Contributors

Ajay Agrawal
Rotman School of Management
University of Toronto
105 St. George Street
Toronto, ON M5S 3E6 Canada

Hezekiah Agwara
School of Public Policy
George Mason University
3351 Fairfax Drive, MS 3B1
Arlington, VA 22201

Philip Auerswald
School of Policy, Government, and International Affairs
George Mason University
3351 Fairfax Drive, MS 3B1
Arlington, VA 22201

Lee Branstetter
Heinz College
School of Public Policy and Management
Department of Social and Decision Sciences
Carnegie Mellon University
Pittsburgh, PA 15213

Timothy F. Bresnahan
Stanford Institute for Economic Policy Research (SIEPR)
Landau Economics Building, Room 325
579 Serra Mall
Stanford, CA 94305–6072

Annamaria Conti
Scheller College of Business
Georgia Institute of Technology
800 West Peachtree Street, NW
Atlanta, GA 30308-0520

Jason P. Davis
Department of Entrepreneurship and Family Enterprise
INSEAD
1 Ayer Rajah Avenue
Singapore 138676

Maryann Feldman
Department of Public Policy
University of North Carolina at Chapel Hill
209 Abernethy Hall, CB 3435
Chapel Hill, NC 27599–3435

Lee Fleming
Department of Industrial Engineering
330B Blum Center
University of California, Berkeley
Berkeley, CA 94720
Contributors

Chris Forman
Scheller College of Business
Georgia Institute of Technology
800 West Peachtree St., NW
Atlanta, GA 30308

Richard B. Freeman
National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138

Ina Ganguli
Department of Economics
904 Thompson Hall
University of Massachusetts
200 Hicks Way
Amherst, MA 01003

Joshua S. Gans
Rotman School of Management
University of Toronto
105 St. George Street
Toronto ON M5S 3E6 Canada

Avi Goldfarb
Rotman School of Management
University of Toronto
105 St. George Street
Toronto ON M5S 3E6 Canada

Shane Greenstein
Kellogg School of Management
Northwestern University
2001 Sheridan Road
Evanston, IL 60208

Brian Higginbotham
School of Public Policy
George Mason University
3351 Fairfax Drive
Arlington, VA 22201

Adam Jaffe
Motu Economic and Public Policy Research
PO Box 24390
Wellington 6142 New Zealand

Benjamin Jones
Department of Management and Strategy
Kellogg School of Management
Northwestern University
2001 Sheridan Road
Evanston, IL 60208

Lauren Lanahan
Department of Public Policy
University of North Carolina at Chapel Hill
203 A Abernethy Hall, CB 3435
Chapel Hill, NC 27599-3435

Julia Lane
American Institutes for Research
1000 Thomas Jefferson Street, NW
Washington, DC 20007

Guangwei Li
Heinz College
School of Public Policy and Management
Carnegie Mellon University
3013 Hamburg Hall
Pittsburgh, PA 15213

Christopher C. Liu
Rotman School of Management
University of Toronto
105 St. George Street
Toronto, Ontario M5S 3E6 Canada

John McHale
School of Business & Economics
National University of Ireland
Cairnes Building
NUI Galway, Ireland

Raviv Murciano-Goroff
Economics Department
Stanford University
579 Serra Mall
Stanford, CA 94305–6072

Fiona Murray
MIT Sloan School of Management
100 Main Street, E62–470
Cambridge, MA 02142
Ramana Nanda  
Harvard Business School  
Rock Center 317  
Soldiers Field  
Boston, MA 02163

Alexander Oettl  
Scheller College of Business  
Georgia Institute of Technology  
800 West Peachtree Street, NW  
Atlanta, GA 30308

Timothy Simcoe  
School of Management  
Boston University  
595 Commonwealth Avenue  
Boston, MA 02215

Paula Stephan  
Department of Economics  
Andrew Young School of Policy Studies  
Georgia State University  
Box 3992  
Atlanta, GA 30302–3992

Francisco Veloso  
Department of Engineering and Public Policy  
Carnegie Mellon University  
131E Bake Hall  
Pittsburgh, PA 15213

Bruce A. Weinberg  
Department of Economics  
Ohio State University  
410 Arps Hall  
1945 North High Street  
Columbus, OH 43210

Pai-Ling Yin  
SIEPR  
366 Galvez Street  
Stanford, CA 94305–6015

Ken Younge  
Krannert School of Management  
Purdue University  
West Lafayette, IN 47907–2076
Author Index

Aboelela, S. W., 293
Abowd, J., 103
Acs, Z. J., 394, 395n50
Adams, J. D., 17, 23, 49, 68
Aghion, P., 109, 381
Agrawal, A., 2, 18, 68n7, 76, 77, 80, 97, 98, 99, 107, 113, 170, 171
Akçigit, U., 215
Alberts, B., 115, 116, 368
Alcácer, J., 154
Aldaz-Carroll, E., 387n21
Anderson, P., 215
Armstrong, M., 269n38
Arora, A., 171
Arrow, K., 108, 355, 381
Arthur, W. B., 381
Auerswald, P., 379, 383, 383n11, 384, 384n13, 384n14, 384n15, 386n16, 387n18, 388n28, 394n49, 401n68, 402n69
Baldwin, C., 392n44
Baldwin, R. E., 394
Barefoot, K., 143n11
Barro, R. J., 171, 184
Basant, R., 136
Basker, E., 413
Beadle, G., 339
Beaver, D. B., 17, 115
Becker, G. S., 68
Bercovitz, J., 359
Bergemann, D., 223
Berglund, D., 289, 290
Bernard, A., 413
Berry, F. S., 295, 296, 297, 297n6
Berry, W. D., 295, 296, 297, 297n6
Biagioli, M., 112
Biddle, B., 390
Bikard, M., 72, 111
Black, G., 105
Blind, K., 389n32, 390, 390n35, 391n37
Bloom, N., 175n8, 226, 381, 382, 383n12, 412
Blossfeld, H.-P., 297, 297n6
Blum, B., 171
Blume-Kohout, M. E., 296
Bordo, M. D., 393
Boudreau, K., 35
Bozeman, B., 292, 293
Brady, R. A., 391n36
Branscomb, L. M., 379, 384n15, 401n68, 402n69
Branstetter, L., 138n4, 139n7, 140n8, 142
Breka, J., 399n62
Bresnahan, T. F., 84, 118, 175n8, 235n1, 236n4, 242n12, 258n31, 272n43, 280, 282n47, 393n46
Broad, W., 115, 117
Brown, J. S., 392n43
<table>
<thead>
<tr>
<th>Author Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown, P. W.</td>
<td>336</td>
</tr>
<tr>
<td>Brynjolfsson, E.</td>
<td>175n8</td>
</tr>
<tr>
<td>Bunton, S. A.</td>
<td>293</td>
</tr>
<tr>
<td>Burgess, S.</td>
<td>103</td>
</tr>
<tr>
<td>Busch, L.</td>
<td>390</td>
</tr>
<tr>
<td>Bush, V.</td>
<td>322, 326, 372</td>
</tr>
<tr>
<td>Cairncross, F.</td>
<td>4, 171</td>
</tr>
<tr>
<td>Cameron, A. C.</td>
<td>154, 155, 156</td>
</tr>
<tr>
<td>Campbell, D. T.</td>
<td>314</td>
</tr>
<tr>
<td>Cantwell, J.</td>
<td>143</td>
</tr>
<tr>
<td>Card, D.</td>
<td>117</td>
</tr>
<tr>
<td>Catalini, C.</td>
<td>18, 171</td>
</tr>
<tr>
<td>Cawkell, A. E.</td>
<td>115</td>
</tr>
<tr>
<td>Chandler, A. D.</td>
<td>383</td>
</tr>
<tr>
<td>Chang, C.-H.</td>
<td>136n1, 138n3, 340</td>
</tr>
<tr>
<td>Chang, T.</td>
<td>330, 338</td>
</tr>
<tr>
<td>Chen, J.</td>
<td>136n1, 138n3</td>
</tr>
<tr>
<td>Chen, M. X.</td>
<td>395n51</td>
</tr>
<tr>
<td>Chiang, H.</td>
<td>330, 338, 340</td>
</tr>
<tr>
<td>Christensen, C.</td>
<td>258n30</td>
</tr>
<tr>
<td>Clark, K.</td>
<td>215, 392n44</td>
</tr>
<tr>
<td>Clougherty, J. A.</td>
<td>395n52</td>
</tr>
<tr>
<td>Coase, R. H.</td>
<td>386n16</td>
</tr>
<tr>
<td>Coburn, C.</td>
<td>289, 290</td>
</tr>
<tr>
<td>Coggeshall, P. T.</td>
<td>336</td>
</tr>
<tr>
<td>Cohen, W. M.</td>
<td>173</td>
</tr>
<tr>
<td>Cole, J. R.</td>
<td>112</td>
</tr>
<tr>
<td>Cole, S.</td>
<td>112</td>
</tr>
<tr>
<td>Combes, R. S.</td>
<td>289, 292</td>
</tr>
<tr>
<td>Conti, A.</td>
<td>50, 53, 105, 220</td>
</tr>
<tr>
<td>Cook, T. D.</td>
<td>314</td>
</tr>
<tr>
<td>Cooper, R. N.</td>
<td>137, 143, 152</td>
</tr>
<tr>
<td>Corbett, C. J.</td>
<td>398n61, 399, 400, 400n65</td>
</tr>
<tr>
<td>Cozzens, S. E.</td>
<td>290</td>
</tr>
<tr>
<td>Crane, D.</td>
<td>112</td>
</tr>
<tr>
<td>Cummings, J. N.</td>
<td>35</td>
</tr>
<tr>
<td>Danguy, J.</td>
<td>139n6</td>
</tr>
<tr>
<td>Darby, M. R.</td>
<td>144, 290</td>
</tr>
<tr>
<td>Dasgupta, P.</td>
<td>53, 72, 107, 112</td>
</tr>
<tr>
<td>Davis, J.</td>
<td>278</td>
</tr>
<tr>
<td>De Figueiredo, J. M.</td>
<td>352n29</td>
</tr>
<tr>
<td>Delgado, M.</td>
<td>169, 171, 184</td>
</tr>
<tr>
<td>DellaVigna, S.</td>
<td>117</td>
</tr>
<tr>
<td>Denis, O.</td>
<td>50, 105</td>
</tr>
<tr>
<td>Dewatripont, M.</td>
<td>109</td>
</tr>
<tr>
<td>Diamond, A. M.</td>
<td>296</td>
</tr>
<tr>
<td>Ding, W. W.</td>
<td>72, 113, 171</td>
</tr>
<tr>
<td>Downes, T.</td>
<td>177n11</td>
</tr>
<tr>
<td>Eberhardt, M.</td>
<td>152</td>
</tr>
<tr>
<td>Ehrenberg, R. G.</td>
<td>345, 345n23, 345n25, 346</td>
</tr>
<tr>
<td>Eisinger, P. K.</td>
<td>289</td>
</tr>
<tr>
<td>Engers, M.</td>
<td>115</td>
</tr>
<tr>
<td>Fann, R.-E.</td>
<td>203</td>
</tr>
<tr>
<td>Farrell, J.</td>
<td>247n20, 278n45, 390, 392n40</td>
</tr>
<tr>
<td>Feldman, M.</td>
<td>289, 290, 290n2, 292, 294, 359</td>
</tr>
<tr>
<td>Feller, I.</td>
<td>287, 289, 290, 292</td>
</tr>
<tr>
<td>Fernandez, J.-M.</td>
<td>225</td>
</tr>
<tr>
<td>Fleming, L.</td>
<td>72, 210</td>
</tr>
<tr>
<td>Fogarty, M. S.</td>
<td>154</td>
</tr>
<tr>
<td>Foley, C. F.</td>
<td>142</td>
</tr>
<tr>
<td>Fons-Rosen, C.</td>
<td>18</td>
</tr>
<tr>
<td>Forman, C.</td>
<td>68n7, 170, 171, 173, 175, 175n8, 176, 176n9, 176n10, 190</td>
</tr>
<tr>
<td>Fosler, R. S.</td>
<td>289</td>
</tr>
<tr>
<td>Franzoni, C.</td>
<td>18</td>
</tr>
<tr>
<td>Freeman, R. B.</td>
<td>17, 43, 50, 55n2, 57, 70, 136, 330, 338, 340</td>
</tr>
<tr>
<td>Friedman, R. C.</td>
<td>293</td>
</tr>
<tr>
<td>Friedman, R. S.</td>
<td>293</td>
</tr>
<tr>
<td>Friedman, T. L.</td>
<td>4, 171</td>
</tr>
<tr>
<td>Frische, S.</td>
<td>116</td>
</tr>
<tr>
<td>Furman, J.</td>
<td>108, 116, 359</td>
</tr>
<tr>
<td>Furusten, S.</td>
<td>396n58</td>
</tr>
<tr>
<td>Gaeta, T. J.</td>
<td>115</td>
</tr>
<tr>
<td>Galison, P.</td>
<td>58, 113</td>
</tr>
<tr>
<td>Gans, J.</td>
<td>72, 111, 115, 128, 225</td>
</tr>
<tr>
<td>Gaspar, J.</td>
<td>89</td>
</tr>
<tr>
<td>Gaulé, P.</td>
<td>18</td>
</tr>
<tr>
<td>Gavetti, G.</td>
<td>215</td>
</tr>
<tr>
<td>Geisler, C.</td>
<td>72</td>
</tr>
<tr>
<td>Gertner, J.</td>
<td>401n68</td>
</tr>
<tr>
<td>Ghosh, S.</td>
<td>200, 220n9, 220n10</td>
</tr>
<tr>
<td>Giles, L.</td>
<td>104</td>
</tr>
<tr>
<td>Gittelman, M.</td>
<td>154</td>
</tr>
<tr>
<td>Glaeser, E. L.</td>
<td>11, 89, 169, 171</td>
</tr>
<tr>
<td>Gleick, J.</td>
<td>402</td>
</tr>
<tr>
<td>Goldfarb, A.</td>
<td>2, 18, 68n7, 76, 99, 107, 113, 170, 171, 173, 175, 175n8, 176, 176n10, 382n8</td>
</tr>
<tr>
<td>Golsch, K.</td>
<td>297, 297n6</td>
</tr>
<tr>
<td>Gompers, P.</td>
<td>200, 223</td>
</tr>
<tr>
<td>Gopalakrishnan, S.</td>
<td>287</td>
</tr>
<tr>
<td>Gottschalk, R.</td>
<td>389n31</td>
</tr>
<tr>
<td>Gourieroux, C.</td>
<td>155</td>
</tr>
<tr>
<td>Graff Zivin, J.</td>
<td>99, 108</td>
</tr>
<tr>
<td>Grajek, M.</td>
<td>395n52</td>
</tr>
<tr>
<td>Gray, V.</td>
<td>296</td>
</tr>
<tr>
<td>Green, J.</td>
<td>109, 118, 118n4, 123</td>
</tr>
</tbody>
</table>
Greenstein, S., 84, 170, 171, 173, 175, 175n8, 176, 176n10, 177n11, 192, 235n1, 242n12, 280, 390, 390n35, 401, 414
Griffith, R., 138n4
Griffith-Jones, S., 389n31
Griliches, Z., 155, 173n2, 382n9
Grossman, G. M., 135, 142, 143
Guasch, J. L., 387n24, 390, 390n35, 391n37, 391n38, 395n51
Guerrero Bote, V. P., 26
Guler, I., 223
Hagel, J., III, 392n43
Hägstrom, W. O., 112
Hall, B. H., 147, 154, 155, 173, 174, 192, 287, 296
Hall, R., 222
Haltiwanger, J., 103
Hampton, K., 170
Harhoff, D., 154
Harrison, R., 138n4
Hascic, I., 202n2, 203, 203n4
Hauger, J. S., 299
Hausman, J. A., 155
Hausmann, R., 373, 373n1, 381, 382n7, 396
Häussler, C., 115
Hayek, F. A., 283
Hecker, D. E., 300
Hege, U., 223
Heinig, S. J., 357
Helmers, C., 152
Helpman, E., 135, 142
Henderson, R., 169, 215, 379
Herr, B. W., 103
Hicks, D., 17, 26
Hidalgo, C. A., 373, 373n1, 381, 382n7, 396
Hitt, L., 175n8
Horn, M. B., 258n30
Howitt, P., 381
Hsu, D., 225
Hu, A. G., 138, 150, 152n19
Huang, C., 150
Huang, K., 113
Huang, W., 17, 43
Hummels, D., 137, 143, 152
Ignatius, D., 354
Ishii, J., 137, 143, 152
Jaffe, A. B., 49, 144, 147, 154, 169, 173, 174, 192, 379
Jakubson, G. H., 345, 345n25, 346
Jang, S.-L., 136n1, 138n3
Jefferson, G. H., 138, 150, 152n19
Jensen, K., 116
Jewkes, J., 377n5
Johnson, C. W., 258n30
Jones, B. F., 2, 3, 17, 43, 49, 50, 55n2, 68, 69, 71, 76, 87, 113, 114, 156, 171
Jones, C. I., 75n1
Jorgenson, D. W., 380
Jungmittag, A., 389n32
Kaiser, J., 349n28, 354
Kalba, K., 388n27
Kaminski, D., 72
Karch, A., 288, 297n6
Kash, D. E., 390n33
Katz, J. S., 17, 26
Kerr, W. R., 11, 169, 200, 215, 222
Khabasa, M., 104
Kiesler, S., 35
Kim, E. H., 2, 76, 99
Kindleberger, C. P., 389
King, A. A., 398n61, 399, 399n63
Klepper, P., 247n20, 278n45
Klepper, S., 235n2
Knook-Cetina, K., 113
Knuth, D., 384n14
Kogut, B., 143, 144
Kolko, J., 171
Kortum, S., 200
Kremer, M., 381
Krugman, P., 135, 137, 142, 143, 152
Kumar, K. B., 296
Lai, R., 144, 144n12
Lanahan, L., 289, 290, 290n2, 292, 294
Landes, D., 390
Lane, J., 103
Lawani, S. M., 17
Lee, C., 354
Lee, J., 380
Lei, Z., 152
Lendel, I., 289, 290, 290n2, 292, 294
Lerner, J., 200
Leslie, S., 330
Levin, S., 340n21
Levinson, M., 387n20, 387n22, 387n23
Libaers, D., 293
Litsikas, M., 399n62, 399n63
Liu, C. C., 53
Lo, A. W., 225
<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowery, D.</td>
<td>296</td>
</tr>
<tr>
<td>Luca, A.</td>
<td>398n61, 399, 400, 400n65</td>
</tr>
<tr>
<td>Magrini, S.</td>
<td>171, 184</td>
</tr>
<tr>
<td>Malerba, F.</td>
<td>282n47</td>
</tr>
<tr>
<td>Mallon, W. T.</td>
<td>293</td>
</tr>
<tr>
<td>Mani, S.</td>
<td>136</td>
</tr>
<tr>
<td>Mansfield, E.</td>
<td>49, 382n9</td>
</tr>
<tr>
<td>Manso, G.</td>
<td>108, 354</td>
</tr>
<tr>
<td>Martin, P.</td>
<td>394</td>
</tr>
<tr>
<td>McHale, J.</td>
<td>77, 80, 97, 98</td>
</tr>
<tr>
<td>Medhi, N.</td>
<td>202n2, 203, 203n4</td>
</tr>
<tr>
<td>Melkers, J. E.</td>
<td>290</td>
</tr>
<tr>
<td>Merton, R.</td>
<td>107, 112</td>
</tr>
<tr>
<td>Mervis, J.</td>
<td>347, 353n30, 357, 360, 361</td>
</tr>
<tr>
<td>Mintrom, M.</td>
<td>297n6</td>
</tr>
<tr>
<td>Mokry, J.</td>
<td>75n1, 107, 108, 113</td>
</tr>
<tr>
<td>Monfort, A.</td>
<td>155</td>
</tr>
<tr>
<td>Morse, A.</td>
<td>12, 76, 99</td>
</tr>
<tr>
<td>Moya-Añegón, F. de</td>
<td>26</td>
</tr>
<tr>
<td>Munger, M. G.</td>
<td>327, 328</td>
</tr>
<tr>
<td>Murphy, C.</td>
<td>387n23</td>
</tr>
<tr>
<td>Murphy, K. M.</td>
<td>68</td>
</tr>
<tr>
<td>Muzyrya, Y.</td>
<td>278</td>
</tr>
<tr>
<td>Nanda, R.</td>
<td>200, 220n9, 220n10, 222, 225, 226</td>
</tr>
<tr>
<td>Nelson, R. R.</td>
<td>108, 173, 383, 411</td>
</tr>
<tr>
<td>Nerkar, A.</td>
<td>215</td>
</tr>
<tr>
<td>Nookala, B. S.</td>
<td>147</td>
</tr>
<tr>
<td>Oettl, A.</td>
<td>77, 80, 97, 98</td>
</tr>
<tr>
<td>Olmeda-Gómez, C.</td>
<td>26</td>
</tr>
<tr>
<td>Olson, G.</td>
<td>3, 35</td>
</tr>
<tr>
<td>Olson, J.</td>
<td>3, 35</td>
</tr>
<tr>
<td>Otsuki, T.</td>
<td>395n51</td>
</tr>
<tr>
<td>Ozcan, Y.</td>
<td>84, 192, 401, 414</td>
</tr>
<tr>
<td>Palmisano, S. J.</td>
<td>371, 394, 395n50</td>
</tr>
<tr>
<td>Pancaldi, G.</td>
<td>113</td>
</tr>
<tr>
<td>Payne, A. A.</td>
<td>287, 296</td>
</tr>
<tr>
<td>Peng, L.</td>
<td>223</td>
</tr>
<tr>
<td>Petsko, G. A.</td>
<td>354</td>
</tr>
<tr>
<td>Plosila, W. H.</td>
<td>294</td>
</tr>
<tr>
<td>Ponzetto, G. A. M.</td>
<td>169, 171</td>
</tr>
<tr>
<td>Popp, D.</td>
<td>202n2, 203, 203n4</td>
</tr>
<tr>
<td>Porter, M.</td>
<td>169, 171, 184</td>
</tr>
<tr>
<td>Potoski, M.</td>
<td>400, 400n66</td>
</tr>
<tr>
<td>Prakash, A.</td>
<td>400, 400n66</td>
</tr>
<tr>
<td>Preston, L.</td>
<td>394</td>
</tr>
<tr>
<td>Price, D. J.</td>
<td>115, 127n6</td>
</tr>
<tr>
<td>Puga, D.</td>
<td>11, 136, 143, 152</td>
</tr>
<tr>
<td>Raballand, G.</td>
<td>387n21</td>
</tr>
<tr>
<td>Ragu, T. S.</td>
<td>399n62, 399n63</td>
</tr>
<tr>
<td>Rajaraman, A.</td>
<td>218</td>
</tr>
<tr>
<td>Rao, S.</td>
<td>399n62, 399n64</td>
</tr>
<tr>
<td>Reiss, P. C.</td>
<td>273n43</td>
</tr>
<tr>
<td>Rhodes-Kropf, M.</td>
<td>200, 222, 225</td>
</tr>
<tr>
<td>Rigby, J.</td>
<td>26</td>
</tr>
<tr>
<td>Rivkin, J.</td>
<td>386n17, 411</td>
</tr>
<tr>
<td>Rizzo, M. J.</td>
<td>345, 345n25, 346</td>
</tr>
<tr>
<td>Roach, M.</td>
<td>24, 359</td>
</tr>
<tr>
<td>Rohwer, G.</td>
<td>297, 297n6</td>
</tr>
<tr>
<td>Romer, P. M.</td>
<td>49, 75n1, 143, 381, 381n6, 386</td>
</tr>
<tr>
<td>Rosenbloom, R. S.</td>
<td>84</td>
</tr>
<tr>
<td>Rosenberg, N.</td>
<td>108, 200</td>
</tr>
<tr>
<td>Rosenkopf, L.</td>
<td>215</td>
</tr>
<tr>
<td>Rossi-Hansberg, E.</td>
<td>143</td>
</tr>
<tr>
<td>Rothenberg, J.</td>
<td>226</td>
</tr>
<tr>
<td>Roychowdhury, V. P.</td>
<td>26n4, 127n6</td>
</tr>
<tr>
<td>Ruegg, R. T.</td>
<td>287</td>
</tr>
<tr>
<td>Rycroft, R. W.</td>
<td>390n33</td>
</tr>
<tr>
<td>Rysman, M.</td>
<td>236n4, 268n37</td>
</tr>
<tr>
<td>Sadun, R.</td>
<td>175n8</td>
</tr>
<tr>
<td>Sahlman, W.</td>
<td>222</td>
</tr>
<tr>
<td>Sakakibara, M.</td>
<td>138n4</td>
</tr>
<tr>
<td>Sala-i-Martin, X.</td>
<td>171, 184</td>
</tr>
<tr>
<td>Samila, S.</td>
<td>200</td>
</tr>
<tr>
<td>Samuelson, P.</td>
<td>322n1</td>
</tr>
<tr>
<td>Santoro, M. D.</td>
<td>287</td>
</tr>
<tr>
<td>Sapolsky, H. M.</td>
<td>288, 289, 299</td>
</tr>
<tr>
<td>Sauermann, H.</td>
<td>24, 115</td>
</tr>
<tr>
<td>Sauter, R.</td>
<td>388n27</td>
</tr>
<tr>
<td>Sawers, D.</td>
<td>377n5</td>
</tr>
<tr>
<td>Saxenian, A.</td>
<td>169</td>
</tr>
<tr>
<td>Scelatto, G.</td>
<td>18</td>
</tr>
<tr>
<td>Schaffer, S.</td>
<td>113</td>
</tr>
<tr>
<td>Schmidt, A. G.</td>
<td>380</td>
</tr>
<tr>
<td>Schumpeter, J. A.</td>
<td>377n5, 383</td>
</tr>
<tr>
<td>Scotchmer, S.</td>
<td>109, 118, 118n4, 123</td>
</tr>
<tr>
<td>Sen, A.</td>
<td>394, 394n48</td>
</tr>
<tr>
<td>Shadish, W. R.</td>
<td>314</td>
</tr>
<tr>
<td>Shapin, S.</td>
<td>113</td>
</tr>
<tr>
<td>Shapiro, P.</td>
<td>292</td>
</tr>
<tr>
<td>Sharma, A.</td>
<td>147</td>
</tr>
<tr>
<td>Sharma, P.</td>
<td>147</td>
</tr>
<tr>
<td>Shine, K.</td>
<td>115</td>
</tr>
<tr>
<td>Sichel, D. E.</td>
<td>236n3</td>
</tr>
<tr>
<td>Silverman, B.</td>
<td>352n29</td>
</tr>
<tr>
<td>Simcoe, T. S.</td>
<td>115, 388n30, 390, 392n40</td>
</tr>
</tbody>
</table>
Simkin, M. V., 26n4, 127n6  
Simon, H. A., 381, 381n6  
Sinai, T., 171  
Singh, J., 72, 144, 210  
Solis, L. E., 399, 399n63  
Sood, N., 296  
Sorensen, A. T., 240n9  
Sorensen, J., 215  
Sorensen, O., 200  
Spencer, W. J., 84  
Srinivasan, T. N., 137, 143, 152  
Stein, J., 109  
Stein, R. M., 225  
Stephan, P., 3, 18, 49, 50, 55, 57, 70, 72, 103, 105, 339, 340n21, 349n27, 350, 351, 358  
Stern, S., 108, 169, 171, 184, 200, 225  
Stevens, D., 103  
Stillerman, R., 377n5  
Stiroh, K. J., 380  
Strickland, S. P., 321, 326, 329, 336  
Stuart, T., 53, 72, 215  
Sun, Z., 152  
Sutton, J., 242n13, 258n32  
Swann, G. M., 396n57  
Talley, E. M., 103  
Tang, L., 80  
Taylor, A. M., 393  
Taylor, C. D., 295  
Teich, A., 290  
Teitelbaum, M., 326n5  
Teodoridis, F., 2, 76  
Teraaak, A., 398n61, 399, 399n63  
Thursby, J., 220  
Thursby, M., 220  
Tilghman, S., 55n2  
Todd, W. J., 289, 292  
Toole, A. A., 287, 296  
Tranjtenberg, M., 138n4, 144, 147, 154, 169, 173, 174, 192, 236n4, 379, 393n46  
Treeratpitu, P., 104  
Trelfer, D., 136, 143, 152  
Tripsas, M., 215  
Trivedi, P. K., 154, 155, 156  
Trognon, A., 155  
Troost, R. P., 290  
Turner, F. J., 371  
Tushman, M. L., 215  
Ullman, J., 218  
Uzzi, B., 17, 49, 68, 87, 113, 114, 171  
Vanderbilt, T., 387n21, 387n22  
Van Reenen, J., 138n4, 175n8, 381, 382, 383n12, 412  
Van Zeebroeck, N., 68n7, 170, 171, 176n9, 190  
Venkatraman, V., 116  
Vergari, S., 297n6  
Vernon, R., 135, 142  
Vilhuber, L., 103  
Visentin, F., 50, 105  
Vogel, R. C., 290  
Volden, C., 297n6  
Waguespack, D. M., 115  
Waldfogel, J., 171, 251  
Waldinger, F., 53, 97  
Walsh, J. P., 80, 173  
Wang, J., 50, 99  
Watson, J., 388n27  
Wayne, L., 295  
Weinberg, B. A., 55n2, 369  
Weinberg, S., 339  
Weitzman, M. L., 43n9, 75n1, 144, 381  
Wellman, B., 170  
White, A., 390  
Williamson, J. G., 393  
Wilson, J., 395n51  
Winter, S. G., 381, 381n6, 383, 384, 411  
Woods, S., 390  
Woodward, S., 222  
Wooldridge, J. M., 155  
Wright, B., 152  
Wright, J., 269n38  
Wuchty, S., 17, 49, 68, 87, 113, 114, 171  
Yang, B., 382n8  
Yates, J., 387n23, 393  
Yi, K.-M., 137, 143, 152  
Yin, P.-L., 278  
Yorgason, D., 143n11  
Youtie, J., 292, 293  
Yu, Z., 152  
Zander, U., 143, 144  
Zhao, M., 142, 143, 152, 155  
Zimmerman, A., 33  
Zingales, L., 2, 76, 99  
Zivin, J. G., 50, 354  
Zucker, L. G., 144, 290  
Zuckerman, H., 50
Subject Index

Page numbers followed by f or t refer to figures or tables, respectively.

Academic knowledge: as collective phenomenon, 49–50; empirical setting for study of, 51–55; industrial innovations and, 49. See also Knowledge production; Scientific knowledge, advancement of frontier of; Scientific productivity
Advertising, apps and, 260–61; organizational structures for, 260
Agnew, Paul, 392–93
Algorithmic frontier, 373, 380–83; using quality management standards to map movement of, 395–401
Algorithms, process of discovery and, 401–3
Amazon Kindle platform, 279
American frontier, 371, 374–76
Android apps, 238
App Annie, 245
Apps. See Mobile applications (apps)
App stores: problems facing collaborative filters of, 241–42; rankings for, 239–41
Atari Democrats, 295
Authors, corresponding, survey of, 23–25
Authorship, conventions of, 114–16
Authorship “law and order,” 114–15
Automated teller machines (ATMs), 393n45
Baliles, Gerald, 295
Basel I, 389
Basel II, 389
Basel III, 389
Basic science, 378, 379f
Bayh-Dole Act (1980), 12, 290, 299
Biotechnology, 20
Brenner, Sydney, 402
Brout, Robert, 128
Bush, Vannevar, 1, 8–9, 10–12, 169, 199, 321–22, 371–72, 379, 403–4; university research and, 351
Cahners, Norman, 387
Cascading Style Sheets (CSS), 388
Cellular technology, adoption of, 387–88
Centers of Excellence programs, 8, 290, 291t, 293–95; discussion of results for study of, 311; empirical results for study of, 306–8, 307t; overlap of, 311–12; as part of portfolio, 312–14
CERN. See European Organization for Nuclear Research (CERN)
China: data and descriptive features of rise of innovation of, 144–52; development in, 135–36; empirical models and regression results on quality and quantity of patenting in, 152–61; location of inventors in, 147–49; ownership of patents in, 146–47; patenting in, 5; research and development (R&D) in, 136–37; types of invention in, 147; US multinational R&D in, 137–44. See also India
Citations, international collaboration and, 26, 27f
Coauthors: contributions to collaboration of, 35–37, 36f; meetings and communication between, 32–35. See also Collaboration
Coauthorship, 17–18, 117
Code division multiple access (CDMA), 388
Coinvention: empirical model and results for, 152–61; lessons from interviews of multinational R&D personnel, 161–63. See also China; India; Research and development (R&D)
Collaboration: advantages and challenges of, 37–40, 39t; bias and, 125–26; central role star scientists in, 97–101; changes in, 76; costs of, 43; declining costs of, and star scientists, 88–92; distance and, 76; evolving role of, in science, 2–3; in field of evolutionary biology, 87–92; improvements in technology and, 92–97; issue of getting credit in joint production and, 43–44; level of, 76; local growth in patenting and, 188–92; model examining effects of improved technology and, 92–97; over distance, 25–31; productivity advantage of, 42–43; reasons for increasing, 44–45, 76–77; scientific, economics of, 40–45; supporting technologies and, 76–77; trend of increasing, in evolutionary biology, 87–92; trends, 17–18; types of, 20–21, 21f; US, 19; variation in, and fields of study, 21–23, 22–23f. See also International collaboration; Scientific collaboration, economics of
Collaborative filters, app store, problems facing, 241–42, 253
Communication costs, invention and, 170
Compatibility standards, 390
comScore, 242–45
Containerized shipping, standardization of, 387
Converters, 392, 392n41
Core technologies, 378, 379f
Corporate apps, 235, 261–62, 266
Corresponding authors, survey of, 23–25
Cox proportional hazard model, 297
Credit, 3–4; formal model of, 118–25; history of, 114–18; implications of formal model of, 125–28; institutions of, 107–8; Matthew Effect and, 112, 126–28; organizational choices and institutions of, 110–14; organizational choices of science and, 108–10; researchers and, 43–44; role of, and shaping of organization of science, 111–13; “salami slicing” and, 116–18, 126
CSS (Cascading Style Sheets), 388
Darwin, Charles, 78
Department of Defense (DOD), 330–31
Discovery: logic of, 338–39; process of, algorithms and, 401–3
Divided technical leadership (DTL), 401; apps and, 280–81
Doriot, George, 372
Eminent Scholars programs, 8, 290–92, 291t; discussion of results for study of, 308–10; empirical results for study of, 304–5, 304t; overlap of, 211–312; as part of portfolio, 312–14
Endless Frontier, The (Bush). See Science: The Endless Frontier (Bush)
Endogenous fixed costs, 242n13
Energy supply, 199–204. See also Renewable energy
Engelbart, Douglas, 404
Englert, François, 128
Entrepreneurship: market-based innovation and, 6–9; mobile software applications and, 7
European Organization for Nuclear Research (CERN), 18
Evolutionary biology: changes in spatial organization of, 75–78; collaboration and, 87–92; data for study of, 78–81; decline in skew of distribution of output across departments in, 81–85; defining knowledge in, 78–79; increasing importance of star scientists in, 85–86; trend of increasing collaboration in, 87–92
Financial Accounting Standards Board (FASB), 389
Firm type: and local growth in patenting, 188–92; multihoming by, 277–78
Fixed marketing costs, 242n13
Freemium apps, 259
Frontier in American History, The (Turner), 371
Frontiers, 371–72; concepts of, 373; historical context of, 373, 374–80; measuring, 373; theoretical context of, 380–83

Gartner, hype cycle, 376, 377f
Generally accepted accounting principles (GAAP), 389
General purpose technologies (GPTs), 235–36, 236n4, 393, 393n46
Globalization, 393; invention and, 169–70; as standardization, 393–95
Global supply chains, 392
Global system for mobile communications (GSM), 387
Google Ngram, 374–76, 375f, 376f, 391
Google Play, 240–41, 241n11
Graduate students: collaboration trends for, 67–69; duration of training of, 55–59; publication trends and, 63–67; time to first publication and, 59–63

Heineman, Dave, 295
Herfindahl-Hirschman Index (HHI), 340–41, 340n22
Higgs, Peter, 128
Higgs mechanism, 128
Hype cycle, Gartner, 376, 377f
HyperText Markup Language (HTML), 388

In-app purchasing (IAP), 25n32, 259
India: data and descriptive features of rise of innovation of, 144–52; development in, 135–36; empirical models and regression results on quality and quantity of patenting in, 152–61; location of inventors in, 147; ownership of patents in, 146–47; patenting in, 5; research and development (R&D) in, 136–37; types of invention in, 147; US multinational R&D in, 137–44. See also China
Industrial frontier, 373; inventions defining, 376–77
Industry evolution, mobile apps and, 234
Industry production networks, 378, 379f
Informal (de facto) standards, 390
Information and communications technology (ICT) platform industries, 235–36
Information technology data, 175–77

Innovation: geography of, 4–6; market-based, entrepreneurship and, 6–9; mobile software applications and, 7; in platform-based industries, 236–39; state policies and, 7–8; venture-backed, 200–201
Interchangeability standards, 390–91
International collaboration, 18, 19, 20; citations and, 26, 27f; growing trend of, 19–23; quality of science and, 26–31; survey evidence, 31–32. See also Collaboration; Scientific collaboration, economics of
International Financial Reporting Standards, 389
International Organization for Standardization (ISO), 396, 396n54; adoption rates of quality-management standards, 398–99, 399f; certification by, 397–400; management standards (ISO 2012), 404–6
International Organization for Standardization (ISO) 1400 series, 396–97
International Organization for Standardization (ISO) 2600 series, 396
International Organization for Standardization (ISO) 9000 series, 396–97, 400n65
Internet: business adoption of, and concentration of patenting, 186–88; business adoption of, and local growth in patenting, 188–92; data for adoption of, and inventive activity, 172–77; geographic concentration of invention and, 170–72. See also Patenting
Interoperability, standards and, 392–93
Invention: factors affecting agglomeration for, 169–70; forces for or against geographic agglomeration of, 170
iOS apps, 238
ISO. See International Organization for Standardization (ISO)
iTunes Store, 239–40

KFC, 393
Killer apps, 238
Kindle platform, 279
Knowledge production: policy implications of results for, 71–72; results for, 69–71. See also Academic knowledge; Scientific knowledge, advancement of frontier of
Knowledge production function, 49
Subject Index

Kornberg, Roger, 354
Kosslyn, Stephen, 116

Least publishable units (LPUs), 116–17
Leavitt, Michael, 295
Logic of discovery, 338–39

Marketing costs, 242, 242n13
Matthew Effect, 112, 126–28
McDonald’s, 393
McLean, Malcolm, 387

Mobile applications (apps), 233–36; advertising and, 260–61; asymmetries between platforms for, 267t; competition among platforms for, 278–80; concentration of, and success, 247–51; corporate, 235, 261–62, 266; data sources for, 242–47; divided technical leadership (DTL) and, 280–81; economic return of development of new, 257–67; entrepreneurship and, 7; first stage of innovation for, 237; “Freemiums,” 259; innovation and, 7; institutional and conceptual bottlenecks of, 282; killer, 238; matching across platforms, 270; matching customers to, 239–42; monetization of, 235, 262–66; network effects and, 237–38; no (current) revenue stream, 261–62; other (currently) zero-revenue, 262–63; paid, 259; relative attractiveness of platforms, 267–69; short-run dynamics of, 251–53; store rankings for, 239–42; “top list” implications for market development of, 253–57; twenty-first century innovation and, 282–85. See also Multihoming

Multihoming, 269–70, 392, 392n41; analysis of, 270; defined, 270; at firm level, 274–77; by firm type, 277–78; weight rates of, 272–74. See also Mobile applications (apps)

Multinational corporations (MNCs):
R&D spending in China and India by, 137–44; US patents awarded to, 136

Nanotechnology, 2, 20
Napolitano, Janet, 295
National Defense Education Act (NDEA), 331
National Governors Association (NGA), state science policies and, 295–97
National Institutes of Health (NIH), 322; cut in fellowships by, in 1970s, 340; doubling in budget of, 1998–2002, 349–51; early years of, 326–29; universities and capacity-building initiatives of, 331–39. See also Science: The Endless Frontier (Bush); Universities National Science Foundation (NSF), 322, 404; cut in fellowships by, in 1970s, 340; early years of, 329–30; universities and capacity-building initiatives of, 331–39. See also Science: The Endless Frontier (Bush)

Network effects, mobile apps and, 237–38

NIH. See National Institutes of Health (NIH)

Novelty, new measure of, 230

NSF. See National Science Foundation (NSF)

On the Origin of Species by Means of Natural Selection (Darwin), 78

Optimum order, 386–87

Paid apps, 259

Pallets, standardization of, 387

Particle physics, 19

Patenting: business adoption of Internet and concentration of, 186–88; business adoption of Internet and growth in, 184–85; characteristics of, by incumbent vs. venture-capital backed firms, 210–19; collaboration, firm type, and local growth in, 188–92; county-level growth in, 171–72; data for, and inventive activity, 172–75; empirical models and regression results on quality and quantity of, 152–61; empirical strategy and results for, 177–92; explosion of, in China and India, 5, 136; increased concentration of, 177–84; Internet adoption and, 188f; Lorenz curve for, by county, 177–80, 180f; rates of, in renewable energy, 204–10; in United States, 6; venture capital-firms and, 7. See also Internet

Platform-based industries, innovation in, 236–39

Platform innovation, mobile apps and, 234

Postdocs: collaboration trends for, 67–69; duration of training of, 55–59; publication trends and, 63–67; time to first publication and, 59–63
President’s Scientific Advisory Committee (PSAC), 336–38
Production recipes, 383–86, 393
Publication: time to first, and scientific productivity, 59–63; trends, for graduate students and postdocs, 63–67

Quality standards, 390–91
Reference standards, 390
Renewable energy: characteristics of patenting by incumbent vs. venture capital-backed firms and, 210–19; data for study of, 202–4; patenting rates in, 204–10
Renewable energy start-ups, venture capital financing of, 220–26
Research and development (R&D): funding for, 8, 8n1; “golden age of,” 401–2; interviews with personnel and multinational, 161–63; multinational, in China and India, 137–44; vertical disintegration of, 137. See also Coinvention
Research systems, Bush’s vision of and present day, 9
Reward structure, scientists and, 110–11
Ricardo, David, 372
Rice cookers, 393n45
Roosevelt, Franklin D., 371–72
Salami slicing, 116–18, 126
Science, 321; evolving role of collaboration in, 2–3; organization of, and credit, 108–14; quality of, and international collaboration, 26–31; role of credit in shaping of organization of, 111–13; spatial organization of, 75–76
Science: The Endless Frontier (Bush), 1, 10–12, 321–22, 372, 379, 403–4; R&D and, 8–9; scientific landscape circa 1940 and, 323–26. See also National Institutes of Health (NIH); National Science Foundation (NSF)
Science frontier, 373
Science institutions, historical perspectives on, 9–10
Sciences, changes in spatial organization of, 75–78
Scientific collaboration, economics of, 40–45. See also Collaboration; International collaboration
Scientific credit. See Credit
Scientific knowledge, advancement of frontier of, 372–73. See also Academic knowledge: Knowledge production
Scientific productivity: duration of training and, 55–59; time to first publication and, 59–63
Scientific Progress, the Universities, and the Federal Government (PSAC), 336–38, 338n18
Scientific research, organization of, 2–4
Scientists, reward structure and, 110–11
Seaborg, Glen T., 336
Seaborg report. See Scientific Progress, the Universities, and the Federal Government (PSAC)
Shannon, Claude, 402
Sputnik, 331
Standardization, globalization as, 393–95
Standards: compatibility, 390; creation and maintenance of, 391–92; defined, 386–87; formal (de jure), 390; historical importance of, 387–89; informal (de facto), 390; interchangeability, 390–91; interoperability and, 392–93; quality, 390–91; quality management, for mapping movement of algorithmic frontier, 395–401; reference, 390; types of, 389–91
Standard setting organizations (SSOs), 392
Star scientists, 76; causal impact of, on departmental performance, 77; central role of, in collaboration, 97–101; declining costs of collaboration and, 88–92; effect of improvements in technology on, 92–97; efficient distribution of, 97–101; increasing importance of, in evolution biology, 85–86
Start-ups, renewable energy, venture capital financing of, 220–26
State Intellectual Property Office (SIPO), 5
State science policies, 7–8, 287–89; background on, 289–95; discussion of study results, 308–15; empirical results for study of, 302–8; methodology for study of, 297–302; motivations for, 295–97
Supply chains, 393, 393n46; growth of, 387; vertical disintegration of, invention and, 169–70
TCP/IP protocol stack, 388
Technology, improvements in, and collaboration, 92–97
Term frequency inverse document frequency (TF-IDF), 230
Training, duration of, and scientific productivity, 55–59
Turner, Frederick Jackson, 371, 372

United States: collaborations in, 19; frontiers and, 374–83; patenting in, 6
Universities: capacity-building initiatives of NIH and NSF and, 331–39; challenges threatening research and health of, 353–60; contributions to research and equipment costs by, 343–49; evaluation of research by, 351–53; over expansion of research facilities by, 357; PhD production and market for research positions demand, 355–56; reliance on federal funding and, 359–60; research by, in 1970s, 339–41; research by, in 1980s–1998, 341–43; research funding mix and, 357–59; risk aversion and research by, 354–55
University research, Bush and, 351

University Research Grants program, 8, 290, 291t, 292–93; discussion of results for study of, 310–11; empirical results for study of, 305–6, 306t; overlap of, 311–12; as part of portfolio, 312–14
US-only collaborations, 20

Value creation, mobile apps and, 234
Venture-backed innovation, 200–201
Venture capital-backed firms (VCs), 372; characteristics of patenting, by incumbent vs., 210–19; patents and, 7
Venture capital financing, of renewable energy start-ups, 200–226
Vertical disintegration of supply chains, invention and, 169–70
Vizio, 392
Walmart, 392, 392n42
Watson, James, 117
Wiener, Norbert, 402
World Wide Web Consortium (W3C), 388