

April 2009

Raymond S. Hartman
Curriculum Vita

Date of Birth: 3/31/47

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DEGREES

B.A. (MAGNA CUM LAUDE) Princeton University 1969
M.S. Massachusetts Institute of Technology 1971
Ph.D. Massachusetts Institute of Technology 1977

Ph.D. DISSERTATION

An Oligopolistic Pricing Model of the U.S. Copper Industry (MIT, 1977)

HONORS, SCHOLARSHIPS, AND FELLOWSHIPS

1969-71 National Science Foundation Fellowship to MIT
1965-69 Alfred P. Sloan Scholarship to Princeton
1969 Woodrow Wilson Fellowship Honorable Mention
1965 National Merit Scholarship Finalist

RESEARCH AND TEACHING INTERESTS

Econometrics/Statistics
The Economics of Regulated Industries
Energy and Environmental Economics
Microeconomics
Industrial Organization
Law and Economics

POSITIONS

1967-1969 Research Staff, Financial Research Center and Center for Economic Research, Princeton University
 1970 Research Staff, Board of Governors, Federal Reserve Board, Washington, DC
 1972-1992 Consultant and Staff Economist, Arthur D. Little, Inc.
 1977-1984 Research Faculty, Massachusetts Institute of Technology
 1977-1983 Assistant Professor, Department of Economics, Boston University
 1983-1989 Associate Professor, Department of Economics, Boston University
 1983-1988 Principal & Academic Principal, The Analysis Group
 1988-1993 Visiting Associate Professor/Visiting Faculty, Boalt School of Law, University of California, Berkeley
 1988-1995 Founding Principal, The Law and Economics Consulting Group
 1995-1996 Vice President, Charles River Associates
 1996-1999 Senior Consultant, Charles River Associates
 1996-2000 Director, Cambridge Economics, Inc.
 2000-2004 Special Consultant, Lexecon Inc.
 1997- Director and President, Greynock McKinnon Associates

OTHER PROFESSIONAL ACTIVITIES

Research Referee, *Bell/Rand Journal of Economics, Resources Policy, IPC Science and Technology Press, Management Science, Land Economics, Science, Energy Journal, Applied Economics, Econometrica, Review of Economics and Statistics, Journal of Business and Economic Statistics, International Economic Review, Journal of Economics and Management Strategy, Pakistan Journal of Applied Economics, Journal of Health Economics, American Economic Review, Review of Industrial Organization*

PAPERS APPEARING IN OR BEING SUBMITTED FOR PUBLICATION IN REFEREED JOURNALS AND BOOKS

"Frontiers in Energy Demand Modeling," Annual Review of Energy, 4, 1979.

"The Economic Impacts of Environmental Regulations on the US Copper Industry," with K. Bozdogan and R. Nadkarni, The Bell Journal of Economics, 10(2), Autumn 1979, pp 589-618.

"Schumpeterian Waves of Innovation and Infrastructure Development in Great Britain and the United States: The Kondratieff Cycle Revisited," with D. Wheeler, Research in Economic History, 1979, Vol 4, Chapter 2.

"U. S. Demand for Copper: An Introduction to Theoretical and Econometric Analysis," with K. Bozdogan, in R. Mikesell, The World Copper Industry, Resources for the Future, 1979, Chapter 5.

"Some Evidence on Differential Inventory Behavior in Competitive and Non-Competitive Market Settings," Quarterly Review of Economics and Business, 20(2), Summer 1980, pp. 11-27.

"Short-Run Residential Demand for Fuels: A Disaggregated Approach," with A. Werth, Land Economics, 57(2), May 1981, pp. 197-212.

"An Analysis of Department of Energy Residential Appliance Efficiency Standards," The Energy Journal, 2(3), Summer 1981, pp. 49-70.

"A Note on the Use of Aggregate Data in Individual Choice Models: Discrete Consumer Choice Among Alternative Fuels for Residential Appliances," Journal of Econometrics, 18, 1982, pp. 313-335.

"A Probability Model of Oligopoly Pricing," Applied Economics, 14(3), June 1982, pp. 219-234.

"A Note on Externalities and the Placement of Property Rights: An Alternative Formulation to the Standard Pigouvian Results," The International Review of Law and Economics, 2(1), June 1982, pp. 111-118.

"A Note on the Appropriateness of Conditional Logit for the Modeling of Residential Fuel Choice," Land Economics, 58, November 1982, pp. 478-87.

"The Estimation of Short-Run Household Electricity Demand Using Pooled Aggregate Data," Journal of Business and Economic Statistics, 1(2), April 1983, pp. 127-135.

"The Importance of Technology and Fuel Choice in the Analysis of Utility-Sponsored Conservation Strategies for Residential Water Heating," The Energy Journal, 5(3), July 1984.

"Measuring the Effects of Utility-Sponsored Conservation Programs - Do the Programs Work," Energy Systems and Policy, 8(3), 1984.

"The Estimation of the Effects of Utility-Sponsored Conservation Programs," with M. Doane, Applied Economics, 18(1), 1986, pp. 1-25.

"Household Discount Rates Revisited," with M. Doane, The Energy Journal, 7(1), Winter 1986.

"Energy Conservation Programmes: The Analysis and Measurement of Their Effects," Energy Policy, October 1986.

"Study of Long Range Electrical Demand Planning in Maryland," with K. Jensen and M. Doane, Economic Studies and Alternative Energy Sources, NTIS No. PB88-101118/AS, January 1987.

"Product Quality and Market Efficiency: The Effect of Product Recalls on Resale Prices and Firm Valuation," The Review of Economics and Statistics, 69(2), May 1987, pp. 367-371.

"The Use of Hedonic Analysis for Certification and Damage Calculations in Class Action Complaints," with M. Doane, The Journal of Law, Economics and Organization, Fall 1987.

"Taking the Con Out of Conservation Program Evaluation" with Michael Doane, Resources and Energy, 9, 1987, pp. 187-207.

"Self-Selection Bias in the Evaluation of Voluntary Energy Conservation Programs," Review of Economics and Statistics, 70(3), August 1988.

"Household Preference for Interruptible Rate Options and the Revealed Value of Service Reliability," with M. Doane and C.K. Woo, The Energy Journal, 9, 1988.

"Households' Perceived Value of Service Reliability: An Analysis of Contingent Valuation Data," with M. Doane and C.K. Woo, The Energy Journal, 9, 1988.

"An Empirical Model of Product Design and Pricing Strategy," International Journal of Industrial Organization, 7(4), December 1989.

"Hedonic Methods for Evaluating Product Design and Pricing Strategies," Journal of Economics and Business, 41(3), August 1989.

"Status Quo Bias in the Measurement of Value of Service," with M. Doane and C.K. Woo, Resources and Energy, Volume 12, 1990, pp. 197-214.

"Product Emulation Strategies in the Presence of Reputation Effects and Network Externalities: Some Evidence from the Minicomputer Industry," with D. Teece, Economics of Innovation and New Technology, Volume 1, 1990, pp. 157-182.

"Consumer Rationality and the Status Quo," with M. Doane and C.K. Woo, Quarterly Journal of Economics, Volume 106, February, 1991, pp. 141-162.

"A Monte Carlo Analysis of Alternative Estimators in Models Involving Selectivity," Journal of Business and Economic Statistics, 9(1), January, 1991, pp. 41-49.

"Assessing Market Power in Regimes of Rapid Technological Change," with D. Teece, W. Mitchell and T. Jorde, Industrial and Corporate Change, 2(3), 1993, pp. 317-350.

"Estimation of Household Preferences for Long Distance Telecommunications Carrier," with Z. Naqvi, Journal of Regulatory Economics, 6(2), May, 1994, pp. 197-220.

"Strategic Rate Making in the Context of Dynamic Ramsey Pricing," with K. Jensen and K. Seiden, Applied Economics, 26, 1994, pp. 363-374.

"Incentive Regulation: Market Based Pollution Control for the Real World?" with David Wheeler, in Claudio Frischtak, ed., Regulatory Policies and Reform: A Comparative Perspective, World Bank/Oxford University Press, chapter 11, 1996.

"The Efficiency Effects of Electric Utility Mergers: Lessons from Statistical Cost Analysis," Energy Law Journal, 17(2), Fall 1996.

"The Use of Regression Techniques in Transfer Price Analysis," with Delores Wright and J.D. Opdyke, European Taxation, International Bureau of Fiscal Documentation, TP, Suppl. No. 18, July 1996.

"The Regulatory Contract and Restructuring: A Modest Proposal," with R.D. Tabors, The Electricity Journal, 9(10), December 1996.

"Predicting the Efficiency Effects of Mergers," Journal of Forensic Economics, 9(3), Fall 1996.

"The Cost of Air Pollution Abatement," with David Wheeler and Manjula Singh, Applied Economics, Volume 29, 1997.

"Optimal Operating Arrangements in the Restructured World: Economic Issues", with R.D. Tabors, Energy Policy, 25(7), 1997.

"The Use of Statistical Methods in Disparate Impact Cases: The Northern Mariana Islands Case," Litigation Economics Digest, 3(1), Summer 1998.

"How Good a Deal Was the Tobacco Settlement?: Assessing Payments to Massachusetts", with David Cutler, Arnold Epstein, Richard Frank, Charles King, Joseph Newhouse, Elizabeth Richardson and Meredith Rosenthal, Journal of Risk and Uncertainty, 21(2/3), 2000.

"Price-Performance Competition and the Merger Guidelines," Review of Industrial Organization , 18, 2001.

"The Microeconomic Analysis of Pollution, Pollution Abatement and Pollution Abatement Regulation," with D. Wheeler, The Pacific and Asian Journal of Energy, 10(2), December 2000.

"The Economic Impacts of the Tobacco Settlement," with David Cutler, Jonathan Gruber, Mary Beth Landrum, Joseph Newhouse and Meredith Rosenthal, Journal of Policy Analysis and Management, 21(1), Winter 2002.

"Tobacco manufacturers are now compensating states for smoking-related costs. How will this affect the economy?", with David Cutler, Jonathan Gruber, Joseph Newhouse and Meredith Rosenthal, Regional Review, Federal Reserve Bank of Boston, 12(2), 2002, Quarter 2.

"An Analysis of Price Discrimination in Brand Name Drug Wholesaling," with Richard Frank and Benjamin Sommers, International Journal of the Economics of Business, 14(3), 2007.

Contributions of economic forecasting articles to the popular press, such as Management Forum and Nations Business

PAPERS IN PROGRESS

"Welfare Measures in Discrete Choice Markets"

"Market Definition and Pharmaceutical Market Competition," with Richard Frank

CONFERENCE PAPERS AND PRESENTATIONS

"Policies To Maximize Economic Growth In Japan," in Foreign Experience with Monetary Policies to Promote Economic and Social Priority Programs, Committee on Banking and Currency, 92nd Congress, Washington, May, 1972.

Comments on "Econometric Models of Choice and Utilization of Energy-Using Durables" by D. Brownstone, Electric Power Research Institute Workshop on the Choice and Utilization of Energy Using Durables, Boston, Nov. 1-2, 1979.

"Market Penetration of Energy Technologies," talk given in the Boston University 1980 Spring Lecture Series, "Man and Energy: Energy and Regional Growth," 1979.

"Discrete Consumer Choice among Alternative Fuels and New Technologies for Residential Energy-Using Appliances," MIT Energy Laboratory Working Paper, #MIT-EL-79-049WP, August, 1979. Paper given at the TIMS/ORSA Meetings, "Market Penetration Assessment of New Energy Technologies," May 4-7, 1980, and at the MIT Industrial Liaison Program, "The Future Demand for Energy," March 18, 1980.

"Department of Energy Residential Appliance Efficiency Standards-An Overview," Papers and Proceedings, Second Annual North American Meeting of the International Association of Energy Economists, October 1980.

Comments on "A Review of the Conditional Demand Approach to Electricity Demand Estimation," by S. George, Electric Power Research Institute Workshop on End-Use Modeling and Conservation Analysis, Atlanta, Nov. 17-19, 1980.

"Measuring the Effects of Utility Sponsored Conservation Programs." Paper presented at the Fourth Symposium on Electric Utility Load Forecasting: Focus on the Short Run, Electric Power Research Institute Workshop, Dallas, Texas, December 1982.

"Measuring the Impact of Utility Residential Conservation Programs: Two Case Studies," with S. Braithwait and M. Doane. Paper presented in the Electric Power Research Institute National Symposium Proceedings, Annual Review of Demand and Conservation, Atlanta, May 1984, and Buildings and Their Energy Systems, St. Louis, October 1984.

"Measuring Program-Induced Energy Savings: A Comparison of Alternating Methods," with M. Doane, in Electric Power Research Institute National Symposium Proceedings, Energy Expo 1985: Meeting Energy Challenges, Peragon Press.

"Taking the Con Out of Conservation Program Evaluation." Paper presented at "Energy Conservation Program Evaluation," Argonne National Laboratory Conference, Chicago, August, 1985, and at the Eighth Annual North American Conference of the International Association of Energy Economists, MIT, Cambridge, November 1986.

"Quality and Efficiency of Limited Information Maximum Likelihood Estimators: A Monte Carlo Simulation Study," with M. Sonnenschein. Paper presented at the 27th International Meeting of the Institute of Management Sciences, Brisbane, Australia, 1986.

"Product Emulation Strategies in the Presence of Reputation Effects and Network Externalities: Some Evidence from the Minicomputer Industry," with D. Teece. Paper presented at National Bureau of Economic Research, Conference on Productivity Measurement, July, 1987, and Stanford Center for Economic Policy Research Conference on Compatibility Standards and Information Technology: Business Strategy and Public Policy Issues, February 1989.

Comments and discussion on "Efficient Postal Discounts" by John Panzar and "Efficient Component Pricing for Postal Service: It Ain't That Efficient!" by Michael Crew and Paul Kleindorfer -- both papers presented at the Session on Postal Economics, American Economic Association Meetings, Washington D.C., January 7, 1995.

"Making Electricity Markets Work: Competitive Models and Constraints to Competition," paper given at the Conference, "Keeping the Lights On: Technical and Institutional Issues in a Restructured Electricity Industry," Massachusetts Institute of Technology, Cambridge, October 19-20, 1995.

"A Discussion of Market Power in a Non-Merger Context: RTG/Power Pool Commercial Practice Issues," paper given at the Conference "Market Power: The Antitrust Dilemma for the Electric Industry," Washington DC, March 4, 1996.

Comments and discussion on "Electricity Data Needs: An Economic Perspective," by Douglas Hale, Office of Statistical Standards, Meeting of the American Statistical Association Committee on Energy Statistics, Washington, DC, Fall 1996.

"The Average Wholesale Price Litigation: A Report for the Front Lines," ABA Section of Antitrust Law, Health Care and Pharmaceuticals Committee and Consumer Protection Committee, December 3, 2008.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT); ANALYSIS GROUP, INC., (AG); LAW AND ECONOMICS CONSULTING GROUP (LECG); AND ARTHUR D. LITTLE, INC., (ADL) REPORTS

MIT Related

MIT Energy Management and Economics Group, The Conditional/Generalized Maximum Likelihood Logit Computer Program: Instructions for Use, MIT Energy Laboratory Report, MIT-EL-78-013, June 1978.

MIT Model Assessment Group, Independent Assessment of Energy Policy Models: Two Case Studies, Report to the Electric Power Research Institute, EPRI-EA-1071, Project 1015-1, May 1979.

MIT Residential Energy Demand Group, Aggregate Pooled Data Utilized and/or Developed for Residential Energy Demand, MIT Energy Laboratory Working Paper, #MIT-EL-79-047, August 1979.

MIT Energy Laboratory, Assessment of the Appropriate Methods of Incorporating Appliance Engineering Analyses and Data into Residential End-Use Demand Models, Report to the Electric Power Research Institute, Number EA 4146, 1982.

Hartman, Suggested Procedures for the Validation of Bonneville Power Administration's Residential Energy Forecasting Model, Report to Bonneville Power Administration, June 1983.

R. Hartman and P. Spinney, Incentive Regulation for the Restructured Electric Power Industry in Massachusetts, MIT School of Engineering, Laboratory for Electromagnetic and Electronic Systems, LEES Working Paper wp-96-005, September, 1996.

AG Related

AG, Recent Contributions to the Theory and Measurement of Service Reliability, Task 1 Report, Prepared for Niagara Mohawk Power Corporation, September, 1987.

AG, Review of Existing Niagara Mohawk Power Corporation Procedures for Collecting Data on Outage Costs, Task 2 Report, Prepared for the Niagara Mohawk Power Corporation, September, 1987.

AG, The Design of Methods and Implementation Procedures to Collect Data on Customer Outage Costs and the Value of Service Reliability, Task 3 Report, Prepared for the Niagara Mohawk Power Corporation, January 1988.

AG, Customer Outage Costs and the Value of Service Reliability: Draft Analysis Plan for Residential and Large Commercial/ Industrial Customers, Draft Report prepared for the Niagara Mohawk Power Corporation, August 1988.

LECG Related

LECG, Optimal Plant and Firm Size in the Electric Power Industry: Report on Academic/Industry Literature, Report to the Division of Ratepayer Advocates, California Public Utility Commission, August, 24, 1989.

LECG, Analysis of Competitive Consequences and Efficiency Claims for the Proposed Merger Between Southern California Edison and San Diego Gas and Electric, Report to the Division of Ratepayer Advocates, California Public Utility Commission, December, 1989.

LECG, Report on the Proposed Merger of the Southern California Edison Company and the San Diego Gas and Electric Company, Report to the California Public Utilities Commission, Division of Rate Payer Advocates, Application 88-12-035, February, 1990, Exhibit 10,500;

LECG, A Critique of the Commodity Futures Trading Commission (CFTC) Study: "Economic Analysis of Dual Trading on Commodity Exchanges", Report prepared for the Coffee, Sugar and Cocoa Exchange, Inc., March, 1990

LECG, Report on the Proposed Merger of the Southern California Edison Company and the San Diego Gas and Electric Company -Surrebuttal: Econometric Analysis of Merger Impacts, Report to the California Public Utilities Commission, Division of Rate Payer Advocates, Application 88-12-035, July, 1990, Exhibit 10,511.

LECG, A Critical Analysis of the Proposed Merger Between Kansas Power and Light Company and Kansas Gas and Electric Company, Report to the Missouri Public Service Commission, March 25, 1991.

LECG, Petitioners' Economic Testimony in the Matter of Certain Carbon Steel Flat Products, Final Hearing before the United States International Trade Commission, June 29-30, 1993.

LECG, Petitioners' Post Hearing Brief in the Matter of Certain Carbon Steel Flat Products, before the United States International Trade Commission, July 7, 1993.

Hartman, "Returns to Scale and Scope in the Electric Utility Industry: Review of Existing Econometric Analyses and Examination of Their Applicability to the Proposed Merger Between Southern California Edison and the San Diego Gas & Electric Company," LECG Working paper, September, 1989.

Hartman, "Measuring Productivity for the United States Postal Services," Report to the Resource Technology Center of Arthur D. Little, Inc. and the United States Postal Services, January, 1991.

Hartman, "The Relevance of Incentive Regulation to the United States Postal Service," Report to the Resource Technology Center of Arthur D. Little, Inc. and the United States Postal Services, February, 1992.

Hartman, "The Relevance of Incentive Regulation for Environmental Policy Modeling," Report to the World Bank, February, 1992.

Hartman, "Issues in the Valuation and Aggregation of Goods and Services: A Concept Paper," Report to the World Bank, Socio-Economic Data Division, International Economics Department, May, 1992.

Hartman, "A Framework for the Spatial Development of Infrastructure: The Electric Power Industry," Report to the Government of Indonesia, Bappenas, Jakarta, July, 1992.

Hartman, "Stimulating Pollution Abatement Efforts in the Brantas River Basin," Report to World Bank, Indonesian Environmental Mission, Jakarta, August, 1992.

Hartman, "Policies to Control Emissions from Energy Production and Use in Thailand," Report to the World Bank, East Asia Country Operations, January, 1993.

World Bank, Thailand: Managing Environmental Impacts in a High-Growth Economy, Country Economic Report, April 5, 1993.

ADL Related

ADL, Growth Patterns of U.S. Industries and Markets in 1973: The Year Ahead, 1972.

ADL, Tourism in Maryland: Analysis and Recommendations, Report to the Maryland Department of Economic and Community Development, 1972.

ADL, Economic Impact Study of the Pollution Abatement Equipment Industry, Report to the Environmental Protection Agency, December 1972.

ADL, Economic Transition of Distressed Communities, An Analytical Study, Report to the Economic Development Administration, U.S. Department of Commerce, 1974.

ADL, Tourism in Maine: Analysis and Recommendations, Report to the Maine Vacation Travel Analysis Committee, May 1974.

ADL, Tourism in San Diego: Its Economic, Fiscal and Environmental Impacts, Report to the City of San Diego, November 1974.

ADL, The Economic Impact of Proposed OSHA Airborne Arsenic Standards, Report to the American Smelting and Refining Company, June 1975.

ADL, Preliminary Projections of New England's Energy Requirements, Report to the New England Regional Commission, September 1975.

ADL, Economic Impact of Environmental Regulations on the U.S. Copper Industry, Preliminary Rough Draft Report to the U.S. Environmental Protection Agency, 1976.

ADL, Pacific Gas and Electric Company Estimates of Energy Conservation Potential, 1980-2000, Report to the Public Utilities Commission of the State of California, June 1980.

ADL, Southern California Edison Estimates of Electricity Conservation Potential, Report to the Public Utilities Commission of the State of California, June 1981.

ADL, Southern California Edison Projections of Conservation Goals 1982-1986, Report to the California Public Utilities Commission for Southern California Edison, October 1981.

ADL, Estimate of Conservation Penetration for the Southern California Gas Company Service Area, 1981-1986, Report to the Southern California Gas Company, November 1981.

ADL, Electricity and Natural Gas Conservation Potential in the San Diego Gas and Electric Service Territory, Report to the Public Utility Commission of the State of California, April 1982.

ADL, Integrated Conservation Planning/Load Forecasting System Technical Users Guide, Report to San Diego Gas and Electric Company, Vols. I and II, Summer 1982.

ADL, A Method for Evaluating Residential Conservation Programs: Interim Report, Report to the Electric Power Research Institute, RP 1587, March 1983.

ADL, Measuring the Impact of Residential Conservation, Volume II: An Econometric Analysis of Portland General Electric Company Data, Report to the Electric Power Research Institute, EPRI EA-3606, September 1985.

ADL, Measuring the Impact of Residential Conservation, Volume III: An Econometric Analysis of General Public Utilities Inc. Data, Report to the Electric Power Research Institute, EPRI EA-3606, Project 1587, May 1986.

ADL, Measuring the Impact of Residential Conservation, Volumes IV: A Comparison of Alternative Methods, Report to the Electric Power Research Institute, EPRI EA-3606, Project 1587, May 1986.

ADL, Evaluation of EUA's Proposed Acquisitions of Unitil and Fitchburg Electric, Report to Gaston and Snow, March 12, 1990.

Hartman, "Critical Review of Selected Energy End-Use Models and Proposed Specifications for PG&E End-Use Modeling Efforts," Arthur D. Little, Inc., Working Memorandum #13 for Pacific Gas and Electric Co., June 1979, Arthur D. Little, San Francisco.

Hartman, "Potential State-of-the Art Energy Demand Models for Use in Developing an Integrated Natural Gas Forecasting and Conservation Planning System for Southern California Gas Company," Arthur D. Little Working Paper, June 1981, Arthur D. Little, San Francisco.

Hartman, "A Critical Review of the Delmarva 1981-2000 Load Forecast," with James C. O'Keefe, Arthur D. Little Working Paper, September 1981, Arthur D. Little, San Francisco.

Hartman, "Analyzing and Measuring the Effects of Utility Sponsored Conservation Programs," Arthur D. Little Energy Group Discussion Paper, September 1982, Arthur D. Little, San Francisco.

UNPUBLISHED WORKING PAPERS

"An Examination of the Use of Probability Modeling for the Analysis of Inter-fuel Substitution in Residential Fuel Demand," with M. Hollyer, MIT Energy Lab Working Paper #MIT-EL-77-018WP, July 1977.

"A Critical Survey of Three Copper Industry Models and Their Policy Uses," MIT Energy Lab Working Paper #MIT-EL-77-028WP, September 1977.

"The Evolutionary Model of Technical Change: Historical Evidence from Great Britain and the United States," with D. Wheeler, mimeo, December 1977.

"A Critical Review of Single Fuel and Interfuel Substitution Residential Energy Demand Models," MIT Energy Laboratory Report #MIT-EL-78-003, March 1978.

"A Generalized Logit Formulation of Individual Choice," MIT Energy Laboratory Working Paper #MIT-EL-79-010WP, February 1979.

"A Model of Residential Energy Demand," MIT Energy Laboratory Working Paper, #MIT-EL-79-041WP, August 1979.

"The Incorporation of Solar Photovoltaics into a Model of Residential Energy Demand," MIT Energy Laboratory Working Paper #MIT-EL 80-014WP, May 1980.

"Consumer Choice Among Alternative Fuels and Appliance Technologies: An Analysis of the Effects of Alternative Energy Conservation Strategies," MIT Energy Laboratory Working Paper #MIT-EL 82-036WP, June 1982.

"Estimation of Hedonic Supply Curves For Residential Water Heaters Using Technical Data and Federal Testing Guidelines," with Alan Cox and Mary Litterman, MIT Energy Laboratory Working Paper #MIT-EL 82-037WP, June 1982.

"A Monte Carlo Examination of the Heckman and the Manski-Lerman Estimators in Discrete/Continuous Models of Demand," October 1986.

"The Value of Service Reliability: Alternative Welfare Measures," with C.K. Woo, October, 1988.

"The Use of Hedonic Analysis in Defining and Measuring Market Size: The Extension of the Merger Guidelines to Heterogeneous Products," Working Paper No. 91-12, Program in Law and Economics. School of Law, Boalt Hall

EXPERIENCE IN CONSULTING AND EXPERT TESTIMONY

Overview of Qualifications

Dr. Hartman is an economist specializing in microeconomics, econometrics and the study of industrial organization. Microeconomics is the science used to analyze and characterize the behavior of groups of consumers and producers that constitute markets. Econometrics is a science that makes use of mathematics and statistics to measure and quantify economic behavior and economic phenomena in markets. The study of industrial organization makes use of both microeconomic theory and econometrics. It focuses upon the structure, conduct and performance of the participants (consumers and producing firms) in markets and industries, for the purposes of predicting behavior and addressing such policy issues as antitrust, regulation and industrial policy.

He has taught economics, conducted economic research and provided economic consulting in his areas of specialization for thirty-five years. He taught economics as an Assistant Professor and Associate Professor within the Department of Economics at Boston University over the period 1977-1988. He taught economics as a Visiting Associate Professor and member of the Visiting Faculty at the School of Law, Boalt Hall, University of California at Berkeley over the period 1988-1993. He was a member of the research faculty at MIT over the period 1977-1982, during which time he conducted research in energy markets for the United States Department of Energy. During the same time, he declined the offer of a Visiting Assistant Professorship within the Department of Applied Economics at MIT, and instead lectured on a selective basis. Since 1971, he has consulted to federal and state governmental bodies, private corporations, law firms, consulting companies, research organizations and international lending organizations. He has been and continues to be a research referee for a variety of academic journals, including the top academic journals in the country. He is the author of more than 100 refereed journal articles, book chapters and research/consulting reports.

He has submitted oral and written testimony before federal and state courts of law and regulatory commissions. His testimony as an expert witness has addressed anticompetitive behavior, merger efficiencies, breach of contract, employment discrimination, patent infringement, class certification and the estimation of damages in a variety of markets and industries including, but not limited to, the pharmaceutical industry, the health care services industry, the electric power industry, the banking industry, the agrochemical industry, the copper industry, the defense industry, the cable TV industry, the tobacco industry, the electrical and mechanical carbon products industry, the medical devices industry and the construction industry. He has consulted to counsel on litigation matters in a broader array of markets.

While his experience has been broadly-based across industries, two industries/markets have been primary subjects of substantial consulting, research and litigation support.

Experience in Energy Markets and Regulated Industries

Since 1977, Dr. Hartman's expertise and experience have involved regulated industries generally and the markets for electric power and natural gas specifically. His consulting and/or litigation assignments have included load forecasting, evaluation of conservation and load management programs, econometric cost analysis, analysis of revenue requirements and rate-making, analysis of value of service reliability, the analysis of mergers and acquisitions, analysis of industry restructuring, analysis of manipulation of spot and future prices in energy markets, and analysis of contract damages arising from DOE's partial breach of the Standard Contract regarding storage of nuclear waste. In these assignments, Dr. Hartman has consulted for such clients as Arizona Public Service, the Pacific Gas and Electric Company, the Southern California Edison Company, the Southern California Gas Company, the San Diego Gas and Electric Company, Portland General Electric Company, Bonneville Power Administration, General Public Utilities, Northeast Utilities, Niagara Mohawk Power Corporation, the Delmarva Power Corporation, Florida Power Corporation, Sithe Energies, the California Energy Commission and Public Utilities Commission, the Missouri Public Service Commission, the Rhode Island Division of Public Utilities, the Attorney General of the State of Massachusetts, the Electric Power Research Institute, the Gas Research Institute, the U.S. Department of Energy, the U.S. Department of Justice, the World Bank, and the governments of Indonesia and Thailand. He has consulted for a number of other clients whose identity must remain confidential.

Experience in Health Care and Pharmaceutical Markets

Over the past 13 years, Dr. Hartman has participated as testifying or consulting expert in a wide array of matters related to health-care markets generally and, more specifically, markets for medical devices and pharmaceutical products. For examples, working with a team of health care experts, he submitted written testimony assessing and measuring the impacts of smoking on Medicaid health care costs in the Commonwealth of Massachusetts. He submitted testimony analyzing the competitive impacts upon and damages to a class of dental laboratories caused by the restrictive dealer practices of a dominant U.S. manufacturer of medical prostheses - false teeth. He consulted to the group of wholesaler defendants in the Brand-Name Prescription Drugs Antitrust Litigation, addressing issues of wholesaler pricing across classes of trade. He consulted to counsel to a manufacturer of cardiovascular stents and other related devices in a variety of patent infringement matters, addressing such issues as competition, market penetration of new products and economic damages arising from patent infringement. He consulted for one group of private plaintiffs in the antitrust matter regarding the prescription drugs lorazepam & clorazepate and for the Federal Trade Commission in the matter of Hoechst Marion Roussel, Inc., Carderm Capital L.P. and Andrx Corporation concerning antitrust claims involving the prescription drug Cardizem CD. That consultation addressed issues of market definition, product competition, class certification and damage estimation. He consulted to counsel on the matter of damages to the class of direct purchasers of the prescription drug Taxol and on the matter of damages to the class of indirect end-payer purchasers of the prescription drugs K-Dur, Augmentin, Wellbutrin, Zyprexa, Bextra, Celebrex, Tricor, Nexium, Estratest, and Vioxx. He submitted testimony addressing class certification, liability and/or damages for the class of end-payer purchasers in antitrust, state consumer protection or RICO litigation concerning the prescription drugs Hytrin, BuSpar, Relafen, Lupron, Premarin, Ditropan, the hormone replacement therapy Estratest, Cipro in the states of New York and California and in the United States, and Neurontin in the United States and Pennsylvania. In the MDL AWP litigation, he submitted testimony in support of the certification of to the

class of end-payer purchasers of those pharmaceutical products produced by AstraZeneca, the Bristol-Myers Squibb Group, the Johnson & Johnson Group, the GlaxoSmithKline Group and the Schering Plough Group that were alleged to have been the subject of a scheme to fraudulently inflate their Average Wholesale Price (AWP); he subsequently submitted and presented at trial testimony supporting findings of causation, liability and the calculation of damages for those end-payer groups for which class certification was granted. He has consulted to and/or submitted testimony for the Offices of the Attorneys General for the states of Massachusetts, New York, Connecticut, Montana and Nevada in analogous matters. He submitted testimony addressing class certification, liability, damages and settlement allocation in the MDL litigation, *New England Carpenters Health Benefits Fund, et al., Plaintiffs, v. First Databank, Inc., a Missouri Corporation and McKesson Corporation, a Delaware Corporation, Defendants*, in which violations of U.S. RICO and state consumer protection statutes were allegedly violated. He submitted testimony regarding class certification in the MDL matter alleging ERISA violations, *In re Express Scripts, Inc., PBM Litigation*. He has consulted to drug companies on related matters when they have arose in a patent litigation context. His testimony has been the basis for the certification of class in a variety of these matters. His testimony has been the basis for approval supporting settlement agreements in a variety of these and other pharmaceutical matters.

Specific Assignments

1972-1975: In consultation with Arthur D. Little, Inc., Dr. Hartman developed economic impact models to assess the effects of environmental regulations upon the U.S. pollution abatement equipment industry and upon a particular U.S. copper smelting company.

1972-1975: In consultation with Arthur D. Little, Inc., Dr. Hartman developed economic models to assess the regional macroeconomic and industrial impacts of alternative strategies to promote tourism-related industries. The models were used in the United States by the states of Maryland and Maine and for the Philadelphia Bicentennial Commission. Internationally, the models were used by the Ministry of Planning of Mexico to assess the national and regional importance of tourism coming into Acapulco.

1976-1977: Consultation with Arthur D. Little, Inc. for the U.S. Environmental Protection Agency. The effort involved the design, estimation and implementation of an econometric simulation model that was used to assess the impact of pollution abatement legislation on the U.S. copper industry. The model was designed to incorporate engineering cost estimates attributable to the abatement legislation while accounting for the noncompetitive pricing behavior in the industry. The model was used to evaluate and revise proposed abatement legislation. This analysis was the basis for Dr. Hartman's Ph.D. dissertation and several of his publications.

1977-1982: Working as the testifying expert, Dr. Hartman analyzed the presence of a price-fixing conspiracy among the major U.S. copper producers during the 1970's. His testimony addressed issues of liability and developed a model of damages. See

Affidavit to United States District Court for the Southern District of New York, *J.N. Futia Co., Inc., Plaintiff, Against Phelps Dodge Corporation, et al., Defendants*, 78 Civ. 4547 (ADS), 1978.

Deposition for United States District Court, Southern District of New York for *Reading Industries, Inc., et al. (Plaintiffs) against Kennecott Copper Corporation, et al. (Defendants)*, 17 Civ. 1736 (MEL), 1982.

1979: Working for the California Energy Commission, Dr. Hartman developed and presented a Statement of Opinion and Critical Review of Selected Energy End-Use Models and Proposed Specifications for PG&E End-Use Modeling Efforts before the California Energy Commission Hearings on Utility Construction and Siting, November 26-30, 1979.

1984: Testifying expert for the class of all individuals who employed the services of members of Massachusetts Furniture and Piano Movers Association. The analysis developed an econometric model to assist in certifying the class and measuring the damages common to that class. See

Affidavit to United States District Court for the District of Massachusetts in the Matter of *Kenett Corporation et al. v. Massachusetts Furniture and Piano Movers Association Inc. et al.*, May 1984, Civil Action No. 82-140-Z.

1984-1986: In consultation with the U. S. Postal Service, Dr. Hartman identified appropriate econometric methods for analysis of the determinants of Postal Service costs. The particular methods he suggested were "hedonic" cost techniques, which are specifically designed to account for the fact that both increased levels of production and improved product attributes increase costs. The techniques assisted the Postal Service in quantification of the cost impacts of the attributes of service quality for alternative classes of service. For example, the techniques allowed for estimation of the differential cost impacts of alternative service priorities, size and weight attributes of the various classes of mail.

He later applied these techniques for a group of second class mailers. The analysis was introduced before the Postal Service Commission to assess whether proposed postal rate changes reflected actual costs.

1984-1986: The development of econometrically-based strategic planning models, which allow for estimation of the effects on corporate profits of alternative product design and pricing strategies. The models allow for examining specific design strategies by explicitly incorporating detailed product attributes. The models were developed for Westin Hotels and Shell Oil. The Westin models have been implemented into an interactive PC tool that facilitates pricing decisions at the front desk.

1985: For analysis presented before the International Trade Commission, Dr. Hartman helped develop and estimate a model to evaluate the domestic effects of importation of certain synthetic aramid fibers. The analysis was used in adjudicating an international patent infringement complaint.

1985-1986: Dr. Hartman participated in an analysis of one of the nation's largest mutual funds. The study was undertaken as part of a class action alleging inappropriate management fees. The study assessed competition in the money market mutual fund industry. It measured investors' sensitivity to changes in yield and to the level of services provided. It also statistically identified the determinants of the costs of providing mutual fund services.

1985-1986: The development for GTE Laboratories of econometric demand models for analysis and measurement of the determinants of demand for telecommunications services. The models explicitly address the separate customer decisions to subscribe to one of several telecommunications carriers and the demand for telecommunications services, conditional upon the subscription decision. The analysis was employed by GTE to assist their subsidiary, GTE Sprint, in the design of marketable services, where the services were differentiated by tariff, perceived service quality, provider reputation, and specialized customer services. The analysis is summarized in the paper

"Estimation of Household Preferences for Long Distance Telecommunications Carrier", *Journal of Regulatory Economics*, Volume 6, 1994.

1985-Present: Dr. Hartman has performed a variety of economic damage analyses in cases of personal injury, wrongful injury and wrongful death. He has worked for both plaintiff and defendant. He has been deposed in such matters as recently as 1995.

1986: For a major natural gas pipeline, preparation of an analysis of the effects of natural gas deregulation as proposed in the Federal Energy Regulatory Commission's Notice of Proposed Rulemaking No. 436.

1986-1987: Working for the class of owners of selected General Motors' X Cars and VW Rabbits, Dr. Hartman specified and estimated econometric models that assisted in the certification of class and estimation of class damages. The damages flowed directly from allegedly-concealed design flaws in these automobiles. The methods are described in

"The Use of Hedonic Analysis for Certification and Damage Calculations in Class Action Complaints," with M. Doane, *The Journal of Law, Economics and Organization*, Fall 1987.

1986-1987: Development of damage models for litigation in high technology industries. The models were developed in several cases. One involved alleged patent infringement by a major Japanese semiconductor firm, and the second involved market foreclosure of a domestic minicomputer emulator. In these efforts, Dr. Hartman developed econometric models to estimate the market potential, absent the violation, for the particular product foreclosed or whose patent was infringed. The methods are described generically in

"Product Emulation Strategies in the Presence of Reputation Effects and Network Externalities: Some Evidence from the Minicomputer Industry," with D. Teece, *Economics of Innovation and New Technology*, Volume 1, 1990.

1987: Analysis of the competitive effects of relaxing the restrictions on the Bell Regional Operating Companies regarding their vertical extension upstream into equipment manufacture and downstream into the provision of selected telecommunication services. The study was introduced before Judge Greene in the triennial review of the divestiture of the Bell operating companies from AT&T.

1987-1988: For a major gas utility, participation in analysis of the economic effects arising if bypass of an existing pipeline were allowed by state and federal regulation. The analysis developed methods for assessing when competitive bypass is socially desirable. The analysis also developed and used an econometric model to simulate the effects of bypass on demand and prices.

1988: Analysis of the competitive effects the acquisition of trade secrets through the predatory hiring of a competitor's essential labor force. See

Analysis submitted in testimony in the case *Universal Analytics Inc. v. MacNeil Schwendler, Corp.*

1988-1989: As part of their proposed acquisition of Public Service of New Hampshire, Dr. Hartman was retained by Northeast Utilities, Inc. to develop and estimate load forecasting models. The models were used to assess the demand implications of alternative rate assumptions proposed as part of the acquisition.

The forecasts were introduced as part of Northeast Utilities' filings before the bankruptcy court, the state public utility commissions, the SEC and the FERC.

1989: As part of major antitrust litigation against the leading vendors of airline computer reservation systems, Dr. Hartman helped develop liability analysis and models for the estimation of damages.

1989: As a proposed testifying expert for Parnelli Jones, Inc., Dr. Hartman analyzed the antitrust implications of Firestone's retail trade practices, particularly alleged vertical and horizontal restraints of trade. He designed damage models for the alleged violations.

1989 - Present: Dr. Hartman has performed and continues to perform the market analyses required for Hart-Scott-Rodino applications and second requests supporting mergers and acquisitions in a variety of industries, including specialty chemicals, airlines, health care and medical diagnostic products, and energy products and services.

1989-1990: Dr. Hartman participated as a principal investigator and testifying expert for the Division of RatePayer Advocates of the California Public Utility Commission in an analysis of the economic and legal implications of the proposed merger between Southern California Edison Company and San Diego Gas and Electric Company. Dr. Hartman's responsibilities included overall study design, econometric analysis of scale and scope economies arising with the merger, and analysis of efficiencies purportedly arising with the coordination of the demand-side management programs of the two utilities. His direct and surrebuttal testimony is found in

California Public Utilities Commission, Division of Rate Payer Advocates, Report on the Proposed Merger of the Southern California Edison Company and the San Diego Gas and Electric Company, Volume V, Chapter II, Application 88-12-035, February, 1990, Exhibit 10,500; and

California Public Utilities Commission, Division of Rate Payer Advocates, Report on the Proposed Merger of the Southern California Edison Company and the San Diego Gas and Electric Company, Surrebuttal: Econometric Analysis of Merger Impacts, Application 88-12-035, July, 1990, Exhibit 10,511.

1989-1990: Working with Arthur D. Little, Inc., Dr. Hartman participated as a principal investigator and testifying expert in a merger study for several small New England utilities within Nepool. Dr. Hartman designed and implemented a statistical study of returns to scale and scope in the industry. Using the statistical results, Dr. Hartman developed opinions regarding the efficiency effects of the proposed merger. His analysis appears as an independent Appendix to

Arthur D. Little, Inc., Evaluation of EUA's Proposed Acquisitions of UNITIL and Fitchburg, Report to Gaston and Snow, March 12, 1990, presented in support of the acquisition to the Securities and Exchange Commission and the New Hampshire Public Utilities Commission.

1990: Working for a group of commodity futures exchanges, Dr. Hartman participated as Principal Investigator in a critical review of a statistical and econometric study performed by the Commodity Futures Trading Commission. The CFTC study was developed to assess the effects of dual trading on commodity futures markets, in order to implement proposed regulations curtailing such trading.

1990: Working with Barakat and Chamberlin, Inc., Dr. Hartman developed a Ramsey pricing model for Arizona Public Service Corporation. The Ramsey pricing model was used to develop and explore alternative rate strategies for a variety of residential, commercial and industrial market segments. The analysis was submitted in formal rate hearings.

1990-1992: Working with the Technology Research Center of Arthur D. Little, Inc. for the United States Postal Service, Dr. Hartman specified and estimated econometric models to analyze the determinants of productivity for the largest 120 post offices in the United States. The econometric models are being used to identify the most and least productive offices, with the purpose of learning from the performance of the most productive offices in order to improve the performance of the least productive offices. The models are being used to design and implement incentive regulation mechanisms to increase productivity across post offices.

A second set of econometric models have been specified and estimated to quantify the effects of the attributes of alternative postal services and rate classes upon total postal service costs. The results of this analysis are being used to design postal rates for alternative classes of service which reflect the real costs of providing the services. The analysis and its results will be introduced into the postal rate hearings.

1990-1997: Working with the World Bank, Dr. Hartman has specified and is estimating a set of econometric models to measure both the level and types of pollutants emitted by United States plants and establishments and the costs of abating those pollutants. The models identify and quantify, at the plant level, the relationship between the emission of approximately 300 pollutants and the scale of production, the types of technology used, the age and characteristics of the plant and equipment used, the extent to which abatement equipment has been installed, and the costs (capital and operating) of abating alternative pollutants.

The models will be used in the following ways in developing countries and Eastern European countries: to assist the countries to predict and assess the environmental implications of reliance upon certain technologies and industries in development; to assess the effectiveness of alternative regulatory methods for abating pollution, including effluent standards, effluent taxes, effluent licenses, technology standards, effluent banks, and alternative property right schemes; to implement incentive regulation mechanisms to better stimulate abatement compliance; and to identify and prioritize those industries that can abate certain pollutants at least cost.

As part of this effort, Dr. Hartman has also designed a specific incentive regulation system for pollution abatement compliance in Indonesia. The system is based upon the most recent theory in regulated incentive mechanisms. The system will ultimately evolve into an effluent bank or a system of effluent fees. If the effort is successful, it will form the basis for environmental institutions in other developing countries. In the process of designing this system, he has reviewed the institutional and statutory basis for environmental policy in Indonesia.

Also as part of this work, Dr. Hartman is in the process of designing the institutional and statutory structures for Environmental Protection Agencies in a variety of developing countries. The institutional structures will be designed to articulate and implement pollution abatement policies that are informed by the econometric modeling described above.

1991: Dr. Hartman participated as a principal investigator and testifying expert for the Missouri Public Service Commission in a critical analysis of the proposed merger between Kansas Power and Light Company and Kansas Gas and Electric Company. Dr. Hartman's responsibilities included overall study design, analysis of scale and scope economies arising with the merger, analysis of unanticipated transitional cost

arising with the merger and an econometric event study of the stock market's response to the merger. His testimony appears in

A Critical Analysis of the Proposed Merger Between Kansas Power and Light Company and Kansas and Electric Company, Report to the Missouri Public Service Commission, March 25, 1991.

1991: Working for the Resolution Trust Corporation in its litigation against Michael Milken and Drexel Burnham Lambert Inc., Dr. Hartman developed data and econometric models to measure the size of the relevant antitrust markets dominated by Drexel and to estimate the size of the economic damages produced by Drexel's alleged monopolization of those markets.

1991-1992: Working for the Indonesian government and the United States Agency for International Development, Dr. Hartman critically reviewed the structure of the Indonesian electric power industry and the institutions regulating that industry. The purpose of the analysis was to assist the government with privatizing their energy industries. His analysis focused upon the following: developing better data and models for predicting demand and supply; identifying and implementing more efficient industrial structures; and developing better regulatory regimes.

1992: Working for the World Bank, Dr. Hartman designed methods to measure and compare the social value of the environmental effects of alternative development projects, at the microeconomic and macroeconomic levels. His analysis focused upon standard and contingent valuation survey approaches and their use in econometric settings.

1992-1993: Working for the World Bank in Bangkok, Dr. Hartman characterized and critically analyzed the environmental effects of Thailand's energy use patterns. He focused upon the use and production of electric power, petroleum, coal and natural gas. He developed recommendations for environmental policy changes that included, but were not limited to, fuel taxes, effluent standards, technology standards, and privatization of environmental monitoring within a "bubble" policy approach.

1992-1993: Working for a biomedical company (a producer of vascular grafts) in an antitrust situation, Dr. Hartman designed and implemented survey techniques and econometric models to measure the size of the relevant markets and market power within those markets.

1992-1993: In a proceeding before the International Trade Commission, Dr. Hartman critiqued ITC econometric methods used for estimating elasticities of demand, supply and substitution among domestic and imported products. His focus was selected steel products. He formulated and estimated alternative models and methods to improve the existing estimates. He developed presentation materials for the Commission and testified before the Commission. His testimony is included in

LECG, Petitioners' Economic Testimony in the Matter of Certain Carbon Steel Flat Products, Final Hearing before the United States International Trade Commission, June 29-30, 1993; and

LECG, Petitioners' Post Hearing Brief in the Matter of Certain Carbon Steel Flat Products, before the United States International Trade Commission, July 7, 1993.

1992-1997: Working for the World Bank, Dr. Hartman has designed and is currently implementing a set of regional econometric/engineering models that accurately portray and predict the economic, environmental, infrastructural and socio-demographic effects of large-scale, World-Bank-funded infrastructural projects. The models combine input-output and econometric methods.

Given the Bank experience that many of their financially-sponsored projects create significant unanticipated environmental effects, the models are designed to be broad and comprehensive enough to incorporate and predict all important effects. The models systematically characterize the relationship between resource-based economic growth and the regional environment in which that growth occurs.

The models are currently being implemented for assessing project developments in the Carajas region of the Brazilian Amazonian rain forest, which is a large, dynamic and ecologically sensitive frontier area. The methods implemented for Brazil will be generalized for analysis of economic growth in ecologically similar areas, such as the Lake Baikal region of the former Soviet Union.

1993-1994: Working for the Commonwealth of the Northern Mariana Islands, Dr. Hartman developed and presented testimony rebutting a complaint by the United States Department of Justice that the Public School System of the Commonwealth practiced employment discrimination against teachers of Filipino and native Carolinian origin. Dr. Hartman's testimony examined both hiring and compensation practices. His testimony included hedonic regression analysis of the market for public school teachers in the islands. This analysis measured how teacher attributes and qualifications determined teacher salaries and hiring. The results of the analysis indicated that salary differentials resulted from differences in teacher qualifications rather than discrimination.

1993-Present: Working either as the testifying expert or supporting other testifying experts, Dr. Hartman has participated in a variety of patent infringement cases. He has developed, supported and estimated alternative theories and measures of damages for manufacturers of coaxial cable and a variety of alternative medical devices.

1993-1998: Working as the testifying expert, Dr. Hartman developed models estimating the damages to the business of a construction general contractor that were caused by the malicious prosecution of the contractor's insurance company.

1994: Working for the United States Wheat Associates in a proceeding before the ITC, Dr. Hartman designed and implemented an econometric study to assess and quantify the extent to which Canadian Wheat Board imports into the U.S. undersold domestic supplies and thereby materially interfered with the United States Department of Agriculture Wheat Program. The econometric study was hedonic. The study measured how non-price attributes are valued in U.S. wheat markets. The non-price attributes analyzed included such things as protein content, shipment defects, moisture content and a number of end-use performance characteristics. Having measured the value of these attributes in U.S. markets, the analysis indicated how the Canadian Wheat Board fixed import prices below market levels, given the attributes of the imported wheat.

1994: Working as a testifying expert for Gallo Wines in a proceeding before the ITC, Dr. Hartman designed and implemented a statistical study of the US wine industry that analyzed the impacts of Chilean wine imports upon the domestic industry that would result from the inclusion of Chile in a Free Trade Agreement with the US.

1994: Working as a testifying expert for an insurer of a member of the Asbestos Claims Facility and Center for Claims Resolution, Dr. Hartman developed a statistical analysis estimating alternative indemnification liabilities expected under the Settlement Share Analysis of the Center for Claims Resolution and under the tort system. The results were used to make strategic decisions regarding the desirability of participating in the Class Action Settlement relative to litigating the claims.

1994: Working for several regional Bell Operating companies, Dr. Hartman has developed models and survey procedures to analyze and quantify the determinants of demand for local services, long-distance services and PCS services. The models quantify how consumers respond to and select among alternative carriers who differentiate their services by performance attributes and vendor reputation. The models also estimate the level of service demand, conditional upon the selection of service vendor. The models are being used to quantify the nature of competition among local carriers and long-distance carriers in the Intralata market. The models are also being used to help develop bidding strategies for specific RBOCs as they participate in the FCC auctions for the PCS spectra.

1995: Working as a testifying expert for a group of independent television stations and program producers, Dr. Hartman developed an econometric analysis of the impacts of the Prime Time Access Rule (PTAR) upon the economic performance of independent television stations. The analysis was submitted to the Federal Communications Commission as part of their consideration of the repeal of the Rule. Dr. Hartman's analysis proved that PTAR had a strong, statistically significant effect upon the economic performance of these stations, and that its repeal would adversely impact them.

His testimony is included in

The Economic Effects of Repealing the Prime Time Access Rule: Impact on Broadcasting Markets and the Syndicated Program Market, Report prepared by LECG and presented before the Federal Communications Commission, MM Docket No. 94-123, March 7, 1995.

1995: Working for a big six accounting firm, Dr. Hartman designed and implemented a hedonic regression analysis to calculate transfer prices under the comparable uncontrolled price (CUP) method. The analysis is discussed in

"The Use of Regression Techniques in Transfer Price Analysis," with Delores Wright and J.D. Opdyke, *European Taxation*, 1996.

1995-1996: Working as the testifying expert for a major high tech firm in New England, Dr. Hartman has developed rebuttal and affirmative testimony to rebut claims of age discrimination in the termination of a group of employees over forty. His rebuttal testimony involved critically reviewing statistical analyses purporting to demonstrate disparate treatment and disparate impact. His affirmative testimony has involved designing and implementing econometric models to identify and estimate those factors actually determining the compensation and termination decisions of the defendant.

1995-1996: Working as the testifying expert for the Office of Attorney General of the State of Massachusetts, Dr. Hartman has analyzed and helped develop the State's positions on the following issues: restructuring the electric utility industry in Massachusetts and New England; regulating those entities in the restructured industry that will remain subject to regulation; and valuing those assets that may be stranded as a result of restructuring. As part of the effort, Dr. Hartman also critically reviewed the restructuring proposals of the largest utilities in the state. His testimony appears in

"The Market for Power in New England: The Competitive Implications of Restructuring," a report prepared for the Office of the Attorney General, Commonwealth of Massachusetts and submitted February 16, 1996 in support of their filing to the Department of Public Utilities as part of DPU 95-30, which was initiated August 15, 1995.

1995-1996: Working as the testifying expert, Dr. Hartman represented Florida Power Corporation in a contract dispute with Independent Power Producers. His analysis and testimony focused upon issues of damages incurred as a result of a breach of contract.

1995-1999: Working with a team of economists, Dr. Hartman represented the group of wholesalers in the retail prescription drug price fixing conspiracy case. His efforts included industry analysis and participation in cross examination of plaintiffs' experts.

1996: Working as the testifying expert for the Division of Public Utilities of the State of Rhode Island, Dr. Hartman has analyzed and helped develop the State's positions on restructuring the electric utility industry in Rhode Island and New England, for both the State's Public Utilities Commission and the FERC. As part of the effort, Dr. Hartman also critically reviewed the restructuring proposals of some of the utilities in the state. His testimony appears in

"The Division Plan to Restructure the Electric Utility Industry in Rhode Island," Volume 2 of Supporting Testimony to the State of Rhode Island and Providence Plantations Public Utilities Commission, in re: Electric Industry Restructuring, Docket 2320, April 12, 1996.

1996: Working with a team of engineering firms, an international investment banking firm, a big six accounting firm and several national law firms, Dr. Hartman developed models of demand, supply and futures markets in restructured electric power markets to assist a major industry participant in evaluating specific alternative acquisition strategies.

1996: Working with a team of economists developing evidence for presentation before the High Court of New Zealand, Dr. Hartman critically reviewed and rebutted a variety of econometric analyses of natural gas markets and more broadly-defined energy markets in New Zealand. These analyses were used to determine the size of antitrust markets for a variety of energy products.

1996: Dr. Hartman was retained by a major mid-west utility to critically review and rebut analyses and evidence presented before the FERC and the relevant State Commissions concerning the competitive impacts of the proposed Primergy merger.

1996-2003: Working as the testifying expert, Dr. Hartman analyzed the employment practices and procedures of the Florida Power Corporation during a reduction in force, to assess the validity of a complaint that those practices and procedures resulted in a pattern of age discrimination. In his testimony, Dr. Hartman implemented a variety of statistical and econometric analyses to address and quantify claims of disparate impact and disparate treatment.

1996-1997: Working for US Airways with a team of economists, Dr. Hartman specified and estimated a variety of econometric consumer choice models to measure customer preferences for the services of alternative air carriers in a cross section of US-European origin-destination markets. The models were used to evaluate the economic impacts of both the proposed alliance between American Airlines and British Airways and alternative proposals to condition that alliance.

1996-1997: Working as the testifying expert, Dr. Hartman represented a major national retail pharmaceuticals wholesaler in litigation brought by a regional distributor alleging monopolization of wholesale services to distinct classes of trade. His analysis addressed market definition, the analysis of competition generally and analysis of the competitive impact of specific contractual arrangements.

1997: Working with a team of experts, Dr. Hartman analyzed economic impacts of the construction of the Warrior Run Cogeneration plant which was under construction in Western Maryland and was contracted to sell power to Allegheny Power System's (APS) Maryland subsidiary, Potomac Edison.

1997: Working as the testifying expert for the Office of Ratepayer Advocates of the California Public Utilities Commission, Dr. Hartman critically reviewed the efficiencies estimated by Applicants to be induced by the proposed merger of Pacific Enterprises and Enova Corporation.

1997: Working with a team of economists, Dr. Hartman prepared affirmative and rebuttal testimony in a breach of contract matter in the pharmaceutical industry arbitrated before the International Chamber of Commerce.

1997-2000: Working as the testifying expert, Dr. Hartman developed analysis supporting certification of class and estimation of damages for the class of purchasers of thermal fax paper in the US over the period 1990-1992 who were damaged as a result of a price fixing conspiracy by major suppliers.

1998: Working as the testifying expert, Dr. Hartman analyzed the employment practices, procedures and personnel data of the Florida Power Corporation, in general and in particular, to assess the validity of a complaint that a specific employee had been subjected to racial discrimination.

1998-1999: Working with a team of economists for the Office of the Attorney General of the State of Massachusetts, Dr. Hartman developed and implemented econometric models to analyze and measure the health care costs arising under the Medicaid program that have been attributable to smoking. The analysis appears in the following documents:

David M. Cutler, Arnold M. Epstein, Richard G. Frank, Raymond S. Hartman, Charles King and Joseph P. Newhouse, *The Impact of Smoking on Medicaid Spending in Massachusetts: 1970-1998 -- Report on Methods*, June 15, 1998;

David M. Cutler, *et al.*, *The Impact of Smoking on Medicaid Spending in Massachusetts: 1970-1998 - Results From The Inclusive Approach for Adults*, July 1, 1998;

David M. Cutler, *et al.*, *The Impact of Smoking on Medicaid Spending in Massachusetts: 1991-1998 - Results From The Disease-Specific Approach for Adults and Overall Summary*, July 11, 1998.

Drawing upon these efforts, Dr. Hartman worked with the same team of experts to analyze the economic impacts of the Master Settlement Agreement and to present their findings to the Tobacco Fee Arbitration Panel.

1999: Working as one of two testifying experts for the Office of the Attorney General of the Commonwealth of Massachusetts, Dr. Hartman critically analyzed potential rate increases relevant to Joint Petitions introduced by both Eastern Enterprises/Colonial Gas Company and Boston Edison/Commonwealth Energy Systems. His testimony appears as

Joint Testimony of Seabron Adamson and Raymond Hartman on Behalf of the Massachusetts Attorney General, in the matter of the Joint Petition of Eastern Enterprises and Colonial Gas Company For Approvals of Merger Pursuant to G.L. c. 164, §§ 96 and 94, DTE 98-128, March 26, 1999.

Joint Testimony of Seabron Adamson and Raymond Hartman on Behalf of the Massachusetts Attorney General, in the matter of the Joint Petition of Boston Edison Company, Cambridge Electric Light Company, Commonwealth Electric Company and Commonwealth Gas Company For Approval of Rate Plan Pursuant to G.L. c. 164, §§ 76 and 94, DTE 99-19, April 30, 1999.

1999-2000: Dr. Hartman was retained by a group of industrial purchasers of copper to develop and implement methods and models to assess liability and measure damages in the matter involving the manipulation of the spot and future prices of copper on the London Metals Exchange by Sumitomo Corporation and Yasuo Hamanaka over the period 1987-1996.

1999-Present: Dr. Hartman consulted with counsel and the testifying expert in the development of data and models needed to certify class and measure damages in a price fixing case involving the manufacturer (Mylan) of generic clorazepate and lorazepam.

1999-2001: Working as the testifying expert, Dr. Hartman analyzed liability arising from a variety of restrictive dealer arrangements implemented by Dentsply International Inc., a U.S. manufacturer of artificial teeth, to foreclose entry by rival manufacturers from the US dental-laboratory dealer network. Dr. Hartman developed and implemented methods to measure damages to the class of dental laboratories that purchased artificial teeth from Dentsply at prices above the competitive prices that would have obtained absent the restrictive dealer arrangements.

1999-2000: Working with a team of economists for the Federal Trade Commission, Dr. Hartman analyzed the pro-competitive and anti-competitive nature of settlement agreements between generic and pioneer drug manufacturers resolving patent infringement litigation arising from certification under Paragraph IV of the Hatch Waxman Act (Drug Price Competition and Patent Term Restoration Act). Particular settlements analyzed include the settlement between Abbott Laboratories and Geneva Pharmaceuticals regarding the drug Hytrin and the settlement between Hoechst Marion Roussel (Aventis) and Andrx Corporation regarding the drug Cardizem.

1999-2000: Working as the testifying expert for the class of purchasers of Nine West shoes, Dr. Hartman was asked to analyze liability and measure damages arising from an alleged conspiracy to raise and maintain the prices of women's shoes manufactured by the Nine West Group Inc. and sold by a variety of general merchandise retailers through their upscale retail department stores. The defendants in the case included Nine West Group Inc., Federated Department Stores, Inc., Dayton Hudson Corporation, Lord and Taylor, Nordstrom, Inc., May Department Stores, Macy's, Bloomingdale's, Inc., and other general merchandise retailers.

2000: Working with the testifying expert, Dr. Hartman assisted in the analysis and estimation of economic damages to a Class defined as all smokers with 20-pack years each of whom contracted lung cancer which was substantially contributed to by cigarette smoking.

2000: Working with a team of economists, Dr. Hartman developed econometric models to analyze and measure the impacts of subject imports, non-subject imports and factor price changes upon the prices of structural steel beams during the period 1998-1999. The work was presented before the International Trade Commission.

2001: Working with a team of economists, Dr. Hartman developed econometric models to analyze and measure the impacts of subject imports, non-subject imports and factor price changes upon the prices of structural steel beams and during 2000. He also developed econometric models to analyze and measure the impacts of subject imports, non-subject imports and factor price changes upon the prices of cold rolled and hot

rolled steel during the Period of Inquiry of 1997-1999. Both efforts were presented before the International Trade Commission.

2001-2004: Working as the testifying expert, Dr. Hartman developed and submitted testimony in support of class certification of and the calculation of damages to the class of indirect purchasers of the anti-hypertensive drug, Hytrin, produced by Abbott Laboratories and the generic equivalent of Hytrin, generic terazosin hydrochloride, produced by Geneva Pharmaceuticals. The class alleges monopolization and violation of the Hatch Waxman Act (Drug Price Competition and Patent Term Restoration Act).

2001-Present: Working as consultant and testifying expert, Dr. Hartman has been retained by counsel to the classes of indirect or direct purchasers of a variety of branded pharmaceuticals (including but not limited to Augmentin, Bextra, Cipro (New York, California, U.S.), BuSpar, Celebrex, Vioxx, K-Dur, Taxol, Lupron, Relafen, Paxil, Neurontin, Remeron, Ditropan, Tamoxifen, Premarin, Wellbutrin and Zyprexa) to analyze and submit testimony dealing with class certification, liability, market definition, damage calculations and settlement allocations arising from violations of the Hatch Waxman Act (Drug Price Competition and Patent Term Restoration Act), related state-specific unfair competition statutes and the RICO Act.

Dr. Hartman's testimony in this area has been relied upon (and cited thereto) for certification of end-payer consumer classes in the following matters:

- *In re: Terazosin Hydrochloride Antitrust Litigation*, United States District Court, Southern District of Florida, Case No. 99-MDL-1317-Seitz/Klein [Order Granting Indirect Purchaser Plaintiffs' Motions for Class Certification of State-Wide Classes, April 8, 2004]
- *In re Cipro Cases I and II*, D043543 (JCCP Nos. 4154, 4220), Court of Appeal, Fourth Appellate District, Division One, State of California [Decision affirming class certification not titled but marked as "Not to Be Published in Official Reports," Filed 7/21/04]
- *In re: Relafen Antitrust Litigation*, United States District Court, District of Massachusetts, Master File No. 01-12239-WGY [Memorandum granting certification for an exemplar class, May 12, 2004]
- *In re Pharmaceutical Industry Average Wholesale Price Litigation*, United States District Court for the District of Massachusetts, MDL, No. 1456, Civil Action: 01-CV-12257-PBS.
- *New England Carpenters Health Benefits Fund; Pirelli Armstrong Retiree Medical Benefits Trust; Teamsters Health & Welfare Fund of Philadelphia and Vicinity; and Philadelphia Federation of Teachers Health and Welfare Fund, District Council 37, AFSCME - Health & Security Plan; June Swan; Maureen Cowie And Bernard Gorter v. First Databank, Inc., and McKesson Corporation*, United States District Court District of Massachusetts, C.A. No. 1:05-CV-11148-PBS.

Dr. Hartman's testimony has been relied upon (and cited as necessary) for approval of proposed settlement allocations in the following matters:

- *In re: Lupron® Marketing and Sales Practices Litigation*, United States District Court, District of Massachusetts, MDL No. 1430, Master File No. 01-CV-10861-RGS [Memorandum and Order Approving Settlement and Certifying the Class, May 12, 2005]

- *HIP Health Plan of Florida, Inc., On Behalf of Itself and All Others Similarly Situated v. Bristol-Myers Squibb Co. and American Bioscience*, Case Number 1:01CV01295, United States District Court for the District of Columbia
- *In re Buspirone Antitrust Litigation*, MDL No. 1413, United States District Court for the Southern District of New York
- *In re Relafen Antitrust Litigation*, United States District Court, District of Massachusetts, Master File No. 01-CV-12222-WGY
- *In re Remeron Antitrust Litigation*, United States District Court, District of New Jersey, Master Docket No. 02-CV-2007

2001: Working as consultant to counsel for various U.S. steel producers, Dr. Hartman worked with a team of economists to develop econometric models to analyze and measure the impacts of imports, demand and factor price changes upon the prices of domestically produced carbon steel flat products and carbon steel long products in the Section 201 hearings before the International Trade Commission. Dr. Hartman testified before the ITC in the hearings. The Commission decided in favor of most of the products subject to these analyses.

2001: Working as consultant to counsel for Nucor Steel Corporation, Dr. Hartman worked with a team of economists to develop econometric models to analyze and measure the impacts of imports, demand and factor price changes upon the prices of domestically produced carbon steel cold rolled products for preliminary hearings before the International Trade Commission.

2001-2002: Consulting to counsel for the Plaintiff Class, Dr. Hartman analyzed the targeting of youth by cigarette advertisements in the matter *in re Devin Daniels, et al., v. Philip Morris Companies, Inc., et al.*, Case Number 719446, coordinated with JCCP 4042.

2001-2003: Working as testifying expert, Dr. Hartman developed and presented statistical evidence analyzing the relative performance of a particular cardiovascular surgeon litigating the fact that his surgical privileges had been revoked as a result of incompetent surgical performance and results. He testified before an arbitration panel in the matter.

2003: Working as the testifying expert for Defendants, Dr. Hartman submitted testimony analyzing the allegation of racial discrimination on the part of Wells Fargo Home Mortgage, Inc. and Norwest Mortgage, Inc.

2003: Working as a consulting expert to counsel for the class of purchasers of graphite electrodes, Dr. Hartman developed econometric models to assess the impact of alleged antitrust violations.

2003: Working as a consulting expert for counsel to the class of direct purchasers, Dr. Hartman reviewed materials in a matter regarding antitrust allegations concerning the manufacture and sale of microcrystalline cellulose in the United States.

2003: Working as a consulting expert to counsel for a large electrical generation company, Dr. Hartman developed economic and econometric models to analyze the allegation that this electrical generation company participated in a conspiracy to manipulate prices of power sold in California.

2003: Working as the testifying expert, Dr. Hartman submitted testimony which analyzed and calculated the economic impacts and damages to the U.S. growers and quota holders of flue-cured and burley

tobacco leaf caused by a price-fixing conspiracy among the major U.S. tobacco leaf buyers and cigarette manufacturers. The \$1.4 billion settlement ultimately reached in the matter was the second highest antitrust settlement in history.

2004: Working as the consulting expert for the United States Department of Justice, Dr. Hartman critically analyzed the calculation of the economic damages borne by an electric power generation utility as a result of the breach of the Standard Contract with the U.S. Department of Energy to remove spent nuclear fuel in 1998. Dr. Hartman's analysis included a critical review and rebuttal of the models and data put forward by the utility's experts in the calculation of damages; the development and presentation of alternative and improved models and corrected data to more accurately calculate damages; a critical review of econometric analyses put forward by one of the utility's experts; and a review of the economics of re-licensing existing nuclear generating facilities.

2004: Working as the testifying expert, Dr. Hartman submitted testimony in support of the certification of the class of purchasers of electrical carbon products who have been alleged to have been impacted and injured economically as a result of a price-fixing customer-allocation conspiracy of the major suppliers of such products in the United States.

2004-2008: Working as the testifying expert, Dr. Hartman submitted testimony in deposition and at trial in support of the certification of the class of end payer purchasers of those pharmaceutical products produced by AstraZeneca, the Bristol Myers Squibb Group, the Johnson and Johnson Group, the Glaxo-Smith-Kline Group and the Schering Plough Group that were subject to an alleged scheme to fraudulently inflate their Average Wholesale Price (AWP), thereby fraudulently inflating the reimbursement rates paid by the Class members for those pharmaceuticals when their reimbursement rates were formulaically related to the AWP. Dr. Hartman developed, implemented and presented at trial a theory of causation and under that theory calculated damages to the relevant indirect purchaser classes. The Court found in favor of Plaintiffs. Dr. Hartman has and continues to consult and at times submit testimony on appeals and on related litigation undertaken by the Offices of the Attorneys General for the States of New York, Connecticut, Arizona, Nevada, Montana, Pennsylvania and the Commonwealth of Massachusetts.

2004-2005: Working as a consulting expert to counsel for a major electricity and gas utility holding company, Dr. Hartman developed models to evaluate allegations of affiliate abuse by the regulated gas distribution entities and the trading entities of the holding company. The alleged abuses concerned spot and forward gas markets in California.

2005: Working as the testifying expert for the United States Department of Justice, Dr. Hartman developed models to critically analyze the cost submissions to the U.S. Court of Federal Claims by the TVA for monetary damages alleged to have resulted from partial breach by the U.S. Department of Energy of the Standard Contract to remove spent nuclear fuel from TVA beginning in 2002. Dr. Hartman's analysis included a critical review and rebuttal of the models, data and cost analyses put forward by the utility and the development and implementation of alternative and improved models and corrected data to more accurately calculate costs attributable to the alleged partial breach.

2005-2007: Working again as the testifying expert for the United States Department of Justice, Dr. Hartman developed models to critically analyze the cost submissions to the U.S. Court of Federal Claims by the Systems Fuel Inc., a subsidiary of Entergy, for monetary damages alleged to have resulted from partial breach by the U.S. Department of Energy of the Standard Contract to remove spent nuclear fuel from SFI facilities in Mississippi and Arkansas. Dr. Hartman's analysis has included a critical review and rebuttal of the SFI models, data and cost analyses put forward by the utilities and the development and implementation of

alternative and improved models and corrected data to more accurately calculate costs attributable to the alleged partial breach.

2005-present: Working as one of two testifying experts, Dr. Hartman submitted testimony calculating monetary damages caused by the allegedly fraudulent promotion of the drug Neurontin for indications that were not approved by the FDA (off-label promotion). As part of his analysis, he consulted on the estimation of the econometric models calculating those prescriptions induced by the off-label promotion. His testimony has been submitted in the MDL and Pennsylvania matters.

2006: Working as the testifying witness for counsel to the named plaintiffs and the class, Dr. Hartman submitted testimony in support of certification of the Indirect Purchasers of the drug Ditropan.

2006-present: Working as the testifying expert, Dr. Hartman has submitted testimony supporting class certification, liability and calculating damages resulting from an alleged conspiracy between McKesson and First Data Bank to inflate prices paid for a broad spectrum of brand name drugs by manipulating the list prices of those drugs (AWPs and WACs). Once class was certified and damages calculated, Dr. Hartman submitted testimony analyzing and supporting several proposed settlements to the litigation. Dr. Hartman is currently extending his analysis to state AG litigation, to assist those AGs to recover the overcharge damages paid on Medicaid reimbursement as a result of the conspiracy.

2007-present: Working as a consulting expert, Dr. Hartman worked with a team of economists estimating econometric models to analyze and quantify the extent to which allegedly illegal off-label promotion by the manufacturer of the drug Zyprexa caused increases in the amount of Zyprexa prescribed and sold.

2008-2009: Working as the testifying expert for the named plaintiffs and the class, Dr. Hartman submitted testimony in support of class certification for the indirect purchasers of the drug Estratest, which was marketed and promoted by its manufacturer Solvay for hormone replacement therapy, despite the fact that it had received no FDA approval to do so even though Solvay had actively sought FDA approval and repeatedly made applications to the FDA for decades.

2008-2009: Working as the testifying expert for the United States Department of Justice, Dr. Hartman developed models to critically analyze the cost submissions to the U.S. Court of Federal Claims by the Energy Northwest. Dr. Hartman's analysis focused upon correct procedures to analyze cost effective responses in the actual world to DOE delays in taking spent nuclear fuel.