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Curriculum Vitae
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Date of Birth: March 1, 1945

Education: B.A., Physics, Wellesley College, 1966
Ph.D., Economics, Stanford University, 1988
[M.A., Oxford University, 1996]

CURRENT POSITIONS

2015 to present: Visiting Professor, Max Planck Institute, Munich.

2012 to present: Visiting Fellow, National Institute of Social and Economic Research, London.

1995 to present: International Research Associate, Institute for Fiscal Studies, London.

1988 to present: from Faculty Research Fellow to Research Associate, National Bureau of Economic Research, Member, Programs on Productivity and Technical Change; Industrial Organization

1987 to present: from Assistant Professor to Full Professor Emerita of Economics, University of California at Berkeley.

PAST POSITIONS:

2005 to 2015: Professor of Technology and the Economy, University of Maastricht, Netherlands and Professorial Research Fellow, UNU-MERIT.

1977 to 2012: Founder, Owner, and Partner, TSP International, a computer software firm that maintained, distributed, and did continuing development on the TSP econometrics package.

1996 to 2001: Temporary Professor of Economics, Oxford University, and Professorial Fellow, Nuffield College.

PUBLICATIONS

“Is there a role for patents in the financing of innovative firms?” (2018). **Industrial and Corporate Change**, forthcoming. [NBER Working Paper No. 24370. Max Planck Institute for Innovation and Competition Research Paper No. 18-06.]

“Measuring Science, Technology, and Innovation: A Review” (2018), with Adam Jaffe. **Annals of Science and Technology Policy** 2 (1): 1-74. *doi: 10.1561/110.00000005*.
[Report for the Panel on Developing Science, Technology, and Innovation Measures for the Future, National Academy of Science (May 2012).]

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“The Market Value of R&D in Emerging Economies: Evidence from India” (2017), with Sunil Kanwar. **B. E. Journal of Economic Analysis and Policy** 17(1), *doi: 10.1515/bejeap-2016-0103*.

[NBER Working Paper No. 21196 (May).]

“Financing constraints, R&D investments and innovative performances: new empirical evidence at the firm level for Europe” (2016), with Pietro Moncada-Paterno-Castello, Sandro Montresor, and Antonio Vezzani, **Economics of Innovation and New Technology** 25 (3): 183-196.

“Patents as Quality Signals? The Implications for Financing Constraints on R&D” (2017), with Dirk Czarnitzki (KU Leuven) and Hanna Hottenrott (DICE, Heine Universitaet, Dusseldorf). **Economics of Innovation and New Technology** 25 (3): 197-217. *doi: 10.1080/10438599.2015.1076200*.

[NBER Working Paper No. 19947; UNU-MERIT wp2014-013; NIESR Discussion Paper No. 430.]

“Appropriability mechanisms, innovation and productivity: Evidence from the UK,” with Vania Sena, University of Essex (2017). **Economics of Innovation and New Technology** 26 (1-2): 42-62. *doi:10.1080/10438599.2016.1202513*.

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“An Empirical Analysis of Primary and Secondary Pharmaceutical Patents in Chile,” with Maria Jose Abud Sittler and Christian Helmers (2015). **PLOS ONE**. *doi:10.1371/journal.pone.0124257*.

[NBER Working Paper No. 20995.]

“The choice between formal and informal intellectual property: A literature review,” with Christian Helmers, Mark Rogers, and Vania Sena (2014). **Journal of Economic Literature** 52(2): 375–423. *doi:10.1257/jel.52.2.375*.

[NBER Working Paper No. 17983 (April 2012, revised May 2013)].

“Does Patent Protection Help or Hinder Technology Transfer? (2014). In S. Ahn, B. H. Hall, and K. Lee (eds.), **Intellectual Property for Economic Development: Issues and Policy Implications**, Edward Elgar.

“Innovation and Productivity: An Update,” with Pierre Mohnen (2013). **Eurasian Business Review** 3(1): 47-65.

[UNU-MERIT Working Paper No. 2013-021]

“The importance (or not) of patents to UK firms,” with Christian Helmers, Mark Rogers, and Vania Sena (2013). **Oxford Economic Papers** 65 (3): 603-629. *doi:10.1093/oenp/gpt012*.

[NBER Working Paper No. 19089; NIESR Discussion Paper].

“Innovation in clean/green technology: Can patent commons help?,” with Christian Helmers (2013). **Journal of Environmental Economics and Management** 66(1): 33-51, *doi:10.1016/j.jeem.2012.12.008*.

[Paper presented at the Sciences Po Workshop on Innovation without Patents, Paris, France, June 2010. NBER Working Paper No. 16920 (March 2011); UNU-MERIT Working Paper No. 2011-025].

“Evidence on the impact of R&D and ICT investment on innovation and productivity in Italian firms,” with Francesca Lotti and Jacques Mairesse (2013), **Economics of Innovation and New Technology** 22 (3): 300-328. *doi:10.1080/10438599.2012.708134*

[Revised version of paper presented at the Concord 2010 Conference, Seville, Spain, March 2010. NBER Working Paper No. 18053 (May 2012); Banca d'Italia Temi di discussione (Economic working papers) 874]

“Recent Research on the Economics of Patents,” with Dietmar Harhoff (2012). **Annual Review of Economics** 4: 541-565.

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“The Internationalization of R&D” (2011), in A. Sydor (ed.), **Global Value Chains: Impacts and Implications**, Ottawa, Canada: Foreign Affairs and International Trade Canada, Government of Canada, pp. 179-210. Also published as “Internationalisation de la R-D,” in A. Sydor (ed.), **Les chaînes de valeur mondiales : impacts et implications**, pp. 215-252. [UNU-MERIT Working Paper 2011-049].

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“The role of patent protection in (clean/green) technology transfer,” with Christian Helmers, **Santa Clara High Technology Law Journal** 26 (2010): 487-532.

[NBER Working Paper No. 16323; Oxford CSAE WPS/2010-23; UNU-MERIT Working Paper No. 2010-046]. Reprinted in Peter Menell and Sarah Tran (eds.), *Intellectual Property, Innovation and the Environment*, Edward Elgar.

“The Private Value of Software Patents” (2010), with Megan MacGarvie, **Research Policy**, 39 (7): 994-1009.

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“Measuring the Returns to R&D” (2010), with Jacques Mairesse and Pierre Mohnen. In Hall, B. H. and N. Rosenberg, **Handbook of the Economics of Innovation**, Elsevier (April), pp. 1034-1076.

[NBER Working Paper No. w15622 (December 2009), UNU-MERIT Working Paper No. 2010-006, Montreal: CIRANO Scientific Series 2010s-02].

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“Issues in and Possible Reforms of the U. S. Patent System” (2009), in S. Nagaoka, M. Kondo, K. Flamm, and C. Wessner (eds.), **21st Century Innovation Systems for Japan and the United States**, Washington, DC: The National Academies Press. Reprinted in C. Sri Krishna (ed.), **Patent Reforms: Policy Approaches**. Hyderabad, India: Amicus Books, ICFAI (2009).

[presentation to the Cooperative Symposium on 21st Century Innovation Systems for Japan and the United States: Lessons from a Decade of Change, 10 January 2006, Tokyo, Japan.]

“Innovation and Productivity in SMEs: Empirical Evidence for Italy” (2009), with Francesca Lotti and Jacques Mairesse, **Small Business Economics** 33: 13-33.

[Paper presented at the Workshop on Drivers and Impacts of Corporate R&D in SMEs, Seville, September 18, 2008; NBER Working Paper No. 14594; Banca d'Italia Temi di discussione (Economic working papers)]

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“Financial Patents in Europe” (2009), with Grid Thoma and Salvatore Torrisi, **European Management Review** 6: 45-63. Reprinted in Thoma (ed.), **Patent Management and Valuation** (2017), New York: Routledge.

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“R&D and Financial Investors” (2009), with Alessandro Grandi and Raffaele Oriani, Chapter 4 of V. Chiesa and F. Frattini (eds.), **Evaluation and Performance Measurement of Research and Development**, Cheltenham, UK: Edward Elgar, pp. 143-165.

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[UNU-MERIT Working Paper No. 2006-043; IFS Working Paper No. 06/24, NBER Working Paper No. 13296]

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[Universite Paris I, CREST-ENSAE, and UC Berkeley, June 2005. Revised version of paper presented at the Conference in Memory of Keith Pavitt, SPRU, University of Sussex, UK, November 2003. NBER Working Paper No. 11739; UNU-MERIT Working Paper No. 2006-042]

“Does the Market Value R&D Investment by European Firms? Evidence from a Panel of Manufacturing Firms in France, Germany, and Italy” (2006), with Raffaele Oriani, **International Journal of Industrial Organization** 24: 971-993.

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[European University Institute ECO-WP Number 2004/15. University of Cambridge: Cambridge Business Research Working Paper No. 292. Newer version as NBER Working Paper Number 11120 (February 2005)]

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[Paper presented at the Zvi Griliches Memorial Conference, Paris, August 2003 and the Tor Jakob Klette Memorial Conference, Oslo, Norway 2004, IFS Working Paper No. 06/23, NBER Working Paper No. 13473 (September 2007)].

“Uncovering General Purpose Technologies using Patent Data” (2005), with Manuel Trajtenberg. In Antonelli, C., D. Foray, B. H. Hall, and W. E. Steinmueller, **New Frontiers in the Economics of Innovation and New Technology**, Cheltenham, UK: Edward Elgar (paperback edition 2007). NBER Working Paper No. 10901 (Nov. 2004), Revision of paper prepared for presentation at a conference honoring Paul A. David, May 20-21, 2000, Torino, Italy].

“A Note on the Bias in the Herfindahl Based on Count Data” (2005), **Revue d'Economie Industrielle**, No. 110: 149-156.
[revision of a note published in A. Jaffe and M. Trajtenberg (eds), **Patents, Citations and Innovations**, Cambridge, MA: The MIT Press, 2002].

“Market Value and Patent Citations” (2005), with Adam Jaffe and Manuel Trajtenberg. **Rand Journal of Economics** 36: 16-38.
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“Testing for Unit Roots in Panel Data: An Exploration with Real and Simulated Data” (2005), with Jacques Mairesse, in Andrews, D., and Stock, J. (eds.), **Identification and Inference in Econometric Models: Essays in Honor of Thomas J. Rothenberg**, Cambridge University Press.
[Nuffield College, Oxford, UC Berkeley, INSEE-CREST, and NBER: September 1999. Revised version presented at the World Congress of the Econometric Society, Seattle, August 2000 and the Conference in Honor of T. Rothenberg, University of California at Berkeley, August 2001.]

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[invited lecture at the ZEW Workshop on Empirical Economics of Innovation and Patenting, Mannheim, Germany, March 14/15, 2003. NBER Working Paper No. 10605 (July 2004). University of Cambridge: Cambridge Business Research Working Paper No. 292 (September 2004).]

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[Paper presented in Kansai, Japan, August 2002, European University Institute ECO-WP Number 2004/14.]

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[NBER Working Paper No. 10212 (Jan. 2004).]

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“On Copyright and Patent Protection for Software and Databases: A Tale of Two Worlds” (2004), in Granstrand, Ove (ed.), **Economics, Law, and Intellectual Property**, Boston/Dordrecht: Kluwer Academic Publishers, pp. 259-278.
[presented at the ESF-IIASA-NSF Science Policy Workshop on Digital Collaboration Technologies, Laxenburg, Austria, December 1999.]

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and Competition Policy Center Working Paper No. CPC03-038.]

“Post-issue Patent ‘Quality Control’: A Comparative Study of U.S. Patent Re-examinations and European Patent Oppositions” (2003), with Stuart J. H. Graham, Dietmar Harhoff, and David C. Mowery. In W. Cohen and S. Merrill (eds.), **Intellectual Property in the Knowledge-Based Economy**. Washington, DC: National Academies Press.

[NBER Working Paper No. 8807 (February 2002)].

“Adoption of New Technology” (2003), with Beethika Khan. In Jones, Derek C. (ed.), **New Economy Handbook**, Amsterdam: Elsevier Science.

[NBER Working Paper No. W9730. UC Berkeley Department of Economics Working Paper No. E03-330.]

“Universities as Research Partners” (2003), with Albert N. Link and John T. Scott. **Review of Economics and Statistics** 85: 485-491.

Reprinted in Martin, S. (ed.), *Market Failure*, The International Library of Critical Writings in Economics, Cheltenham, UK: Edward Elgar (2018).

Reprinted in Link, A. N. (ed.), **Entrepreneurship and Technology Policy**, Cheltenham, UK: Edward Elgar (2005).

Reprinted in Audretsch, D. B. and A. N. Link (eds.). **Universities and the Entrepreneurial Ecosystem** Cheltenham, UK: Edward Elgar (2016).

[Paper prepared for presentation at the ASSA Meetings, Boston, Mass., January 7-9, 2000. UC Berkeley, Oxford University, University of North Carolina, and Dartmouth College. NBER Working Paper No. 7643 (March 2000).]

“The Financing of Research and Development” (2002), **Oxford Review of Economic Policy** 18 (1): 35-51.

Reprinted in A. Bartzokas and S. Mani (eds.), **Financial Systems, Corporate Investment in Innovation and Venture Capital**, Cheltenham, UK: Edward Elgar, (2004); P. Auerswald and A. Bozkaya (eds.), **Financing Entrepreneurship**, Cheltenham, UK: Edward Elgar (2008); D. C. Mowery and J. Fagerberg (eds.), **Innovation, Technology and Economic Change**, Cheltenham, UK: Edward Elgar (2014).

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“Investissement des entreprises et contraintes financières en France et aux États-Unis” (2001), with Jacques Mairesse and Benoit Mulkay. **Économie et Statistique** No. 341-342 (Juillet): ____.

“The Effects of Strengthening Patent Rights on Firms Engaged in Cumulative Innovation: Insights from the Semiconductor Industry” (2001), with Rosemarie Ham Ziedonis. In Libecap, Gary (ed.), **Entrepreneurial Inputs and Outcomes: New Studies of Entrepreneurship in the United States**, Vol. 13 of **Advances in the Study of Entrepreneurship, Innovation, and Economic Growth**, Amsterdam: Elsevier Science.

“Investment and R&D in France and in the United States” (2001), with Benoit Mulkay and Jacques Mairesse. In Herrman, Heinz, and Rolf Strauch (eds.), **Investing Today for the World of Tomorrow**, Springer Verlag. [Oxford: Nuffield College Economics Discussion Paper No. 143 (March 1998); NBER Working Paper No. 8038 (December 2000); Université Paris I: CNRS Cahiers de l’Innovation No. 00035 (2000); presented at the Conference on Financing and Entrepreneurship in Science-Based Industries, January 22-23, Mannheim, Germany, the 1999 European Meetings of the Econometric Society, Santiago de Compostella, Spain (August 1999); revised version presented at the Deutsche Bundesbank, April 27-29, 2000, Frankfurt, Germany.]

“The patent paradox revisited: an empirical study of patenting in the U.S. Semiconductor Industry, 1979-1995” (2001), with Rosemarie Ham Ziedonis. **Rand Journal of Economics** 32: 101-128.

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[Presented at the NBER Conference on the Patent System and Innovation, Santa Barbara, January 1999. NBER Working Paper No. 7062 (March 1999). University of California at Berkeley Dept. of Economics Working Paper No. E99-268 (May 1999)].

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“Heart of Darkness: Public-Private Interactions Inside the R&D Black Box” (2000), with Paul A. David. **Research Policy** 29: 1165-1183.

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SHORTER PAPERS AND COMMENTS

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“Models of Research Funding: Discussion” (2003), in A. Guena, A. Salter, and W. E. Steinmueller (eds.), **Science and Innovation: Rethinking the Rationales for Funding and Governance**. Edward Elgar.

“University-Industry Research Partnerships and Intellectual Property – A View from the United States” (2001), in Granstrand, Ove (ed.), **IPR Aspects of Internet Collaborations**, European Commission (DG Research) Workshop Report (March).

“Investment and Taxation in Germany - Evidence from Firm-Level Panel Data by Harhoff and Ramb: Discussion” (2001), in Herrman, Heinz, and Rolf Strauch (eds.), **Investing Today for the World of Tomorrow**, Springer Verlag.

“Tax Policy and Investment Incentives, by Kevin Hassett and Glenn Hubbard: Comment” (1996), in Auerbach, Alan (ed.), **Fiscal Policy: Lessons from Economic Research**, Cambridge, Mass.: MIT Press.

“Valuing Intangible Assets” (1997). Nuffield College, Oxford University: photocopied.

“Incremental Tax Credits for R&D: The United States Experience” (1005), presentation to the Save British Science meeting on measures to encourage innovation in industry, Milton Hill, Abingdon, UK, June 3.

“Fiscal Policy Towards R&D in the United States: Recent Experience” (1995), presentation to the OECD meeting on Fiscal Measures to Promote R&D, Paris, France, January 19.

“On the Sensitivity of R&D to Delicate Tax Changes: The Behavior of U.S. Multinationals in the 1980s, by James R. Hines, Jr.: Comment” (1995), in Slemrod, Giovannini, and Hubbard (eds.), **International Aspects of Taxation**, NBER Conference Volume, University of Chicago Press, Chicago, Ill.

“Empirical Analysis of the Size Distribution of Farms: Discussion” (1987), **American Journal of Agricultural Economics**, May.

BOOKS and SPECIAL JOURNAL ISSUES edited

“Financing constraints, R&D investments and innovative performances: new empirical evidence at the firm level for Europe” (2016), with Pietro Moncada-Paterno-Castello, Sandro Montresor, and Antonio Vezzani, **Economics of Innovation and New Technology** 25 (3).

Intellectual Property for Economic Development: Issues and Policy Implications, (2013), with Sanghoon Ahn and Keun Lee, Korean Development Institute. Cheltenham: Edward Elgar.

“Empirical studies of employment and performance of scientists and engineers” (July 2010), with Andries de Grip and Wendy Smits, **Economics of Innovation and New Technology** 19 (5).

Handbook of the Economics of Innovation (2010), with Nathan Rosenberg, Elsevier.

“Property and the Pursuit of Knowledge: IPR issues affecting scientific research” (2006), with Paul A. David, **Research Policy** 35 (6).

“Empirical studies of innovation in the knowledge driven economy: An introduction” (2006), with Jacques Mairesse. **Economics of Innovation and New Technology** 15(4/5). [NBER Working Paper No. w12320; UNU-MERIT Working Paper No. 2006-028]

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“Technology Policy: The Assessment” (2002), **Oxford Review of Economic Policy** 18 (1).

“Économie et Économétrie de l'Innovation: Avant-propos” (en français) and “Overview” (in English) (1998), with David Encaoua, François Laisney, and Jacques Mairesse, **Annales d'Économie et de Statistique** 49/50 (Janvier-Juin): 1-50.

“The Effects of Technology and Innovation on Firm Performance, Employment, and Wages: Introduction” (1998), with Francis Kramarz. Introduction to a special volume of **Economics of Innovation and New Technology**, Volume 5 (2/4).

UNPUBLISHED WORKING PAPERS

“Should there be lower taxes on patent income?” (2018), with Fabian Gaessler and Dietmar Harhoff. MPI Munich. NBER Working Paper No. 24843. Max Planck Institute for Innovation and Competition Research Paper No. ____.

“Assessing the Effectiveness of the Eco-Patent Commons: A Post-mortem Analysis (2018), with Jorge Contreras and Christian Helmers. Waterloo, Canada: CIGI Working Paper No. 161.

“The impact of international patent systems: Evidence from accession to the European Patent Convention” (2018), with Christian Helmers. (January 2012, revised January 2018). NBER Working Paper No. 24207. Max Planck Institute for Innovation and Competition Research Paper No. 18-03.

“IP use in middle income countries: The case of Chile (2018), with Carsten Fink and Christian Helmers. WIPO, Geneva. NBER Working Paper No. 24348. WIPO Economic Research Paper No. 43.

“Technology Entry in the Presence of Patent Thickets,” with Christian Helmers, and Georg von Graevenitz (July 2015). NBER Working Paper No. 21455 (August 2015, revised January 2017). Queen Mary University of London CGR Working Paper No. 60.

“The market value of patents and R&D: Evidence from European firms,” with Grid Thoma and Salvatore Torrisi, UC Berkeley and University of Maastricht, University of Camerino, University of Bologna, and CESPRI, October 2006, NBER Working Paper No. 13426 (September 2007), revised 2010.

“The Use and Value of Patent Rights,” in UK IPO (eds.), *The Economic Value of Intellectual Property: An Agenda for Policy-Relevant Research*,” Report of a forum hosted by David Lammy, Minister of State for Intellectual Property, June 2009.

“Do R&D Tax Credits Increase Innovation? Panel Evidence from US Firms,” with Nicholas Bloom (Stanford University), Chiara Criscuolo (LSE), and John Van Reenen (LSE),” first draft, April 2008, for presentation at the International Conference on Knowledge for Growth, Toulouse, July 7-9, 2008.

“Which firms participate in open source software development? A study using data from Debian,” with Rishab Ghosh and Kirsten Haaland, UNU-MERIT, The Netherlands, May 2008, presented at the DIME-DRUID Fundamental on Open and Proprietary Innovation Regimes, Copenhagen, June 2008.

“An Empirical Analysis of Patent Litigation in the Semiconductor Industry ,” with Rosemarie Ham Ziedonis, paper presented at the ASSA meetings, Chicago, IL, 4-7 January 2007, and the EPIP Annual Conference, Lund, Sweden, September 2008.

“Innovation in Non-bank Payment Systems,” (2007). [Paper presented at the Federal Reserve Bank of Kansas City 2007 Payments Conference, Santa Fe, New Mexico, May 2-4, 2007].

“Comparing the Market Valuation of Innovative Assets in U.S. and German Firms,” with Dirk Czarnitzki, paper presented at the International Industrial Organization Conference, Chicago, April 23-24, 2004 and the Applied Econometrics Association Conference, Singapore, July 2004. *under revision*

“Incentives for Knowledge Production with Many Producers,” paper presented at the European Commission/NSF/OECD Conference on Networks of Knowledge: Research and Policy for the Knowledge-Based Economy, Brussels, June 7/8, 2004.

“A Note on Measurement Error and Proxy Variables,” May 2004.

“Business Method Patents, Innovation, and Policy,” paper prepared for the Financial Markets Conference of the Atlanta Federal Reserve Bank, Sea Island, Georgia, April 3-5, 2003. NBER Working Paper No. W 9717. UC Berkeley Department of Economics Working Paper No. E03-331 and Competition Policy Center Working Paper No. CPC03-039.

“Universities as Partners in ATP-Funded Research Projects,” with Albert N. Link and John T. Scott. Report to the Advanced Technology Program. UC Berkeley, Oxford University, University of North Carolina, and Dartmouth College. (Final version 2002; Preliminary version April 1998).

“Intellectual Property Strategy in the Global Cosmetics Industry,” with Dietmar Harhoff. 2002. Ludwig-Maximilians-Universitaet Muenchen and UC Berkeley.

“Redefining the Takeover Target: An Empirical Investigation Using Duration Models,” with Constance Phelizon. UC Berkeley and Université Paris I: Photocopied.

“Mergers and R&D Revisited.” Paper prepared for an NBER Conference on Mergers and Productivity, Key Largo, Florida, January 1997; revised for a Eurofin Conference on Restructuring in Science-Based Industries, Milano, Italy, May 1999 and the UC Berkeley/NSF Symposium on Quasi-experimental Methods in Economics, August 1999.

“Differences in Reported R&D Data on the NSF/Census RD-1 Form and the SEC 10-K Form: A Micro-Data Investigation,” with William F. Long. NBER, UC Berkeley, Oxford University, and BPRA. Photocopied (October 1997, revised October 1999).

“Market Value, Market Share, and Innovation,” with Katrin Vopel. NBER, the University of California at Berkeley, and the University of Mannheim. Photocopied (May 1996, revised May 1997).

“The Role of Working Capital in the Investment Process,” with Hugo Kruiniker. NBER, the University of

California at Berkeley, and the Rijksuniversiteit Limburg; Photocopied (December 1995).

“Firm-Level Investment with Liquidity Constraints: What Can the Euler Equations Tell Us?” NBER and the University of California at Berkeley (April 1991).

“Investment and Research and Development at the Firm Level: Does the Source of Financing Matter?” Paper presented at the International Conference on Quantitative Economics and Its Applications to Chinese Economic Development and Reform in the 1990s, Beijing, People's Republic of China, June 24-28, 1990 (published in Chinese), and at the North American Winter Meetings of the Econometric Society, Washington D.C., December 28-30, 1990. IBER Working Paper No. 92-194 (May 1992). NBER Working Paper No. 4096 (June 1992).

“Research and Development as an Investment,” with Fumio Hayashi. NBER Working Paper No. 2973 (May 1989).

“The Value of Intangible Corporate Assets: An Empirical Study of the Components of Tobin's Q.” University of California at Berkeley and NBER (1988). IBER Working Paper No. 93-207 (January 1993).

“Fishing Out or Crowding Out?: An Analysis of the Recent Decline in U.S. Patenting.” University of California at Berkeley and NBER, (March 1988).

“Estimation of the Probability of Acquisition in an Equilibrium Setting.” Berkeley, CA: IBER Working Paper No. 8887 (August 1988). Revised January 1991.

“A Descriptive Analysis of the Growth and Fluctuations of French Manufacturing Firms.” NBER and ENSAE/INSEE, (June 1987).

TECHNICAL REPORTS

Assessing the Effectiveness of the Eco-Patent Commons: A post-mortem analysis (2017), with Jorge Contreras and Christian Helmers. Waterloo, Canada: Center for International Governance of Innovation Report No. 161.

The use of intellectual property in Chile, with Maria Jose Abud, Carsten Fink, and Christian Helmers. INAPI-WIPO Report, Economic Research Working Paper No. 11 (July 2013).

Is Intellectual Property Important for Future Manufacturing Activities?, Report for UK Government Foresight Future of Manufacturing Specification 1.15 (May 2013).

A study of patent thickets, with Georg von Graevenitz, Christian Helmers, and Chiara Rosazza-Bondibene. Report for the UK Intellectual Property Office (October 2012).

The importance of patents and other formal intellectual property in comparison to informal protection methods, with Christian Helmers, Mark Rogers, and Vania Sena (2011). Report to the UK Intellectual Property Office.

Government Policy for Innovation in Latin America, a Report to the World Bank, May 2005.

The California R&D Tax Credit: Description, History, and Economic Analysis, with Marta Wosinska. UC Berkeley: Report to the California Council on Science and Technology, June 1999.

Effectiveness of Research and Experimentation Tax Credits: Critical Literature Review and

Research Design, Report written for the Office of Technology Assessment, U.S. Congress, Washington, DC, June 1995.

DATA, DATA DOCUMENTATION, AND COMPUTATIONAL PUBLICATIONS

“Methods and software for the harmonization and integration of datasets: A test based on IP-related data and accounting databases with a large panel of companies at the worldwide level,” 2010, with G. Thoma, S. Torrisi, A. Gambardella, D. Guellec, and D. Harhoff. Paris, France: NBER Working Paper No. 15851. OECD/DSTI Working Paper DSTI/DOC(2010)99, available at www.oecd.org/sti/working-papers [paper presented at the EPO/OECD Conference on Patent Statistics for Policy Decision Making, Vienna, Austria, 3-4 September, 2008.]

TSP 5.1 User's Manual, Palo Alto, 2009 (and prior editions from Version 3.0, 1981).

TSP 5.1 Reference Manual, Palo Alto, 2009 (and prior editions from Version 3.0, 1981).

“The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools,” with Adam Jaffe and Manuel Trajtenberg. In A. Jaffe and M. Trajtenberg (eds), **Patents, Citations and Innovations**, Cambridge, MA: The MIT Press, 2002. [NBER Working Paper No. 8498 (October 2001). CEPR Discussion Paper No. 3094 (December 2001).] <http://www.nber.org/patents>

TSP Handbook to accompany Pindyck and Rubinfeld, *Econometric Models and Economic Forecasts*, Irwin-McGraw-Hill, 1997 (with Sergio L. Schmukler).

“The Manufacturing Sector Master File: 1959-1987.” NBER Working Paper No. 3366 (1990). <http://www.nber.org/ftp/bhhall>

“The R&D Master File: Documentation,” with C. Cummins, E. S. Laderman, and J. Mundy. August 1982; revised 1983, 1984, 1985, 1988. NBER Technical Working Paper No. 72 (December 1988).

“Software for Computation of Tobit Model Estimates.” **Journal of Econometrics** 24 (1984): 215-22.

“Historical R&D Panel: 1957-1977 Public Use Correlation Matrices.” Computer tape documentation, September 1984.

“Census R&D Data Match Project: A Progress Report,” with Zvi Griliches. Paper presented at the Workshop on the Development and Use of Longitudinal Establishment Data, Bureau of the Census, Washington, D.C., January 14-15, 1982.

“A General Framework for the Time Series-Cross Section Estimation.” Paper presented at the INSEE-CNRS Conference on the Economics of Panel Data, Paris, France, August 1977. **Annales de l'INSEE** 30-31, Avril-Sept.1978.

“The Canadian Industrial Organization Data Base.” Cambridge, Mass.: Harvard Institute of Economic Research Technical Paper No. 15 (October 1977), (with Richard E. Caves).

FELLOWSHIPS, HONORS, AND VISITING POSITIONS

National Associate of the National Research Council, 2016-
Università Luigi Bocconi, Milano, Italy, Spring 2012.

Center for Advanced Studies, Norwegian Academy of Science, Oslo, Norway, Spring 2008.
 Visiting Professor, Hitotsubashi University, Tokyo, Japan, Winter 2008.
 Senior Visiting Fellow, Institute of Advanced Studies, Universita di Bologna, Italy, Spring 2007.
 Visiting Researcher, Ente “Luigi Einaudi”, Bank of Italy, Rome, Spring 2006.
 Visiting Professor, Ludwig-Maximilians University of Munich, Germany, December 2005.
 Visiting Professor, Katholieke Universitat Leuven, Belgium, September 2005.
 Fulbright Distinguished Visiting Professor, EUI, Florence, Winter 2004.
 Deloitte Distinguished Visitor, Judge Institute of Management, Cambridge, UK, 2004.
 Visiting Fellow, Sidney Sussex College, Cambridge, UK, 2004.
 Visiting Professor of Economics, Scuola Sant’anna Superiore, Pisa, June 2003.
 TIM Visiting Professor of Economics, Scuola Sant’anna Superiore, Pisa, June 2002.
 Omnitel Professor of Economics, Scuola Sant’anna Superiore, Pisa, June 2001.
 Visiting Research Professor, Wissenschaftszentrum Berlin, May 2000.
 Resident, Bellagio Study and Conference Center of the Rockefeller Foundation, April 1998.
 Temporary Professor of Economics and Fellow of Nuffield College, Oxford University, 1996-2001.
 Visiting Professor, New Economics School, Moscow, March-April 1996.
 Economics Visitor, Nuffield College, Oxford University, Spring Term 1995; May 1996.
 Visiting Researcher, CREST/INSEE, Paris, April-June 1987; January-July 1991; January-March 1995; June 1996.
 Invited lecturer on Panel Data Econometrics, Complutense University, Madrid, March 1993.
 Invited visitor, MERIT, University of Limburg, Maastricht, The Netherlands, October 1992.
 Hoover Institution National Fellow, 1992-1993.
 Alfred P. Sloan Dissertation Fellowship, 1985-1986.
 Sigma Xi Society, 1966.
 Who’s Who in Economics, 1995-present.
 Who’s Who, 1997-present.

PROFESSIONAL SERVICE

Current:

Member, Center on Innovation, College de France, Paris, 2016-
 Panel member, European Research Council Advanced Grant evaluation panel, 2014/2016/2018
 International Advisory Panel, Te Punaha Matatini Centre of Research Excellence, New Zealand, 2014-
 Member, Conference on Income and Wealth, 1988-

Series Editor, *Practical Econometrics*, Oxford University Press
 Associate Editor, *Industrial and Corporate Change*, 2008-
 Associate Editor, *Economics of Innovation and New Technology*, 1994-

Past:

International Advisory Board, Solvay School of Economics and Management, Univ Libre de Bruxelles, 2014-2017
 Advisory Board member, National Institute of Social and Economic Research, London UK, 2014-2016
 Panel member, Science of Research, Innovation and Enterprise programme, Singapore National Science Foundation, 2014-2015
 Scientific Advisory Board, DIW (German Institute of Economic Research), Berlin, 2010-2015
 Economic and Scientific Advisory Board, European Patent Office, 2012-2015
 Panel Member, European Research Council Consolidator Grant evaluation panel, 2012-2013
 Scientific Advisory Committee, SIMPATIC research network, EU 7th Framework program, 2012-2014
 Committee to Assess the Value of Research in Advancing National Goals, National Research Council, US

National Academies, 2012-2014
 Board of Management, International Schumpeter Society, 2010-2014
 Scientific Council, Solvay School of Economics and Management, Univ Libre de Bruxelles, 2009-2014
 Consultant, WIPO, Geneva, 2009; 2011-2013
 Advisory Board member, Innovation Research Centre, Imperial College, University of London, and University of Cambridge, 2009-2013
 International Scientific Board, SEEK, ZEW, Mannheim, Germany, 2010-2013
 Founding board member, European Policy for Intellectual Property Association, 2005-2012
 High Level Panel on Innovation Indicators, DG Research, European Commission, Brussels, 2010-2011
 Research Advisory Council, Deutsche Bundesbank, 2005-2011
 STEP Board Committee on Comparative Innovation Policy, 2005-2011
 Co-Chair, STEP/COSEPUP Committee on Measuring the Impacts of Federal Investments in R&D, National Research Council, 2010-2011
 Review panel member, ESRC, UK, 2008
 Expert Panel on Business Innovation, Council of Canadian Academies, 2007-2009
 Expert Group, "Knowledge for Growth", European Commission, 2007-2009
 Advisory Board, BCLT Kauffman Project on Patent Reform and Entrepreneurship, 2006-2010.
 Reviewer, various National Research Council volumes
 Federal Economic Statistics Advisory Committee (FESAC), Washington, DC, 2005-2011
 International Advisory Board, New Economics School, Moscow, 1997-2007
 Science, Technology, and Economic Policy Board, National Research Council, 1999-2005
 STEP Board Committee on Measuring and Sustaining the New Economy, 2003-2006
 Chair, STEP Board Committee on R&D Statistics, 2002-2004
 NRC CNSTAT Committee on R&D Statistics, 2002-2004
 STEP Board Committee on Intellectual Property, 2000-2004
 Board of CSWEP, American Economic Association 1998-2001.
 Advisory Board, HeroArts, Emeryville, Calif., a privately held crafts company
 Board member, California Census Research Data Center (CCRDC) at Berkeley
 Nominating Committee of the Royal Economic Society, UK, 1997-1999.
 Census Advisory Committee of the American Economic Association, 1990-1995.
 Nominating Committee of the American Economic Association, 1994-1996.
 Executive Committee, CAED (Comparative Analysis of Enterprise Data), 2005-2007.
 Scientific Committee, LEM, Scuola Sant'anna Superiore, Pisa, 2003-2005.
 Committee scientifique, Les Enjeux Economiques de l'Innovation, CNRS, Paris, France, 1997-2002.
 NRC Committee to Assess the Portfolio of the Science Resources Studies Division of NSF, 1998-1999.
 Scientific Committee, European Network on Financing and Innovation, 1997-2000.
 Steering Group on Industrial Research and Innovation Indicators, National Research Council, 1997.
 NRC Steering Committee for a Workshop on Industrial Science and Technology Indicators, 1995-1996.
 Steering Committee, European Productivity and Innovation Network, 1994-1999.
 Advisory Committee to the Panel Study of Entrepreneurial Dynamics, Institute for Social Research, University of Michigan, 1993-1996.
 Advisory Committee of Economists to the Inter-University Consortium for Political and Social Research, 1990-1991.
 Data Base Review Committee of the Small Business Administration, 1984-1985.

 Testimony before the FTC Hearings on the Evolving IP Marketplace, Haas School of Business, UC Berkeley, May 4, 2009.
 Testimony before the FTC/DOJ (Antitrust) hearings on Intellectual Property, Competition, and Innovation, Haas School of Business, UC Berkeley, February 2002.
 Testimony before the House Subcommittee on Science, Space, and Technology of the Committee on Technology, etc., Washington, D.C., July 1989.

 Advisory Editor, *Research Policy*, 2006-2012

Associate Editor, *Journal of Economic Behavior and Organization*, 2001-2007

Member, Advisory Board, *International Finance*, 1997-2005

Member, Editorial Board, *Economics of Innovation and New Technology*, 1989-1994

Referee for *American Economic Review*, *Berkeley Economics Journals*, *Canadian Journal of Agricultural Economics*, *Economic Inquiry*, *Economic Journal*, *Economics of Innovation and New Technology*, *European Economic Review*, *Financial Management*, *Industrial and Corporate Change*, *International Journal of Electronic Business*, *Journal of Business*, *Journal of Development Economics*, *Journal of Econometrics*, *Journal of Economic History*, *Journal of Economics and Management Strategy*, *Journal of the European Economic Association*, *Journal of Financial Economics*, *Journal of Industrial Economics*, *Journal of Labor Economics*, *Journal of Law and Economics*, *Journal of Law, Economics, and Organization*, *Journal of Policy Analysis and Management*, *Journal of Political Economy*, *Journal of Productivity Analysis*, *Journal of Public Economics*, *Management and Development Economics*, *Management Science*, MIT Press, *National Tax Journal*, *Oxford Bulletin of Economics and Statistics*, *Oxford Economic Papers*, *Quarterly Journal of Economics*, Princeton University Press, *Rand Journal of Economics*, *Research Policy*, *Review of Economics and Statistics*, *Review of Economic Studies*, *Review of Finance*, *Science and Public Policy*, *Scottish Journal of Political Economy*, *Structural Change and Economic Dynamics*.

CONFERENCE ORGANIZATION

Scientific Committee and Rapporteur, Concord 2018 Conference on Corporate R&D, ITPS, European Commission, Seville, Spain, September 2018

Scientific Committee and Rapporteur, Concord 2017 Conference on Corporate R&D, ITPS, European Commission, Seville, Spain, September 2017

Scientific Committee, Patent Statistics for Decision Makers Conference, Tokyo, November 2015

Scientific Committee, Patent Statistics for Decision Makers Conference, Rio de Janeiro, November 2013

Scientific Committee, 7th Conference on Micro Evidence on Innovation and Development (MEIDE), Santiago de Chile, November 6-8, 2013

Scientific Committee and Rapporteur, Concord 2013 Conference on Corporate R&D, ITPS, European Commission, Seville, Spain, September 2013

European Policy for Intellectual Property (EPIP) Annual Conference, Leuven, Belgium, September 2012

Rapporteur, Concord 2011 Conference on Corporate R&D, ITPS, European Commission, Seville, Spain, October 2011

Scientific Committee, Patent Statistics for Decision Makers Conference, USPTO, Washington, DC, 16-17 November 2011

Scientific Committee, 4th ZEW Conference on Economics of Innovation and Patenting & Finale Conference COST Network STRIKE, Mannheim, Germany, May 2011.

European Policy for Intellectual Property (EPIP) Annual Conference, Maastricht, Netherlands, September 2010

Scientific Committee, Knowledge for Growth/Pour une croissance intensive en connaissance, Toulouse, France, 7-9 July 2008

Scientific Committee, AEA Conference on Economic Insights into the Patent System, RIETI, Tokyo, Japan, December 2008

NIESR/ROA Conference on the Labor Market for Scientists and Engineers, Maastricht, Netherlands, May 2008

European Policy for Intellectual Property (EPIP) Workshop, Pisa, Italy, April 2004

Conference on Intellectual Property Economics, History, and Policy, Berkeley, California, September 2001

Coordinator with J. Mairesse, CREST-NBER Franco-American Seminar, shared organization of the Conference on Technological policy and innovation: Economic and historical perspectives, Paris, November 2000

R&D and Technology Conference, Urbino, Italy, 1998

Scientific Committee, The Economics and Econometrics of Innovation, 10th Intl ADRES Conference, Strasbourg, France, June 1996

RESEARCH GRANTS

National Science Foundation, Grant #SES 8908521, 1989-1991.
 National Science Foundation, Grant #SES 9022686, 1991-1993.
 National Science Foundation, Grant #INT 9217489, 1993-1996 (with Zvi Griliches, intl. travel only).
 National Science Foundation, Grant #SBR 9415252, 1994-1997 (with William F. Long).
 National Science Foundation, Grant #SBR 9320973, 1994-1998 (with Adam Jaffe and Manuel Trajtenberg).
 National Science Foundation, Grant #SBR 9510269, 1995-1996 (doctoral dissertation grant to Adela Luque).
 National Science Foundation, Grant #INT 97....., 1998-2001 (with Zvi Griliches, intl. travel only)
 National Institute of Science and Technology, ATP Program, 1997-1999 (with Albert Link and John Scott).
 National Science Foundation, Grant #INT 00....., 2000-2004 (with Paul David, intl. Travel only)
 STEP Board, National Academies of Science and Engineering, 2000-2002 (with David Mowery and Dietmar Harhoff).
 Ewing Marion Kauffman Foundation, 2005-2006, graduate student support.
 National Science Foundation, Grant #SES-0527657 "Harnessing Patent Data for Social Science Research,"
 2005-2007 (with Iain Cockburn, Boston U., Walter Powell, Stanford U., and Manuel Trajtenberg, Tel Aviv U.).
 Ewing Marion Kauffman Foundation, 2008, patent data project.

TEACHING EXPERIENCE

Econometrics
 Applied econometrics
 Applied industrial organization
 Economics of innovation
all at both the graduate and undergraduate levels

GRADUATE STUDENTS SUPERVISED**First reader (UC Berkeley Economics):**

Michael St. John, 1989
 Daniel Ryan, 1992
 Sharman Haley, 1993
 David Austin, 1993
 My Caohuy, May 1996
 Haru Connolly, August 1997
 Rika Mortimer, April 1998
 Suzanne Majewski, September 1998
 Adela Luque, May 1999
 Alan Marco, August 2000
 Megan Macgarvie, August 2003
 Jesse Giummo, August 2003
 Beethika Khan, May 2004
 Galen Hancock, August 2013

Second or third reader (UC Berkeley):

Kate Rockett, Economics, 1988
 Aslan Cohen, Economics, 1989
 Armando Pinheiro, Economics, 1989
 Hua Cheng Chang, Engineering and Electrical Computing Systems, 1989

David Parsley, Economics, 1989
 Melanie Mauldin, Economics, 1990
 Richard Howarth, Energy & Resource Economics, 1990
 Achia Rosen, Economics, 1990
 Barney Cohen, Economics, 1990
 Freddie Balfour, Economics, 1991
 James Angel, Haas School of Business, 1991
 Lenny Sofer, Haas School of Business, 1991
 Robert Uhlaner, Economics, 1992
 Seung-Hee Choi, Economics, July 1994
 Brian Silverman, Haas School of Business, June 1995
 Joanne Oxley, Haas School of Business, July 1995
 Peter Klein, Economics, September 1995
 Thomas Starrs, Energy & Resource Economics, December 1996
 Renato da Fonseca, Economics, May 1996
 John Wald, Economics, May 1996
 Hank Chesbrough, Haas School of Business, May 1997
 Melissa Appleyard, Economics, May 1997
 Marilyn Garcia, Economics, August 1997
 Janet Berkowitz, Haas School of Business, December 1999
 Rosemarie Ham Ziedonis, Haas School of Business, December 2000
 Arvids Ziedonis, Haas School of Business, April 2001
 Best dissertation in technology management 2001-2002, INFORMS (Institute for Operations
 Research and the Management Sciences).
 Chris Boerner, Haas School of Business, July 2001
 Steven Puller, Economics, August 2001
 Jennifer Kuan, Haas School of Business, August 2001
 Jeffrey Macher, Haas School of Business, September 2001
 Deepak Somaya, Haas School of Business, April 2002
 Best Dissertation Award at the Academy of Management, 2002.
 Gregory Graff, Agricultural and Resource Economics, August 2002
 Carlo Cafiero, Agricultural and Resource Economics, August 2002
 Petra Moser, Economics, October 2002
 Gerschenkron Prize for best dissertation in economic history, Economic History Association, 2002.
 Patrick Moreton, Haas School of Business, December 2002
 Anna Gueorguieva, Agricultural and Resource Economics, June 2003
 Robert Lowe, Haas School of Business, 2003
 Stuart Graham, Haas School of Business, 2004
 Olga Khessina, Haas School of Business, 2004
 Tim Simcoe, Haas School of Business, 2004
 Daniel Snow, Haas School of Business, 2004
 Lamar Pierce, Haas School of Business, 2005
 Kira Markiewicz Fabrizio, Haas School of Business, 2005
 Ronnie Chatterji, Haas School of Business 2006
 Sara Boettiger, ARE, 2006
 Evan Rawley, Haas School of Business, 2007
 Simon Wakeman, Haas School of Business, 2007
 Ian Larkin, Haas School of Business, 2007
 one of top 3 student papers, Business Policy & Strategy Division, Academy of Management 2006
 Chieh-Yu Hsiao, Transportation Engineering, 2008
 Deepak Hegde, Haas School of Business, 2010
 Ed Egan, Haas, UC Berkeley, 2012
 Brian Hong, Haas, UC Berkeley, 2012

Sharat Raghavan, Haas, UC Berkeley, 2012
Gisela Rua, Economics, UC Berkeley, September 2012
Neil Thompson, Haas, UC Berkeley, December 2012
Michel Serafinelli, Economics, UC Berkeley, Fall 2013

Other institutions (not including external examining):

Hugo Kruijger, Maastricht University, November 1996
Michele Cincera, Universite Libre de Bruxelles, April 1998
Daehwan Kim, Harvard University, May 2000
Katrin Hussinger, KU Leuven, September 2007
Rodolfo Lauterbach, UNU-MERIT, December 2012 (first reader)

Visiting scholar supervision:

Katrin Vopel (Cremers), ZEW Mannheim, Germany, 1997
Juergen Bitzer, DIW Berlin, Germany, 1999
Constance Phelizon, Universite Paris I, France, 2000
Raffaele Oriani, Universita di Bologna, Italy, 2000-2001
Markus Reitzig, Ludwig-Maximilians-Universität München, Germany, 2001
Dirk Czarnitzki, ZEW Mannheim, Germany, 2002; 2004
Carmine Ornaghi, U Carlos Tercera, Madrid, Spain, 2002
Otto Toivanen, Helsinki School of Economics, Finland, 2003-2004
Lotta Väänänen, ETLA, Finland, 2004
Andrea Gallice, EUI, Florence, Italy, 2004-2005
Wang Hongwei, Chinese Academy of Social Sciences, Beijing, China, 2006-2007
Patrick Beschorner, U of Mannheim, Germany, 2008-2009
Ana Paula R P Faria, Universidade do Minho, Portugal, 2008-2009
Ling Wang, Chinese Academy of Social Sciences, Beijing, China, 2009-2011
Christian Helmers, Oxford University, UK, 2009-2010
Timo Fischer, Technical University of Munich, Germany, 2010-2011
Yanbing Wu, Chinese Academy of Social Sciences, Beijing, China, 2010-2011
Giovanni Marin, LEM, Lucca, Italy, 2011
Antonio della Malva, University of Maastricht, The Netherlands, 2011