IETF meeting attendees  266
8.4 The IETF standard setting process  268
8.5 The slowdown in IETF standard setting  275
8.6 Distribution of completion times for proposed standards (1992–2003)  275
11.1 Dependence of viewers’ choices on preference parameters  359
11.2 Impact of a subsidy in the first period on viewers’ choices  361
11.3 Impact of a subsidy in the second period on viewers’ choices  361
Tables

2.1 Top ten semiconductor-equipment suppliers, 1980, 1990, and 2000 63
2.2 Top fifteen semiconductor-equipment suppliers, 2003 66
2.3 2003 Market share in submarkets (percent) 78
3.1 Previously cited exemplars for open standards 91
3.2 Inputs and outputs in four phases of standards creation and use 95
3.3 Hypothetical vendor payoff matrix for joining versus fighting standards coalitions 98
3.4 Dimensions of standards openness 114
4.1 Number and percentage of ISPs adopting in October 1997 134
4.2 Average adoption rates per local calling area, October 1997 135
4.3 Evidence of differentiation 136
5.1 Excerpt from MISMO’s automated underwriting specifications logical data dictionary (MISMO 2001) 176
6.1 Analog modem timeline 214
6.2 Patents with the word *modem* in the title 216
6.3 Summary of meetings data 218
6.4 Participation at TR-30 meetings 219
6.5a Patent and citation data summary by meeting participation 221
6.5b Meeting summary data by patents 221
6.6a Correlation among variables: all 326 firms 223
6.6b Correlation among variables: the 45 firms attending meetings and holding patents 223
6.7a Correlations among patents and meetings 224
6.7b Correlations among citations and meetings: smaller data set 224
6.8a Granger causality analysis: all firms 226
List of tables

6.8b Granger/Sims causality tests: all 45 firms 226
6.A1 Descriptive statistics: full data set, \( N = 326 \) 230
6.A2 Descriptive statistics: firms with at least one patent and attending at least one meeting, \( N = 45 \) 230
8.1 Duration of the IETF standard setting process (in days) 274
8.2 Measures of technical complexity (mean by publication year) 277
8.3 Measures of IETF and working group size 280
8.4 Measures of distributional conflict 282
8.A1 Variable definitions 292
8.A2 Means, standard deviations, and simple correlations 293
8.A3 Duration regressions (ordinary least-squares) 294
8.A4 Duration regressions (hazard model) 295
Contributors

SHERRIE BOLIN is President and CEO of The Bolin Group.

TIMOTHY BRESNAHAN is Landau Professor in Technology and the Economy, Stanford University.

LUIS CABRAL is Professor of Economics and Chair, Department of Economics, Leonard Stern School of Business, New York University.

CARL CARGILL is Head of Corporate Standards at Sun Microsystems.

JOSEPH FARRELL is Professor of Economics, University of California at Berkeley.

NEIL GANDAL is Professor in and Chair of Department of Public Policy, School of Government and Policy, Tel Aviv University.

NATALY GANTMAN is a Ph.D. Candidate in Economics at Tel Aviv University.

DAVID GENESOVE is a Professor in the Department of Economics at the Hebrew University of Jerusalem.

SHANE GREENSTEIN is the Elinor and Wendell Hobbs Professor in the Management and Strategy Department of the Kellogg School of Management at Northwestern University.

TOBIAS KRETSCHMER is a Lecturer in Strategy and Economics, Interdisciplinary Institute of Management (IIM), London School of Economics.

RICHARD N. LANGLOIS is Professor of Economics at the University of Connecticut.
List of contributors

JEFFREY MACKIE-MASON is the Arthur W. Burks Professor of Information and Computer Science, and a Professor of Economics and Public Policy at the University of Michigan.

NORBERT MAIER is a Ph.D. Candidate in Economics at London Business School.

M. LYNNE MARKUS is the John W. Poduska, Sr. Professor of Information Management at Bentley College.

GABE MINTON is a Senior Director of Industry Technology at the Mortgage Bankers Association of America.

JANET NETZ is a Principal at ApplEcon, LLC.

MARCO OTTAVIANI is Associate Professor of Economics at the London Business School.

MARC RYSMAN is Assistant Professor of Economics at Boston University.

TIMOTHY SIMCOE is Assistant Professor of Strategy, Rotman School of Management, University of Toronto.

VICTOR STANGO is Associate Professor of Business Administration in the Tuck School of Business at Dartmouth.

CHARLES STEinfeld is a Professor in the Department of Telecommunication, Information Studies, and Media at Michigan State University.

JOEL WEST is Associate Professor of Technology Management, Department of Organization & Management, College of Business, San José State University.

ROLF WIGAND is the Maulden-Entergy Chair and Distinguished Professor of Information Science and Management at the University of Arkansas at Little Rock.

PAI-LING YIN is Assistant Professor of Strategy at Harvard Business School.