

**ADAM B. JAFFE**

**PROFESSIONAL POSITIONS**

Sloan School of Management, M.I.T.

2018 ongoing **Senior Lecturer**

Motu Economic and Public Policy Research, Wellington NZ

2018 ongoing **Senior Research Associate**

2013-2017 **Director and Senior Fellow**

Queensland University of Technology, Brisbane, Australia

2015-ongoing **Adjunct Professor**

Te Pūnaha Matatini Centre of Research Excellence (CoRE), New Zealand

2017 ongoing **Kairangi**

2015-2017 **Principal Investigator and Economics/Social Science Research Theme Leader**

Brandeis University, Faculty of Arts and Sciences and International Business School, Waltham MA

2014-ongoing ***Fred C. Hecht Professor in Economics Emeritus***

1999-2014 ***Fred C. Hecht Professor in Economics***

2003-2011 ***Dean of the Faculty of Arts and Sciences***

2000-2002 ***Economics Department Chair***

1994-1999 ***Associate Professor of Economics***

National Bureau of Economic Research

1985-ongoing ***Faculty Research Fellow (1985-1994) and then Research Associate***

1995-2007 ***Co-founder and Co-organizer, Science and Technology Policy Research Workshop (1995-98) and Innovation Policy and the Economy Group (1999-2007)***

Organization for Economic Cooperation and Development (OECD), Paris

2002-2003 ***Visitor, Directorate for Science, Technology and Industry***

Economics Resource Group, Inc.

1988-1999 **Founding partner**

Harvard University, Faculty of Arts and Sciences

1985-94 ***Assistant, then Associate Professor of Economics. (On leave, academic year 1990-91; visiting the Kennedy School of Government, 1992-94)***

President's Council of Economic Advisers, Washington DC

1990-91 ***Senior Staff Economist.***

## **SELECTED OTHER PROFESSIONAL ACTIVITIES**

**Chair**, U.S. National Academies of Science, Engineering and Medicine, Board on Science, Technology and Economic Policy, 2018 ongoing

**Editor**, *Research Policy*, 2018 ongoing

**Member**, **Science Advisory Panel**, Manaaki Whenua - Landcare Research, 2015-2019

**Co-Chair**, OECD Global Science Forum Experts' Group on "Effective Operation of Competitive Research Funding Systems" (2015-18)

**Conference Co-Organiser**, Asia-Pacific Innovation Conference, Wellington 2017

**Member**, NZ Ministry of Business, Innovation and Employment Science Board, 2014-2017

**Conference Co-Organizer**, "The Changing Frontier: Rethinking Science and Innovation Policy," National Bureau of Economic Research, August 2013

**Lead Author**, Fifth Assessment Report, Intergovernmental Panel on Climate Change, 2011-2013

**Member**, **Board of Editors**, *Journal of Industrial Economics*, 1995-2003; *American Economic Review*, 1995-2000; Associate Editor, *Rand Journal of Economics*, 1997-2003

**Guest Associate Editor**, *Management Science* Special Issue: "Managing Knowledge in Organizations," 2001

## **EDUCATION**

1980-85      *Ph.D. in Economics, Harvard University*. Thesis: "Quantifying the Effects of Technological Opportunity and Research Spillovers in Industrial Innovation."

1976-78      *S.M. in Technology and Policy, Massachusetts Institute of Technology*. Thesis: "Regulating Chemicals: Product and Process Technology as a Determinant of the Compliance Response."

1973-76      *S.B. in Chemistry, Massachusetts Institute of Technology*.

## **HONORS AND AWARDS**

2017 award for **Publication of Enduring Quality**, Association of Environmental and Resource Economists, for "The Induced Innovation Hypothesis and Energy-Saving Technological Change"

Venice Award for Intellectual Property, Honorable Mention for Innovation and Its Discontents (2007)

Alfred P. Sloan Dissertation Fellowship, Harvard, 1984-85

Alfred P. Sloan Research Fellowship, MIT, 1976-77

Phi Beta Kappa, MIT, 1976

### **RECENT INVITED LECTURES**

“Innovation Metrics: We are working on the answers. What are the interesting questions?”  
Keynote Address, Summer School on Science, Technology and Innovation Studies, European Patent Office, Vienna, September 2019

“Reinventing the Older Workforce: Evidence on Age and Creativity”, Opening Keynote Address, DRUID19, Copenhagen, June 2019

"Building a Stronger Evidence Base to Understand the Economy", New Zealand Productivity Hub Workshop on An Investment Approach to Lifting Firm Productivity, Wellington, June 2017

“New models and tools for measuring science and innovation impacts,” invited plenary presentation, *OECD Blue Sky Forum on Science and Innovation Indicators*, Ghent Belgium September 2016”

“Intangible Investment and Firm Performance,” *Ecole polytechnique fédérale de Lausanne*, Lausanne, September 2016

Evaluating the Performance of Public Research Subsidy Programmes," *European Policy for Intellectual Property Conference*, Oxford, September 2016

“The Impact of Science and the Science of Impact,” invited presentation, *New Zealand Association of Scientists Annual Meeting*, Wellington, April 2016

### **RECENT RESEARCH GRANTS AWARDED**

“Innovation Information Initiative” Alfred P. Sloan Foundation (M.I.T. Yarn Labs and National Bureau of Economic Research), 2019-2021

"Investigating Disclosure in Patents using Computational Linguistics", Australian Research Council Discovery Grant (Queensland University of Technology proposal together with Prof. Uwe Dulleck and Prof. Sowmya Balakrishna), 2018-2019

“Reinventing the Elder Workforce: Creative Productivity Over the Life Course Through the Lens of Patent Data,” Alfred P. Sloan Foundation (Brandeis University proposal together with Prof. Margie Lachman), 2017-2020

“People's movements across firms and the contribution of people's productivity to firms' productivity in the construction sector,” Building Research Association of New Zealand, 2016-2017

“Innovation Networks and Economic Performance,” Te Pūnaha Matatini Centre of Research Excellence, 2015-2017

“Research Partnership for use of the Longitudinal Business Database (LBD)”, New Zealand Productivity Hub, 2014-2016

### **RECENT PAPERS**

“Fluid Intelligence and Experience in Invention: Complementarity in Age-Heterogeneous Teams” (with M. Kaltenberg and M. Lachman), American Economic Association Annual Meeting, San Diego, January 2020

"Research 'stars' in New Zealand: concentration, persistence and mobility." (with K. Preston and D. White) New Zealand Ministry of Business, Innovation and Employment Working Paper (2019)

“Bibliometric Analysis of New Zealand Research Performance: Measurement and Classification Issues” (with K. Preston) New Zealand Ministry of Business, Innovation and Employment Working Paper No. 18-09 (2019)

“The procurement of innovation by the U.S. Government” (with G. de Rassenfosse and E. Raiteri), *PLOS ONE* (2019)

“Ex-ante measure of patent quality reveals intrinsic fitness for citation-network growth” (with K.W. Higham, M. Governale, and U. Zülicke), *Physical Review E* (2019)

“Intangible Investment and Firm Performance” (with N. Chappell), *Review of Industrial Organization* (2018)

"Measuring Science, Technology and Innovation: A Review" (with Bronwyn Hall), *Annals of Science and Technology Policy* (2018)

"Worker Flows, Entry and Productivity in the New Zealand Construction Industry' (with N. Chappell and T. Le), NBER Working Paper No. 24376 (2018)

“Mapping the global influence of published research on industry and innovation” (with O. Jefferson, et al), *Nature Biotechnology* (2018)

Econometric evidence on the depreciation of innovations" (with Gaétan de Rassenfosse), *European Economic Review* (2018)

“Are Patent Fees Effective at Weeding Out Low-Quality Patents” (with Gaétan de Rassenfosse), *Journal of Economics and Management Strategy* (2018)

"Unravelling the dynamics of growth, aging and inflation for citations to scientific articles from specific research fields" (with K.W. Higham, M. Governale, and U. Zülicke), *Journal of Informetrics* (2017)

“The Effect of Public Funding on Research Output: the New Zealand Marsden Fund” (with Jason Gush, Victoria Larsen and Athene Laws), *New Zealand Economic Papers* (2017)

“Fame and Obsolescence: Disentangling growth and ageing dynamics of patent citations” (with K.W. Higham, M. Governale, and U. Zülicke), *Physical Review E* (2017)

“The Impact of R&D Subsidy on Innovation: a Study of New Zealand Firms” (with Trinh Le), *Economics of Innovation and New Technology* (2017)

“Barriers to Adoption of No-Cost Options for Mitigation of Agricultural Emissions: A Typology”, Motu Note No. 24, Motu Economic and Public Policy Research (2017)

“Low-quality Patents in the Eye of the Beholder: Evidence from Multiple Examiners” (with Gaétan de Rassenfosse and Beth Webster), NBER Working Paper No. 22244, under review, *Journal of Law, Economics & Organization*

## **BOOKS AND EDITED VOLUMES**

The Changing Frontier: Rethinking Science and Innovation Policy (edited with Benjamin Jones), National Bureau of Economic Research Conference Volume, University of Chicago Press, 2015

Innovation and its Discontents (with J. Lerner), Princeton University Press, 2004; issued in paperback, 2006

Patents, Citations and Innovations: A Window on the Knowledge Economy (with M. Trajtenberg), M.I.T. Press, 2002; issued in paperback, 2005

Innovation Policy and the Economy, Founding Editor, then co-edited with J. Lerner and S. Stern; M.I.T. Press, Cambridge, Volume 1 (2001) through Volume 8 (2007); now published by University of Chicago Press

**HIGH-IMPACT PUBLICATIONS (100 or more citations from subsequent literature)**

“Patent Citation Data in Social Science Research: Overview and Best Practices” (with Gaétan de Rassenfosse), *Journal of the Association for Information Science and Technology* (2017)

“Energy, the Environment and Technological Change” (with D. Popp and R. Newell), in B. Hall and N. Rosenberg, eds, **Handbook of The Economics of Innovation**, North-Holland, 2010

“Innovation and Its Discontents” (with J. Lerner), in *Innovation Policy and the Economy Volume 6*, A. Jaffe, J. Lerner and S. Stern, eds., 2006; reprinted in *Capitalism and Society* Vol. 1 No. 3 (2006) and in **Perspectives on Commercializing Innovation**, F. Kieff and Troy Paredes, eds., Cambridge University Press (2012)

“Market Value and Patent Citations: A First Look” (with B. Hall and M. Trajtenberg), *Rand Journal of Economics*, 2005, Reprinted in **The Economics of Patents**, John Cantwell, Ed., Edward Elgar, 2006

Comment on “Patent Citations and the Geography of Spillovers: A Reassessment” (with R. Henderson and M. Trajtenberg), *American Economic Review*, 2005

“Patent Citations and International Knowledge Flow: The Cases of Korea and Taiwan” (with A. Hu), *International Journal of Industrial Organization*, 2003; reprinted in **The Economics of Patents**, John Cantwell, Ed., Edward Elgar, 2006

“Do Alliances Promote Knowledge Flows” (with B. Gomes-Casseres and John Hagedoorn), *The Journal of Financial Economics*, 2006

“A tale of two market failures: Technology and environmental policy” (with R. Newell and R. Stavins), *Ecological Economics*, 2005; reprinted in **Intellectual Property, Innovation and the Environment**, Peter Menell and Sarah Tran, eds., Edward Elgar (2013); and in **Recent Developments in the Economics of Science and Innovation**, Albert Link and Christiano Antonelli, eds., Edward Elgar (2014)

“Economics of Energy Efficiency” (with R.G. Newell and R. N. Stavins), in Cutler Cleveland, ed., *Encyclopedia of Energy*, Elsevier, Inc. 2004

“Technological Change and the Environment” (with R. Newell and R. Stavins), in Karl-Göran Mäler and Jeffrey Vincent, eds, **Handbook of Environmental Economics**, North-Holland, 2003

“Building Programme Evaluation into the Design of Public Research-Support Programmes,” *Oxford Review of Economic Policy*, 2002

“Environmental Policy and Technological Change” (with R. Newell and R. Stavins), *Environmental and Resource Economics*, 2002

“The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools” (with B. Hall and M. Trajtenberg), NBER Working Paper No. 8498, 2001; reprinted in A. Jaffe and M. Trajtenberg, **Patents, Citations and Innovations: A Window on the Knowledge Economy**, MIT Press (2002)

“Reinventing Public R&D: Patent Policy and the Commercialization of National Laboratory Technologies” (with Josh Lerner), *Rand Journal of Economics*, Spring 2001; reprinted in **Innovation and Entrepreneurship**, David Audretsch, Oliver Falck and Stephan Heblich, eds., Edward Elgar (2009); and in **Recent Developments in the Economics of Science and Innovation**, Albert Link and Christiano Antonelli, eds., Edward Elgar (2014)

“Knowledge Spillovers and Patent Citations: Evidence from a Survey of Inventors” (with Manuel Trajtenberg and Michael Fogarty), *American Economic Review Papers and Proceedings*, 2000

“The U.S. Patent System in Transition: Policy Innovation and the Innovation Process,” *Research Policy*, 2000; reprinted in Albert N. Link, Ed., **The Economics of Innovation Policy**, Edward Elgar (2008)

“The Induced Innovation Hypothesis and Energy-Saving Technological Change” (with R. Newell and R. Stavins), *Quarterly Journal of Economics*, 1999; reprinted in A. Grübler, N. Nakicenovic, and W. Nordhaus, eds., **Technological Change and the Environment**, Resources for the Future, 2002

“International Knowledge Flows: Evidence from Patent Citations” (with M. Trajtenberg), *Economics of Innovation and New Technology*, 1999; reprinted in John Cantwell, ed., **The Economics of Patents**, Edward Elgar (2006)

“Energy-Efficient Technologies and Climate Change Policies: Issues and Evidence” (with R. Newell and R. Stavins), Resources for the Future Climate Issue Brief No. 19, December 1999

“The Importance of ‘Spillovers’ in the Policy Mission of the Advanced Technology Program,” *Journal of Technology Transfer*, Summer 1998

“Evidence from Patents and Patent Citations on the Impact of NASA and Other Federal Labs on Commercial Innovation” (with B. Banks and M. Fogarty), *Journal of Industrial Economics*, June 1998

“Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965-1988” (with R. Henderson and M. Trajtenberg), *Review of Economics and Statistics*, February 1998; also published in a slightly different form as “University Patenting Amid Changing

Incentives for Commercialization” in G.B. Navaretti, P. Dasgupta, K.-G. Mäler and D. Siniscalco, eds., **Creation and Transfer of Knowledge**, Springer, 1998; reprinted in **Technological Entrepreneurship**, Donald Siegel, ed., Edward Elgar (2007)

“Environmental Regulation and Innovation: A Panel Data Study” (with K. Palmer), *Review of Economics and Statistics*, November 1997

“University Versus Corporate Patents: A Window on the Basicness of Invention” (with M. Trajtenberg and R. Henderson), *Economics of Innovation and New Technology*, 1997

“Bounding the Effects of R&D: An Investigation Using Linked Establishment and Firm Data” (with J. Adams), *Rand Journal of Economics*, Winter 1996

“Flows of Knowledge from Universities and Federal Labs: Modeling the Flow of Patent Citations over Time and Across Institutional and Geographic Boundaries” (with M. Trajtenberg), *Proceedings of the National Academy of Sciences*, 93: 12671-12677, November 1996

"Dynamic Incentives of Environmental Regulations: The Effects of Alternative Policy Instruments on Technology Diffusion" (with R. Stavins), *Journal of Environmental Economics and Management*, 1995

“Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?” (with S. Peterson, P. Portney and R. Stavins), *The Journal of Economic Literature*, 1995; reprinted in **Trade and the Environment: Economic, Legal and Policy Perspectives**, Alan M. Rugman and John J. Kirton, eds., Edward Elgar Publishing Limited, 1998; also in **Economics of the Environment: Selected Readings**, Robert Stavins, ed., Norton, 2005; and **Economics of Environmental Law**, Richard Brooks, Nathaniel Keohane and Douglas Kysar, eds, Edward Elgar (2009)

"Energy-Efficiency Investments and Public Policy" (with R. Stavins), *The Energy Journal*, 1994

“The Energy-Efficiency Gap” (with R. Stavins), *Energy Policy*, 1994

"The Energy Paradox and the Diffusion of Conservation Technology" (with R. Stavins), *Resource and Energy Economics*, 1994

"Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations" (with M. Trajtenberg and R. Henderson), *Quarterly Journal of Economics*, 1993; reprinted in **Innovation and Entrepreneurship**, David Audretsch, Oliver Falck and Stephan Heblich, eds., Edward Elgar (2009); also in **The Growth of Cities**, Zoltan Acs, ed., Edward Elgar (2006); also in **Globalization and the Location of Firms**, John Cantwell, ed., Edward Elgar (2005), and in **Recent Developments in Growth Theory**, Daron Acemoglu, ed., Edward Elgar (2004)

"The Effect of Liquidity on Firms' R&D Spending" (with K. Hao), *Economics of Innovation and New Technology*, 1993

"How High are the Giants' Shoulders: An Empirical Assessment of Knowledge Spillovers and Creative Destruction in a Model of Economic Growth" (with R. Caballero), in O. Blanchard and S. Fischer, eds., **National Bureau of Economic Research Macroeconomics Annual, Vol. 8**, MIT Press, 1993; reprinted in Gene M. Grossman, ed., **Economic Growth: Theory and Evidence**, Cheltenham, UK: Edward Elgar, 1996

"Unintended Impacts of Public Investments on Private Decisions: The Depletion of Forested Wetlands" (with R. Stavins), *American Economic Review*, 1990; reprinted in **Economics of Environmental Law**, Richard Brooks, Nathaniel Keohane and Douglas Kysar, eds, Edward Elgar (2009)

"Real Effects of Academic Research," *American Economic Review*, 1989; reprinted in **The Economics of Science and Innovation**, Paula E. Stephan and David B. Audretsch, eds., Edward Elgar (2000); also in **Globalization and the Location of Firms**, John Cantwell, ed., Edward Elgar, (2005); also in **The Economics of Innovation Policy**, Albert Link, ed., Edward Elgar (2008); and in **Innovation and Entrepreneurship**, David Audretsch, Oliver Falck and Stephan Heblich, eds., Edward Elgar (2009)

"Characterizing the 'Technological Position' of Firms, with Application to Quantifying Technological Opportunity and Research Spillovers," *Research Policy*, 1989

"Demand and Supply Influences in R&D Intensity and Productivity Growth," *Review of Economics and Statistics*, August 1988

"Technological Opportunity and Spillovers of R&D: Evidence from Firms' Patents, Profits and Market Value," *American Economic Review*, 1986; reprinted in Edward N. Wolff, ed., **The Economics of Productivity**, Edward Elgar (1997); in R. Towse and R.W. Holzhauser, eds., **The Economics of Intellectual Property**, Edward Elgar (2002); and in Cristiano Antonelli, ed., **The Economics of Innovation: Critical Concepts in Economics**, Routledge (2007)

"Who Does R&D and Who Patents" (with J. Bound, *et al.*), in Z. Griliches, ed., **R&D, Patents and Productivity**, University of Chicago Press, 1984

## **OTHER PAPERS AND PUBLICATIONS**

"A Framework for Evaluating the Beneficial Impacts of Publicly Funded Research", Motu Note No. 15, Motu Economic and Public Policy Research (2015)

"Science and Innovation in Small Countries: Speculation and Research Agenda", *Asia-Pacific Journal of Accounting and Economics*, Volume 22, Issue 1 (2015)

“Technology Diffusion,” in *Emerging Trends in the Social and Behavioral Sciences*, Robert A. Scott and Stephen M. Kosslyn, eds, Wiley Online Library: DOI: 10.1002/9781118900772 (2015)

“Innovation,” in *Emerging Trends in the Social and Behavioral Sciences*, Robert A. Scott and Stephen M. Kosslyn, eds, Wiley Online Library: DOI: 10.1002/9781118900772 (2015)

“The science, economics and politics of global climate change,” Review of The Climate Casino, by William Nordhaus (with S. Kerr), *Journal of Economic Literature*, 2015

“Category 5 or Tempest in a Teapot?” Review of Falling Behind? Boom, Bust and the Global Race for Scientific Talent by Michael S. Teitelbaum, *Science*, 2 May 2014

“Diffusion of Green Technology” (with C. Allan and I. Sin), *International Review of Environmental and Resource Economics*, 7: 1–33, 2014

“Lessons from the Economics Literature on the Likely Consequences of International Harmonization of IPR Protection” (with A.G.Z. Hu), in Intellectual Property Rights: Legal and Economic Challenges for Development, M. Cimoli, G. Dosi, K. Maskus, R. Okediji, and J. Reichman, eds, Oxford University Press, 2014

“Exporting, Innovation and the Role of Immigrants” (with Isabelle Sin, Richard Fabling, David C. Maré and Lynda Sanderson), Motu Working Paper No. 14-15, 2014

“Science and Innovation Policy for New Zealand,” *New Zealand Science Review*, 70 (3) 55, 2013

“Induced Innovation and Technology Trajectory: Evidence from Smoking Cessation Products” (with S. Werfel), *Research Policy*, 2013

“Technology Policy and Climate Change,” *Climate Change Economics*, 2012

Comment on “The Diffusion of Scientific Knowledge Across Time and Space: Evidence from Professional Transitions for the Superstars of Medicine,” in J. Lerner and S. Stern, eds., Rate and Direction of Inventive Activity, University of Chicago Press, 2012

“Comment: The Economics of Technologies to Combat Global Warming,” *Energy Economics*, 33:4, 2011

“Analysis of Public Research, Industrial R&D, and Commercial Innovation: Measurement Issues Underlying the Science of Science Policy,” in The Science of Science Policy: A Handbook, K. Fealing, J. Lane, J. Marburger and S. Shipp, eds., Stanford: Stanford Business Books, 2011

“The US Patent System: Does It Strengthen or Weaken Innovation and Progress?” (with J. Lerner), Chapter 2.2 of *The Innovation for Development Report 2009-2010: Strengthening Innovation for the Prosperity of Nations*, Augusto López-Claros, ed, Palgrave MacMillan, 2009

“The ‘Science of Science Policy’,” *Journal of Technology Transfer*, 2008

“Patent Reform: No Time Like the Present,” *I/S Journal of Law and Policy for the Information Society*, 2008

“Double Research Funding? Be Careful,” *The Scientist*, Vol. 21 No. 7, page 31, 2007

“Academic science and entrepreneurship: Dual engines of growth?” (with J. Lerner, S. Stern and M. Thursby), *Journal of Economic Behavior and Organization*, 2007

“Peanut Butter Patents Versus the New Economy: Does the Increased Rate of Patenting Signal More Invention or Just Lower Standards?” (with P. Sanyal). *Annales d’Economie et de Statistique*, 2006

“The effects of economic and policy incentives on carbon mitigation technologies,” (with R. Newell and R. Stavins), *Energy Economics* 28, no. 5-6: 563-578, 2006.

Public Financial Support for Commercial Innovation (with I. Goldberg, M. Trajtenberg, T. Muller, J. Sunderland and E. Armas), World Bank, 2006

“Technology Policy for Energy and the Environment” (with R.G. Newell and R.N. Stavins), in *Innovation Policy and the Economy Volume 4*, A. Jaffe, J. Lerner and S. Stern, eds., 2003

“International Taxation and the Location of Inventive Activity” (with J.R. Hines, Jr.), in James R. Hines Jr. ed., International Taxation and Multinational Activity, Chicago: University of Chicago Press (2001)

“The Cigarette Industry,” in Walter Adams and James Brock, ed., The Structure of American Industry, Tenth Edition, Prentice Hall, 2000

“The Regional Economic Impact of Public Research Funding: A Case Study of Massachusetts” (with Amy B. Candell), in L.M. Branscomb, F. Kodama, and R. Florida, eds., Industrializing Knowledge: University-Industry Linkages in Japan and the United States, MIT Press, 1999

“Special Issue on Geography and Innovation: Editors’ Introduction” (with R. Henderson), *Economics of Innovation and New Technology*, 1999

Comment on “Inventors, Firms and the Market for Technology: U.S. Manufacturing in the Late Nineteenth and Early Twentieth Centuries,” in Daniel Raff, Naomi Lamoreaux and Peter Temin, eds., Learning By Doing in Firms, Markets, and Nations, University of Chicago Press, 1999

Comment on “What Do Technology Shocks Do?” in Bernanke, Ben S. and Julio Rotemberg, eds., NBER Macroeconomics Annual, 1998

“Inside the Pin-Factory: Empirical Studies Augmented by Manager Interviews: Introduction” (with S. Borenstein and J. Farrell), *Journal of Industrial Economics*, June 1998

“Measurement Issues,” in Investing in Innovation, L. M. Branscomb & J. Keller, Editors, MIT Press, 1998

Review of Green, Inc. by Frances Cairncross, *Journal of Economic Literature*, March 1997

“Economic Analysis of Research Spillovers: Implications for the Advanced Technology Program,” Economic Assessment Office, The Advanced Technology Program, National Institutes of Standards and Technology, U.S. Department of Commerce, November 1996

“Trends and Patterns in U.S. Research and Development Expenditures,” *Proceedings of the National Academy of Sciences*, 93: 12658-12663, November 1996

“Regional Localization of Technological Accumulation: Application to the Tri-State Region,” *The Annals of the New York Academy of Sciences*, 1996

Comment on “Cross-Country Variations in National Economic Growth Rates” by J. Bradford Delong, in Technology and Growth, Jeffrey C. Fuhrer and Jane Sneddon Little, eds., Federal Reserve Bank of Boston Conference Series No. 40, June 1996

“Regulatory Reform and the Economics of Contract Confidentiality: The Example of Natural Gas Pipelines” (with J. P. Kalt, S. T. Jones, and F. A. Felder), *Regulation*, 1996

“Should Electricity Markets Have a Capacity Requirement: If So, How Should It Be Priced?” (with F. Felder), Proceedings of the Electric Power Research Institute Conference on Competitive Electricity Pricing, March 1996.

Planning for Change, Preparing for Growth: Implications for Massachusetts of Reductions in Federal Research Spending, prepared for the Massachusetts Technology Collaborative, March 1996

“On the Microeconomics of R&D Spillovers” (with J. Adams), in Louis A. Lefebvre and Élisabeth Lefebvre, eds., Management of Technology and Regional Development in a Global Environment, Paul Chapman Publishing, Ltd., 1995

"Incentive Regulation for Natural Gas Pipelines" (with J. Kalt), in Ellig, J. and J.P. Kalt, eds., New Horizons in Natural Gas Deregulation, 1995

Comment on "Taxes, Technology Transfer, and the R&D Activities of Multinational Firms" by James R. Hines, Jr., in Martin Feldstein, James R. Hines, Jr. and R. Glenn Hubbard, eds., The Effects of Taxation on Multinational Corporations, University of Chicago Press, 1995

"The Emerging Coexistence of Competition and Regulation in Natural Gas Transportation" (with S. Makowka), *Hume Papers on Public Policy*, 1995

The Investment Consequences of the Re-Regulation of Cable Television (with W. Emmons and J. Taylor), *The Economics Resource Group*, Cambridge, MA, 1994

"Insight on Oversight" (with J. Kalt), *Public Utilities Fortnightly*, April 15, 1994

"Prices, Regulation and Energy Conservation: An Econometric Analysis" (with R. Stavins), delivered at the Conference on Market Approaches to Environmental Regulation, Stanford University, December 1993

Comment on "R&D and Market Value in the 1980s" by Bronwyn Hall, *Brookings Papers on Economic Activity, Microeconomics*, 1993

Environmental Regulations and the Competitiveness of U.S. Industry (with S. Peterson, P. Portney and R. Stavins), U.S. Department of Commerce, Economics and Statistics Administration, Washington DC, NTIS No. PB-93-193514, July 1993

"Achieving Maximum Benefit from Competitive Natural Gas and Emission Allowance Markets" (with J. Kalt), Proceedings of the U.S. Department of Energy/National Association of Regulatory Utility Commissioners Conference on Natural Gas Use, State Regulation and Market Dynamics in the Post 636/Energy Policy Act Era, March 1993.

"The Diffusion of Energy-Conserving Windows: The Effect of Economic Incentives and Building Codes" (with R. Stavins), presented at the American Economic Association annual meeting, Anaheim CA, January 1993

Review of Investing in the Future, by John Irvine, *et al.*, *Journal of Economic Literature*, June, 1992

Review of Productivity and U.S. Economic Growth by D. Jorgenson, *et al.*, *Business History Review*, 1991

"Economic Evaluation of Policy Options for Global Climate Change: Some Methodological Reflections," Center for Energy and Environmental Policy, John F. Kennedy School of Government, Harvard University, August 1990

"Market Power of Local Cable Television Franchises: Evidence from the Effects of Deregulation" (with D. Kanter), *Rand Journal of Economics*, 1990; reprinted in P. MacAvoy and R. Schmalensee, eds., The Causes And Effects Of Deregulation, Edward Elgar (2014)

"Universities and Regional Patterns of Commercial Innovation," *REI Review*, Center For Regional Economic Issues, Case-Western Reserve University, 1989

"Benefit-Cost Analysis and Multi-Objective Evaluation of Federal Water Projects," *Harvard Environmental Law Review*, 1980

"Preventing Groundwater Pollution: Towards a Coordinated Strategy to Protect Critical Recharge Zones (with J.T.B. Tripp), *Harvard Environmental Law Review*, 1979

## **TEACHING EXPERIENCE**

Innovation Analytics (MBA)

How Do We Know What We Know (Second-year seminar)

What a Good Idea! Technology and Innovation in Society (First-year seminar)

Introductory Economics (undergraduate)

Microeconomic Theory (Ph.D.)

Law and Economics (undergraduate)

Environmental and Natural Resource Economics (undergraduate)

Government Regulation and Antitrust Policy (undergraduate and Ph.D.)

R&D, Innovation and Productivity Growth (undergraduate)

Industrial Organization (Ph.D. and undergraduate)

Applied Welfare Economics (John F. Kennedy School of Government)

Competition and Innovation Summer School, run by K. U. Leuven (Belgium) and The Center for European Economic Research, Mannheim (Germany)

Foundation for American Communications, economics education for journalists, "The Role of Government in the Economy"

Australia-New Zealand School of Government, "Government in the Market Economy"

Government Economics Network (Wellington), "Benefit-Cost Analysis"