

**WILLIAM B. FAIRLEY, PhD, PStat ®**

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**SUMMARY OF EXPERIENCE AND QUALIFICATIONS**

- Fellow of the American Statistical Association
- PhD in Statistics from the Department of Statistics, Harvard University.
- PStat ® (Accredited Professional Statistician, American Statistical Association).
- Taught for six years as an Assistant and Associate Professor in the Public Policy Program of the John F. Kennedy School of Government, Harvard University. Visiting Professor at New York University Stern School of Business and Swarthmore College. Worked for three years for the Massachusetts Insurance Commissioner.
- Published over 45 professional articles, including in the *Journal of the American Statistical Association*, *Risk Analysis*, *Bell Journal of Economics*, *The American Statistician*, *Journal of Risk and Insurance*, *Management Science*, *Journal of Legal Studies*, and the *Harvard Law Review*.
- Testified on behalf of plaintiffs and defendants in over 50 trials, hearings, arbitrations, and mediations before federal, state, and local courts, special panels, and regulatory venues.
- Expertise includes sampling, regression, statistical validity, statistical significance, statistical models, probability, risk analysis, and research design.
- Undertaken or critiqued sampling in diverse populations including insurance claims, potentially defective products, social services benefits, construction, accounting records revealing theft or fraud.
- Consultant in over 400 projects in industries including healthcare, construction, education, financial services, manufacturing, pharmaceuticals, and real estate on behalf of corporations, government agencies, law firms, engineering firms, audit organizations, and non-profits.

## **PROJECT EXAMPLES** **(Out of 400+)**

- For a state Blue Cross Blue Shield organization administering claims for Medicare, designed a random sampling of their enormous data files of medical claims in connection with a challenge from a federal inspector general. Participated in the negotiations that resolved the issue.
- A hotel chain was unhappy with the performance of air conditioners installed in its rooms, and pressed the manufacturer for replacement of the units. Designed a random sampling of the units that were then tested by engineers to determine the percent of units that were defective.
- Working with the law firm of Covington & Burling on behalf of their clients—over 40 state social services departments—identified and testified to statistical aspects of the federal quality control program for states' administration of social services that states were able to challenge successfully.
- The reimbursement levels of a company operating skilled nursing home facilities were questioned by government auditors. Using statistics on service utilization, the auditors estimated damages in the millions using their measure of utilization. Developed an alternative, more accurate measure from the data.
- An individual was the subject of a stop and frisk in a downtown city area. He alleged racial profiling. Using police data on stop and frisks and data on the racial composition of persons in the area, determined if there was an imbalance in stop and frisks by racial category that was statistically significant. The case settled.

## **EXPERIENCE**

### **Analysis & Inference, Inc.** — President

Analysis & Inference, Inc. provides authoritative research and consulting services in statistics nationwide to corporations, government agencies, law firms, engineering firms, and non-profits. The firm is skilled at presenting complex ideas to non-experts. Capabilities include sampling, statistical modeling, statistical validity and statistical significance, regression, machine learning, and measurement reliability and validity. Principal topic areas have been discrimination, insurance, healthcare, theft and fraud, risk analysis, product liability, commercial litigation and damages, public policy, and education.

**New York University** — Visiting Professor of Statistics and Operations Research, Leonard N. Stern School of Business, Department of Statistics and Operations Research.

**Swarthmore College** — Visiting Professor, Department of Mathematics.

**Temple University** — Adjunct Lecturer, Department of Statistics.

**Commonwealth of Massachusetts** — Economist and Statistician, Division of Insurance, State Rating Bureau. Member of a special rating and regulatory analysis group created by the Massachusetts Legislature and appointed by the Commissioner of Insurance. Responsible for introducing modern tools of economics, finance, and statistics in rate reviews, research, and testimony of the State Rating Bureau for the major property-liability insurance lines.

**University of Karachi** — Visiting Professor, and Consultant, Applied Economics Research Center, Ford Foundation and Government of Pakistan.

**Harvard University** — Assistant and Associate Professor, Kennedy School of Government, Public Policy Program.

Graduate teaching and research focused on the uses of statistics in government, law and analyses of policy. Taught courses on statistics at the Harvard Law School with Michael Finkelstein, Frederick Mosteller, and Lloyd Weinreb. At various times Chairman of the Ph.D. Committee, Second Year Committee, Modules Committee, and the Committee on Information Services of the Kennedy School.

**New York University** — Assistant Professor, Graduate School of Business.

Graduate teaching and research in applied statistics. Organized and chaired Conference on Quantitative Analysis in Urban Affairs; Member of the Committee on Urban Problems.

**New York City Rand Institute** — Statistician.

Co-director of study on crime in the public housing projects of New York City for the Mayor's Criminal Justice Coordinating Council and with the New York City Housing Authority and New York City Police Department.

**First National City Bank of New York (Citibank)** — Research Specialist, Management Sciences Department.

Consulting within Management Science and Economics Departments; participated in operations research projects on asset management and the prediction of interest rates.

## EDUCATION

**Harvard University**, PhD, Department of Statistics. Woodrow Wilson and National Science Foundation Fellowships.

**London School of Economics**, Fulbright Fellowship.

**Swarthmore College**, BA with High Honors. Major in Economics, Minors in History and Philosophy.

## AWARDS

Fellow of the American Statistical Association

PStat ® (Accredited Professional Statistician, American Statistical Association).

## MEMBERSHIPS

Member of the American Statistical Association; member Committee on Law and Justice Statistics 2009—2011 and 1977—1980; member of Committee on Professional Ethics, 1995—1997. Member of the Society for Risk Analysis and the American Association for the Advancement of Science.

## PUBLICATIONS

### SAMPLING, AUDITING, AND THEFT AND FRAUD LOSSES

“Resolving a Multi-Million Dollar Contract Dispute with a Latin Square,” William B. Fairley, Peter J. Kempthorne, Julie Novak, Scott McGarvie, Steve Crunk, Bee Leng Lee, and Alan Salzberg, *The American Statistician*, August 2017.

“Combining Incomplete Information from Independent Assessment Surveys for Estimating Masonry Deterioration,” William B. Fairley, Alan J. Izenman, and Steven M. Crunk, *Journal of the American Statistical Association*, June 2001.

“Inference for Welfare Quality Control Programs,” William B. Fairley, Alan J. Izenman, and Partha Bagchi, *Journal of the American Statistical Association*, September 1990.

“Bricks, Buildings, and the Bronx,” William B. Fairley, Alan J. Izenman and A. Rhett Whitlock, *Chance*, Summer 1994.

“A Question of Theft,” William B. Fairley and Jeffrey E. Glen in Morris DeGroot, Stephen Fienberg and Joseph Kadane, Editors, *Statistics and the Law*, Wiley, 1986.

“Welfare Quality Control Programs: How Much is Misspent by the Welfare System?,” William B. Fairley and Alan J. Izenman, *Chance*, Summer 1989.

“Estimated Public Welfare Quality Control Error Rates and Penalties,” William B. Fairley and David Fairley, in *Bayesian Statistics 3*, Oxford University Press, 1988.

“Establishing Quantity Estimates and Levels of Certainty in Predicting Structural Damage: A Masonry Case Study,” William B. Fairley, Alan J. Izenman, and A. Rhett Whitlock, *Proceedings of the British Masonry Society*, No. 6, March 1994.

## DISCRIMINATION

“Statistical Criticism and Causality in *Prima Facie* Proof of Disparate Impact Discrimination,” William B. Fairley and William A. Huber, *Observational Studies*, February 2018.

“Measures of Discrimination and Protocols for Evidence: The Case of the Spare List,” Steven M. Crunk and William B. Fairley, *Proceedings of the American Statistical Association*, 2008, Statistical Consulting Section.

“Comment on Federal Judicial Center “Statistical Examples Software Prototype: Age Discrimination Example,” William B. Fairley, *Jurimetrics*, Spring 2002.

“A Case of Unexamined Assumptions: The Use and Misuse of the Statistical Analysis of Casteneda/Hazelwood in Discrimination Litigation,” Thomas J. Sugrue and William B. Fairley, *Boston College Law Review*, July 1983.

“Statistical Evidence of Racial Disparities in Death Sentencing: A Critical Analysis of *McCleskey v. Kemp*,” Glenn Dickinson and William B. Fairley in *Human Rights and Statistics: Getting the Record Straight*, Richard P. Claude and Thomas B. Jabine, Editors, University of Pennsylvania Press, 1992.

## INSURANCE, FINANCE, AND REGULATION

“Investment Income and Profit Margins in Property-Liability Insurance: Theory and Empirical Results,” William B. Fairley, *Bell Journal of Economics*, Spring 1979. Re-printed in J. David Cummins and Scott A. Harrington, Editors, *Fair Rate of Return in Property-Liability Insurance*, Kluwer-Nijhoff, 1987.

“Investment Analysis Using the Probability Distribution of the Internal Rate of Return,” William B. Fairley and Henry D. Jacoby, *Management Science*, August 1975.

“Pricing Automobile Insurance under a Cross-Classification of Risks: Evidence from New Jersey,” William B. Fairley, T. Jerome Tomberlin, and Herbert I. Weisberg, *Journal of Risk and Insurance*, September 1981, Winner of the 1982 *Journal of Risk and Insurance* Articles Award of the National Association of Independent Insurers.

“Pricing Automobile Insurance under Multivariate Classification of Risks: Additive versus Multiplicative,” Lena Chang and William B. Fairley, *Journal of Risk and Insurance*, March 1979. Winner of the *Journal of Risk and Insurance* Clifford D. Spangler Award of the Alpha Kappa Psi Foundation, 1989.

“An Estimation Model for Multivariate Insurance Rate Classification,” Lena Chang and William B. Fairley in *Automobile Insurance Risk Classification: Equity and Accuracy*, Massachusetts Division of Insurance, 1978.

“Automobile Insurance: Additive versus Multiplicative Pricing,” Lena Chang and William B. Fairley, *1978 Proceedings of the Business and Economic Section*, American Statistical Association, Washington, D.C.

“Capacity and Solvency—The Outside Influence,” William B. Fairley, *Society of Actuaries Record*, Vol. 4, No. 1, 190—196, 1978.

## **RISK ANALYSIS, ACCIDENTS, HEALTH, AND PRODUCT LIABILITY**

“Parametric Inference for Right-Censored Data with Indeterminate Survival Times and Censoring Status,” B.L. Lee, Steven M. Crunk, Maheen Khan, and William B. Fairley, *Journal of Applied Statistics* (2017).

“Estimating Mine Equipment Injury Rates,” William B. Fairley and Tian-Tzer Jeng in B. J. Garrick and W. C. Gekler, Editors, *The Analysis, Communication, and Perception of Risk*, Plenum Press, 1991.

“A Probability Model for Brittle Fracture Turbine Reliability,” Edward M. Caulfield, Michael T. Cronin, William B. Fairley, and Nancy R. Rallis in Chris Whipple and Vincent T. Covello, Editors, *Risk Analysis in the Private Sector*, Plenum Press, 1985.

“Insurance Market Assessment of Technological Risks,” William B. Fairley, Michael B. Meyer, and Paul L. Chernick, in Chris Whipple and Vincent T. Covello, Editors, *Risk Analysis in the Private Sector*, Plenum Press, 1985.

“Market Risk Assessment of Catastrophic Risks,” William B. Fairley, in Howard C. Kunreuther and Eryl V. Ley, Editors, *The Risk Analysis Controversy: An Institutional Perspective*, Springer-Verlag, 1982.

*Design, Costs, and Acceptability of an Electric Utility Self-Insurance Pool for Assuring the Adequacy of Funds for Nuclear Power Plant Decommissioning Expense*, with Paul L. Chernick, William B. Fairley, Michael B. Meyer, and Linda C. Scharff, NUREG/CR-2370, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1981.

“Assessment for Catastrophic Risks,” William B. Fairley, *Risk Analysis*, Vol. 1, No. 3, September 1981.

“Evaluating the ‘Small’ Probability of a Catastrophic Accident from the Marine Transportation of Liquefied Natural Gas,” William B. Fairley, in *Proceedings of the Engineering Foundation Conference on Risk Benefit Methodology and Application*, David Okrent, Editor, Asilomar, California, 1975. Re-published in Fairley and Mosteller, *Statistics and Public Policy*, Addison-Wesley, 1977.

“Accidents on Route 2: Two-Way Structures for Data,” William B. Fairley, in William B. Fairley & Frederick Mosteller, Editors, *Statistics and Public Policy*, Addison-Wesley, 1977.

Discussion of Lester B. Lave and Eugene P. Seskin, “Does Air Pollution Shorten Lives,” William B. Fairley, in John W. Pratt, Editor, *Statistical and Mathematical Aspects of Pollution Problems*, Marcel Dekker, 1975.

## **PUBLIC POLICY**

“Credible Argument: School Finance in a Legal Trial,” William B. Fairley, *Proceedings of the American Statistical Association Annual Meeting* Baltimore, 1999.

*Statistics and Public Policy*, William B. Fairley and Frederick Mosteller, Editors, Addison-Wesley, 1977. (Japanese Translation, Shojin Sha Ltd., 1990)

“Public Policy and Statistics,” William B. Fairley, in the *International Encyclopedia of Statistics*, Vol. 2, William H. Kruskal and Judith M. Tanur, Editors, Macmillan and Free Press, 1978.

Contributor to Stephen E. Fienberg, David Hoaglin, William H. Kruskal, and Judith M. Tanur, Editors, *A Statistical Model: Frederick Mosteller’s Contributions to Statistics, Science, and Public Policy*, Springer-Verlag, 1990.

“Comment on Statistical Defensibility,” William B. Fairley, *The American Statistician*, August 1982.

*Improving Public Safety in Urban Apartment Dwellings: Security Concepts and Experimental Design for New York City Housing Authority Buildings*, William B. Fairley and Michael Liechenstein, New York City Rand Institute, 1971.

“Trial of an Adversary Hearing: Public Policy in Weather Modification,” William B. Fairley and Frederick Mosteller, *International Journal of Mathematical Education in Science and Technology*, Vol. 3, pp. 375—383, 1972.

## **LAW, EVIDENCE, AND DAMAGES**

“On Being an Ethical Statistical Expert in a Legal Case,” William B. Fairley and William A. Huber, *The American Statistician*, forthcoming.

“Statistics in Law,” William B. Fairley. Article in the *Encyclopedia of the Statistical Sciences*, Vol. IV, Samuel Kotz and Norman L. Johnson, Editors, Wiley, 1983.

“A Bayesian Approach to Identification Evidence,” Michael O. Finkelstein and William B. Fairley, *Harvard Law Review*, Vol. 83, No. 3, January 1970.

“The Continuing Debate over Mathematics in the Law of Evidence,” Michael O. Finkelstein and William B. Fairley, *Harvard Law Review*, Vol. 84, No. 8 June 1971.

“Probabilistic Analysis of Identification Evidence,” William B. Fairley, *The Journal of Legal Studies*, Vol. II, June 1973. Also in Dirk Wendt and Charles Vlek, Editors, *Utility, Probability, and Human Decision Making*, D. Reidel, 1975.

“A Conversation about Collins,” William B. Fairley and Frederick Mosteller, *University of Chicago Law Review*, Vol. 41, No. 2, Winter 1974.

Discussion of “Statistics in the Law,” William B. Fairley, American Statistical Association, *Proceedings of the Social Statistics Section*, Part I, 1976.

“The Many Uses of Forensic Economics and Statistics,” W. Fairley, P. Eden, C. Aller, C. Vencill, M. Meyer, and P. Chernick, *The Practical Lawyer*, Vol. 31, No. 4, pp. 25—36, 1985.

“Evaluation of Structured Settlements,” W. Fairley, P. Eden, C. Aller, M. Meyer, L. Schroeter, and C. Vencill. *Am. Jur. Trials*, Vol. 31, pp. 595—632, 1984.

## **PROBABILITY THEORY**

“The Number of Real Roots of Random Polynomials of Small Degree,” William B. Fairley, *Sankhya, The Indian Journal of Statistics*, Series B, Pt. 2, pp. 144—152, 1976.

*Roots of Random Polynomials*, William B. Fairley, Ph.D. Thesis, Department of Statistics, Harvard University, June 1968.

## **SPEAKING**

### **SAMPLING, AUDITING, QUALITY AND THEFT AND FRAUD LOSSES**

Participant, Research Workshop, “Creating and Implementing Quality in Organizations,” SEI Center for Advanced Studies in Management, Wharton School, University of Pennsylvania, March, 1990.

Speaker, “Empirical Bayes Procedures for Welfare Quality Control,” American Statistical Association Annual Meeting, Washington D.C., 1989.

Chair, “Estimation for Welfare Quality Control,” American Statistical Association Annual Meeting, New Orleans, 1988.

Speaker, National Academy of Sciences, Committee on National Statistics, Panel on Quality Control in the Family Assistance Programs, 1987.

Speaker, “Error Rate and Penalty Inference for Quality Control in Public Welfare Programs,” American Statistical Association Annual Meeting, San Francisco, August 1987.



Speaker, “Estimated Public Welfare Quality Control Error Rates and Penalties,” Third Valencia International Meeting on Bayesian Statistics, Altea, Spain, June 1987.

Participant, “The City of New Amsterdam vs. Armored Coin Collection Company,” mock trial presented by The Panel on Statistical Assessments in the Courts, National Academy of Sciences, at American Statistical Association Annual Meeting, Las Vegas, 1985.

Speaker, “A Question of Theft,” American Statistical Association Annual Meeting, Philadelphia, August 1984.

## **DISCRIMINATION**

Participant, Mock Trial, Quantitative Analysis in Law, University of Pennsylvania Law School, December 2006.

Speaker, “Statistics Without Measurements: Promotions and Age in a Police Department,” American Statistical Association Annual Meeting, Indianapolis, 2000.

Speaker, “Non-starter Models of Promotion in Age Discrimination,” Fourth International Conference on Forensic Statistics, Raleigh, North Carolina, December 1999.

## **INSURANCE, FINANCE, AND REGULATION**

Invited presentation, “Bootstrap Resampling and Propensity Scores in Statistical Learning, Random Forests, and Bagging to Assign Ownership of Unclaimed Property,” with Marc Sobel and Kenneth Swartz, International Symposium on Business and Industrial Statistics, August 18—21, 2007, a satellite conference of the International Statistical Institute 2007 Meetings in Lisbon, Portugal.

Winner, *Journal of Risk and Insurance* Clifford D. Spangler Award of the Alpha Kappa Psi Foundation, 1989.

Speaker, “Estimating Mine Equipment Injury Rates,” Society for Risk Analysis Annual Meeting, San Francisco, October 1989.

Chairman, “Insurance and Risk Management” session, Society of Risk Analysis, Annual Meeting, New York City, August 1983.

Speaker, “Insurance Market Assessment of Technological Risks,” with Michael B. Meyer and Paul L. Chernick, Annual Meeting, American Association for the Advancement of Science, Detroit, May 1983.

Winner, *Journal of Risk and Insurance* Articles Award, 1982.

Member and Speaker, Advisory Committee to the National Association of Insurance Commissioners' Task Force on Profitability and Investment Income, 1982—83.

Chairman of Session "Equitable Risk Classification in Competitive Insurance Markets," American Economic Association and Association of Property and Casualty Insurance Economists, Annual Meeting, Atlanta, Georgia, December 28, 1979.

Speaker, "Regulatory Rate Setting Decisions in Automobile Insurance: Massachusetts Experience," Public Policy Research Conference, University of Chicago, October 19, 1979.

Chair and Speaker, Session "Is Automobile Insurance Priced Fairly? Equity and Statistical Validity in Risk Classification," American Statistical Association Annual Meeting, San Diego, August 1978.

Panelist of Session "Capacity and Solvency," Society of Actuaries and Casualty Actuarial Society Annual Meeting, New York City, April 1978.

Speaker, "Profits and Rates of Return in Property-Liability Insurance," Society of Actuaries Research Conference on Modeling Financial Markets, New York University, September 1977.

## **RISK ANALYSIS, HEALTH, ACCIDENTS, AND PRODUCT LIABILITY**

Speaker, "Quantitative Risk Assessment: A Study of DDT," Temple Environmental Forum, Philadelphia, Fall 1986.

Speaker, "Decision Uses of Quantitative Risk Assessment," Gordon Research Conference Seminar on Statistics in Chemistry and Chemical Engineering, New Hampton School, New Hampshire, July 1985.

Speaker, "A Probability Model for Brittle Fracture Turbine Reliability," Society for Risk Analysis, Annual Meeting, New York City, August 1983.

Speaker, "Market Risk Assessment of Catastrophic Risk," Summer Study in Decision Processes and Institutional Aspects for Risks, International Institute of Applied Systems Analysis, Vienna, June 1981.

Speaker, "Catastrophic Risks: Case of Zero Occurrences of Accidents," Annual Meeting of the American Statistical Society, Session on "Statistics, Reliability and Risks," Houston, Texas, August 13, 1980.

Panelist, "Accident Risk Assessments," Symposium/Workshop on "Nuclear and Nonnuclear Energy Systems: Risk Assessment and Governmental Decision Making," Washington, D.C., February 1979, Mitre Corporation.

Speaker, "Problems in the Estimation of 'Small' Probabilities," Engineering Foundation Conference on Risk Benefit Methodology and Application, Asilomar, California, September 1975.

## **PUBLIC POLICY AND EDUCATION**

Speaker, "Credible Argument: School Finance in a Legal Trial," American Statistical Association Annual Meeting, Baltimore, 1999.

Invited Lecture Series, "Statistics in Law and Public Policy: How to Bet If You Must," Temple University, Department of Statistics, April 1989.

Speaker, "Statistics and Public Policy," Institute of Mathematical Statistics Meeting, Yale University, August 1976.

## **LAW, EVIDENCE, AND DAMAGES**

Panelist, "Solo Consulting: The Good, the Bad and the Ugly," American Statistical Association at the Association's Annual Meetings, August 2012, San Diego.

Organizer, Invited Session, "Experiences of Statistical Consulting in Lawsuits," American Statistical Association at the Association's Annual Meetings August 2010, Vancouver.

Organizer, Session, "The Statistician's Contribution to Fact-Finding in Law," sponsored by the Statistical Consulting Section of the American Statistical Association at the Association's Annual Meetings August 2007, Salt Lake City.

Speaker, Invited talk to the Winter Gathering of the Philadelphia Chapter of the American Statistical Association, January 26, 2007.

Speaker, "A Consulting Role in Dispute Resolution," invited talk to the Fall Meeting of the Philadelphia Chapter of the American Statistical Association. October 9, 2003.

Speaker, "A Consulting Role in Legal Applications," invited talk at the 20<sup>th</sup> Annual Spring Conference sponsored by the Delaware Chapter of the American Statistical Association, "Probable Justice: Statistics and the Judiciary," April 25, 2003.

Speaker, "Establishing Quantity Estimates and Levels of Certainty in Predicting Structural Damage: A Masonry Case Study," with Alan J. Izenman and A. Rhett Whitlock, Third International Masonry Conference, London, October 1992.

Speaker, "A Case Study of Masonry Deterioration and Civil Damages: Calibration and Poisson Regression," Second International Conference on Forensic Statistics, Tempe, Arizona March 1993.

Discussant, "The Use of Statistics in Litigation," American Statistical Association, Annual Meeting, Detroit, August 1981.

Discussant, "Statistics in the Law," American Statistical Association, Annual Meeting, Boston, August 1976.