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Experience

LONDON SCHOOL OF ECONOMICS, LONDON, ENGLAND

2009-present. Chair in Operations Research.
2010-2013. Head of Management Science Group, Department of Management.
Spring 2001. Visiting Scholar.

UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, ENGLAND

2013-2014. Visitor, Statistical Laboratory, Department of Pure Mathematics and Mathematical Statistics.
2004-2008. Reader in Operations Management, Judge Business School.
1996-2004. University Lecturer in Operations Management, Judge Business School.

GTE LABORATORIES, WALTHAM, MASSACHUSETTS

1995-1996. Acting Department Head, Economics and Statistics Department.
1994-1996. Senior Member of Technical Staff, Economics and Statistics Department.

AT&T BELL LABORATORIES, MURRAY HILL, NEW JERSEY

1991-1993. Member of Technical Staff, Service Concept and Business Analysis Department.
1985-1991. Member of Technical Staff, Operations Research Department (Holmdel, New Jersey).

COLUMBIA UNIVERSITY, NEW YORK, NEW YORK

1993-1994. Adjunct Associate Professor, School of Engineering and Applied Science.
1985. Associate Professor, Graduate School of Business.
1981-1985. Assistant Professor, Graduate School of Business.

UNIVERSITY OF CHICAGO, CHICAGO, ILLINOIS

1980-1981. Assistant Professor of Management Science, Graduate School of Business.

Education

UNIVERSITY OF CHICAGO, CHICAGO, ILLINOIS

1980. Master of Business Administration. Concentration in Management Science.

UNIVERSITY OF WATERLOO, WATERLOO, ONTARIO, CANADA

1979. Doctor of Philosophy in Combinatorics and Optimization. Research conducted under W.T. Tutte.
1976. Master of Mathematics in Combinatorics and Optimization.

REED COLLEGE, PORTLAND, OREGON

1976. Bachelor of Arts. Major in Mathematics.

THE COOPER UNION FOR THE ADVANCEMENT OF SCIENCE AND ART, NEW YORK, NEW YORK

1971-1973. Major in Electrical Engineering. Scholastic Honors List. Transferred to Reed in January 1974.

PUBLICATIONS

“Maximizing Social Welfare in Congestion Games via Redistribution” (with V. Naroditskiy), *Games and Economic Behavior* 93 (2015), 24-41.

“Congestion-Dependent Pricing and Forward Contracts for Complementary Segments of a Communication Network” (with M. Reiter), *IEEE/ACM Transactions on Networking* 20, 2 (2012), 436-449.

“Auction Pricing”, Chapter 27 (pp. 679-712) in: O. Ozer and R. Phillips, eds., *Oxford Handbook of Pricing Management*, Oxford: Oxford University Press, 2012.

“Progressive Adaptive User Selection Environment (PAUSE) Auction Procedure,” pp. 4253-4262 in: James J. Cochran, ed., *Wiley Encyclopedia of Operations Research and Management Science*, Volume 6, John Wiley & Sons, 2011.

“Congestion Pricing and Non-cooperative Games in Communication Networks” (with A. Ganesh and K. Laevens), *Operations Research* 55, 3 (2007), 430-438.

“A Contract and Balancing Mechanism for Sharing Capacity in a Communication Network” (with E. Anderson and F. Kelly), *Management Science*, 52, 1 (2006), 39-53.

Combinatorial Auctions (edited with P. Cramton and Y. Shoham), Cambridge, MA: MIT Press, 2006.
Second printing 2008. Third printing (paperback) 2010.

“Introduction to Combinatorial Auctions” (with P. Cramton and Y. Shoham), pp. 1-13 in: P. Cramton, Y. Shoham, and R. Steinberg (eds.), *Combinatorial Auctions*, Boston: MIT Press, 2006.

“PAUSE: A Computationally Tractable Combinatorial Auction” (with A. Land and S. Powell), Chapter 6 (pp. 139-157) in *Combinatorial Auctions*, Boston: MIT Press, 2006.

“Pricing Internet Service,” Chapter 6 (pp. 175-201) in: A.K. Chakravarty and J. Eliashberg, eds., *Managing Business Interfaces: Marketing, Engineering, and Manufacturing Perspectives*, Dordrecht: Kluwer Academic Publishers/ISQM, 2003.

“Internet Service Classes under Competition” (with R.J. Gibbens and R. Mason), *IEEE Journal on Selected Areas in Communications*, Special Issue on Quality of Service in the Internet, 18, 12 (2000), 2490 -2498. [Lead article]

“A Combinatorial Auction with Multiple Winners for Universal Service” (with F. Kelly), *Management Science* 46, 4 (2000), 586-596.

“The Allocation of Value for Jointly Provided Services” (with P. Linhart, R. Radner, K.G. Ramakrishnan), *Telecommunication Systems* 4, Nos. 3, 4 (1995), 151-175. [Lead article]

PUBLICATIONS (continued)

“Marketing-Production Joint Decision-Making” (with J. Eliashberg), Chapter 18 (pp. 827-880) in: J. Eliashberg and G. Lilien, eds., *Handbooks in Operations Research and Management Science, Vol. 5, Marketing*, North-Holland, 1993. Also published in Japanese in *Marketing Handbook*, Tokyo: Asakura-Shoten, 1997

“Planar Ramsey Numbers” (with C.A. Tovey), *Journal of Combinatorial Theory, Series B* 59, 2 (1993), 288-296.

“An Update on the State of the Three Color Problem,” *Graph Theory Notes of New York* (New York Academy of Sciences) XXV (1993), 9-12

“The State of the Three Color Problem,” *Annals of Discrete Mathematics* 55 (1993), 211-248.

“Dynamic Pricing and Ordering Decisions by a Monopolist” (with A. Rajan and Rakesh), *Management Science* 38, 2 (1992), 240-262.

“Competitive Strategies for Two Firms with Asymmetric Production Cost Structures” (with J. Eliashberg), *Management Science* 37, 11 (1991), 1452-1473.

“Grötzsch's Theorem for the Projective Plane” (with D.H. Younger), *Ars Combinatoria* 28, Dec. (1989), 15-31.

“The Prevalence of Paradoxes in Transportation Equilibrium Problems” (with R.E. Stone), *Transportation Science* 22, 4 (1988), 231-241.

“Marketing-Production Decisions in an Industrial Channel of Distribution” (with J. Eliashberg), *Management Science* 33, 8 (1987), 981-1000.

“Common Cost Allocation in the Firm” (with G. Biddle), Chapter 2 (pp. 31-54) in: H.P. Young, ed., *Cost Allocation: Methods, Principles, Applications*, North Holland 1985.

“Allocations of Joint and Common Costs” (with G. Biddle), *Journal of Accounting Literature* 3 (1984), 1-45.
[Lead article]

“Tutte’s 5-flow Conjecture for the Projective Plane,” *Journal of Graph Theory* 8, 2 (1984), 277-289.

“The Prevalence of Braess' Paradox” (with W.I. Zangwill), *Transportation Science* 17, 3 (1983), 301-318.

“A Topological Space for which Graph Embeddability is Undecidable” (with S. Foldes), *Journal of Combinatorial Theory, Series* 29, 2 (1980), 342-344.

“One Counterexample for Two Conjectures on Three Coloring” (with L.S. Mel'nikov), *Discrete Mathematics* 20, 2 (1977), 203-206.

Other Publications

“Forward Contracts for Complementary Segments of a Communication Network” (with M. Reiter), *IEEE INFOCOM* (2010).

“An Introduction to the Special Issue on E-Auctions for Procurement Operations” (with M. Bichler), *Production and Operations Management*, 16, 4 (2007), 401-403.

“An Overview of Combinatorial Auctions” (with P. Cramton and Y. Shoham), *ACM SIGecom Exchanges*, 7, 1 (2007).

“Congestion Pricing and User Adaptation” (with A. Ganesh and K. Laevens), *IEEE INFOCOM* (2001), 959-965

Expert Reports

“Carbon Capture and Storage (CCS): Analysis of Incentives and Rules in a European Repeated Game Situation” (with D. Newbery, D. Reiner, T. Jamasb, F. Toxvaerd, and P. Noel), Electricity Policy Research Group, University of Cambridge. Prepared for the U.K. Department of Energy and Climate Change. June 2009.

“Comments on Public Notice DA 00-1075, In the Matter of Auction of Licenses in the 747-762 and 777-792 MHz Bands Scheduled for September 6, 2000” (with F. Kelly). Submitted before the U.S. Federal Communications Commission. June 2000.

“A Combinatorial Auction with Multiple Winners for COLR” (with F. Kelly), University of Cambridge. Submitted *ex parte* 18 March 1997 by Citizens for a Sound Economy Foundation before the U.S. Federal Communications Commission re CC Docket No. 96-45—Federal-State Board on Universal Service. March 1997.

“Consumer Benefit from Federal Preemption of Nationwide Caller ID Policy” (with P.B. Linhart, R. Radner, K.G. Ramakrishnan, and R. Rubin), AT&T Bell Laboratories memorandum. Prepared at the request of AT&T for use in a legislative or regulatory context. January 1994

Work in Progress

“Competing Combinatorial Auctions” (with T. Kittsteiner and M. Ott).

“A Framework for Decentralized Combinatorial Auctions with Applications to Subadditive Bidders” (with M. Salek).

“Pricing, Competition and Content for Internet Service Providers” (with P. Key).

“Combinatorial Auctions in Practice” (with D.C. Parkes).

OTHER ACADEMIC APPOINTMENTS

Massachusetts Institute of Technology, Cambridge, Massachusetts

Summer 2011. Visiting Scientist, Sloan School of Management.

Summer 1996. Visiting Scientist, Operations Research Center.

Stanford University, Stanford, California

Autumn 2008. Visiting Scholar, Department of Economics.

Autumn 2003. Visiting Associate Professor of Operations, Information, and Technology, Graduate School of Business.

University of Oxford, Oxford, England

Autumn 2006. Academic Visitor, Said School of Business.

CORE (Center for Operations Research and Econometrics), Université catholique de Louvain, Louvain-la-Neuve, Belgium

Autumn 2000. Research Visitor.

RESEARCH GRANTS

- ESRC (Economic & Social Research Council, U.K.)
Grant of £288,000 as Principal Investigator on:
“A Comparison of Centralized and Decentralized Combinatorial Auctions,” awarded January 2009.
- CMI (Cambridge-MIT Institute)
Grant of £167,000 as Principal Investigator on:
“Internet Congestion Control using Pricing,” awarded January 2004.
- CMI (Cambridge-MIT Institute) with Michael Pollitt, University of Cambridge and Paul Joskow, MIT
Grant of £10,000 as Co-Organizer of workshop on:
“Innovation and Liberalization in Network Markets,” awarded January 2001.

EDITORIAL POSITIONS

Manufacturing and Service Operations Management

2002-present. Senior Editor / Associate Editor.

1999-2002. Member of Editorial Review Board.

Production and Operations Management

2003-present. Senior Editor, E-Business and Operations.

- Special Issue Editor (with M. Bichler), “E-Auctions for Procurement Operations” (Vol. 16, No. 4), 2007.
- Special Issue Associate Editor, “Operations Management in Business to Business Markets,” 2007.
- Special Issue Associate Editor, “Marketing and Operations Management Interfaces and Coordination,” 2006.

SELECTED CONFERENCES AND TALKS

Workshop Organization

London School of Economics, London, England

- Ofcom-LSE Workshop: *Combinatorial Auctions for Spectrum: State of the Art*, September 2013
Co-organized with Geoffrey Myers, Ofcom.

University of Cambridge, Cambridge, England

- Cambridge-MIT Institute Workshop: *Innovation and Liberalization in Network Markets*, January 2000
Co-organized with Michael Pollitt, University of Cambridge and Paul Joskow, MIT.

Keynote Talks

Austrian Computer Society, Vienna, Austria

- Workshop on Advanced Internet Charging and QoS Technology (ICQT'01), September 2001
Keynote speaker on: "Pricing Internet Service."

The Cato Institute, Washington, DC

- Roundtable Luncheon, April 1999
Keynote speaker on: "New Ideas for Universal Service: Are Auctions the Answer?"

Invited Talks

Columbia Institute for Tele-Information, Columbia University, New York, New York

- Symposium: *Spectrum Auction Design, Experience and Post Auction Market Structure*, June 2014
Talk: "A Framework for Decentralized Combinatorial Auctions with Applications to Subadditive Bidders."
- Symposium: *Wireless Communications and Universal Service*, December 2005
Talk: "A Combinatorial Auction for Universal Service."

The Royal Society, London, England

- Workshop on Net Neutrality, December 2006
Talk: "Spectrum Regulation and Auctions."

Schloss Dagstuhl, Wadern, Germany

- Seminar: *Computing and Markets*, January 2005
Talk: "A Contract and Balancing Mechanism for Sharing Capacity in a Communication Network."
- Seminar: *Electronic Market Design*, June 2002
Talk: "Practical Issues on Large-Scale Combinatorial Auction Design."

Aspen Institute Wye River Conference Center, Queensland, Maryland

- FCC Conference on Combinatorial Bidding, May 2000
Talk: "A General Combinatorial Auction Procedure."

Statistical Laboratory, University of Cambridge, Cambridge, England

- *Stochastic Networks Workshop*, December 2000
Talk: "A Combinatorial Auction with Multiple Winners for Universal Service."
- *Stochastic Networks Workshop, Stochastic Networks Workshop*, December 1996
Talk: "The Allocation of Value for Jointly Provided Services."

International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria

- Task Force Meeting on Cost Allocation, August 1983
Talk: "Common Cost Allocation in the Firm."

TEACHING

Courses Taught

MBA & MSc Management

- Operations Management (LSE, Cambridge, Columbia, Chicago)
- Operations Research (Columbia)
- Management Science (Chicago)
- Scheduling and Inventory Control (Columbia)
- Mathematics for Business (Columbia)
- Manufacturing Management (Cambridge)

MS & MEng & MSc Management Science

- Auctions and Game Theory (LSE)
- Dynamic Processes and Game Theory (LSE)
- Quantitative Techniques in Operations Management (Cambridge)
- Facilities Layout and Planning (Columbia)

PhD & MPhil

- Topics in Operations Management (Cambridge)
- Production Scheduling (Columbia)
- Transportation Networks (Columbia)

Undergraduate

- Operations Management (Cambridge)
- Operations Management for Engineers (Cambridge)
- Scheduling (Cambridge)
- Production Scheduling (Cambridge)
- Inventory Control (Cambridge)
- Modeling of Queuing Systems (Cambridge)

M.Math. Supervision

- Supervised Cambridge University M.Math. students on Part III essay, “Applicable Combinatorial Auctions,” 2013-14

Ph.D. Supervision

- Miklós Réiter, University of Cambridge (PhD 2007)
Thesis: “Internet Congestion Pricing: Long-Term Bandwidth Contracts and Investment in Oligopoly”
- Mira Slavova, University of Cambridge (PhD 2006)
Thesis: “Uncertainty, Microstructure and Bidding Behavior in Internet Auction Marketplaces”
- Sang-Bum Lee, Columbia University (PhD 1985)
Thesis: “Topics in Dynamic Lot-Sizing”

Executive Education

- “Pricing Internet Service,” Thought Leadership Seminar, British Telecom, Adastral Park, Ipswich, England, May 2004

INDUSTRIAL EXPERIENCE

Bell Laboratories

1993: BENEFIT FROM FEDERAL PREEMPTION OF CALLER ID POLICY^{[1],[2]}

Co-developed (with P.B. Linhart, R. Radner, K.G. Ramakrishnan, and R. Rubin) economic analysis determining the benefit to consumers of Federal preemption of call blocking of Caller ID service. Co-authored brief explaining economic argument to be used by AT&T before U.S. Congress. (See *Expert Reports*.)

1992-1993: FRIENDS AND FAMILY RESPONSE^[3]

Organized and contributed to joint project involving design of computer simulation tool to study possible AT&T pricing responses to MCI's Friends and Family services.

1991-1993: VALUE OF CALLER ID

Organized and contributed to joint project (with P.B. Linhart, R. Radner, and K.G. Ramakrishnan) on pricing for Caller ID services. Implemented game-theoretic models and linear programming to examine strategies for allocating profits among participating companies.³ (See PUBLICATIONS.)

1991-1993: SPLIT-CABLE ADVERTISING EFFECTIVENESS STUDY

Designed and implemented tracking analysis to monitor difference in usage rates for two groups of households, with one group shielded from AT&T advertising. Represented AT&T in contract negotiations with consultant.

1989-1990: TRANSACTIONAL COST ANALYSIS

Used Activity-Based Costing to analyze cost of sales effort per product across AT&T General Business Systems product line throughout the U.S.

1988: A TOOL FOR SUPPLIER INVENTORY MANAGEMENT

Co-designed information system at AT&T Allentown Works to control the manufacture and inventory of integrated circuits used as components at other AT&T factories.

1987: THE EFFECTS OF NEW AND CHANGED DESIGN ON INVENTORY

Designed PC-based tool, based on the newsvendor model, for use at AT&T Oklahoma City Works to determine optimal inventory levels for electronic circuit board production.

1985-1986: MANUFACTURING DISRUPTIONS MANAGEMENT AND CONTROL

Studied several product lines at AT&T's Columbus Works, North Carolina Works, and Omaha Works, and made recommendations for improvement to reduce frequency and severity of disruptions to manufacturing processes.

Special Recognition from Bell Laboratories

[1] Contribution to "Consumer Benefit from Federal Preemption of Nationwide Caller ID Policy" (see *Expert Reports*) acknowledged with appreciation by Arno Penzias, Vice President of Research, AT&T Bell Laboratories (Oct. 1994).

[2] Work on the project "Benefit from Federal Preemption of Caller ID Policy" acknowledged with appreciation by Arno Penzias (Sept. 1993).

[3] Received Bell Laboratories Mathematical Sciences Research Center's *Member of Technical Staff Merit Award* (Nov. 1992). See AWARDS.

Additional Bell Laboratories Project

1989-1990. Developed new internship program, called the "Martin Farber Internship," to promote theoretical research in the Operations Research Department.

INDUSTRIAL EXPERIENCE (continued)

GTE Laboratories

1995-1996: TELECOMMUNICATIONS AUCTION DESIGN

Developed Web-based auction model for use in determining carrier responsibility for Universal Service. Worked with public interest group (“Citizens for a Sound Economy”), and hired/supervised members of project team.

1994-1995: BUSINESS SIMULATION MODELING II

Co-developed PC-based planning tool to enable GTE business planners to address strategic level questions about various communications businesses engaged in by the company.

1994-1995: BUSINESS SIMULATION MODELING I

Enhanced and modified externally developed UNIX-based business planning tool, and supported clients at corporate headquarters in use of the tool.

Other Industrial Appointments

MICROSOFT RESEARCH, CAMBRIDGE, ENGLAND

2010-2012. Visiting Researcher in the Networks, Economics and Algorithms Group.

Conducted research on Internet pricing and combinatorial auction design, and studied applications of combinatorial auctions in practice. Member of the Microsoft Research World Wide Economics Research Working Group.

SALOMON BROTHERS, NEW YORK, NEW YORK

Summer 1979. Summer Associate under Martin Leibowitz in the Bond Portfolio Analysis Group.

Presented a series of talks to the Bond Portfolio Analysis Group that introduced the firm to duration-based hedging (called “bond immunization” at the time). This subsequently developed into a major product for Salomon Brothers.

Consulting

CANADIAN 2500 MHZ SPECTRUM AUCTION

2015. Provided bidder support.

U.K. NATIONAL AUDIT OFFICE

2013-2014. Supporting Advisor/Project Lead on project to evaluate the UK 4G spectrum auction held Jan-Feb 2013. Advised NAO on their final report, “4G Radio Spectrum Auction: Lessons Learned,” 6 March 2014.

2013. Advised NAO on their “scoping exercise” addressing the outcome of the 4G spectrum auction held in January-February 2013 with respect to revenue generated, effect of the auction rules, and individual strategies of the bidders.

WESTMINSTER CITY COUNCIL, LONDON

2013. Advised Westminster City Council on assessing fire service proposals in relation to critical emergency response in London. Expert witness at Central London Forward Fire Scrutiny held by Westminster City Council on April 22nd.

U.K. DEPARTMENT OF ENERGY AND CLIMATE CHANGE

2009. Designed auction (with F. Toxvaerd) for the UK to submit to the European Union to select demonstration projects for Carbon Capture and Storage.

U.S. FEDERAL COMMUNICATIONS COMMISSION

1997-1998. Advised FCC Office of Plans and Policy on design of combinatorial auctions of licenses for spectrum.

AWARDS

- Bell Laboratories Mathematical Sciences Research Center's *Member of Technical Staff Merit Award*, 1992:
“For facilitating, organizing, and contributing to a joint project between BL05143 [Consumer Communications Services Center] and BL01121 [Mathematical Sciences Research Center] (Linhart, Radner, Ramakrishnan) investigating the economic theory of pricing for caller ID services, particularly using game-theoretic models and linear programming to examine strategies for allocating profits among participating companies cooperating to provide such a service for long-distance calls. Also played a significant role in interactions between these two organizations studying pricing for Friends and Family services.”
- M&SOM (Manufacturing and Service Operations Management) *Meritorious Service Award* :
 - 2004 (G. van Ryzin, Editor in Chief)
 - 2009 (S. Graves, Editor in Chief)
 - 2010 (S. Graves, Editor in Chief).
- Production and Operations Management Society, award and plaque, 2016:
“For the outstanding work performed as a Senior Editor, E-Business and Operations, for its research journal, Production & Operations Management.”

SERVICE

Major University Service

London School of Economics

- PhD Director for Management Science, London School of Economics, 2012-present (not including 2013-2014)
- Course Convenor for “Management Science Methods” on the LSE External Degree program, 2016-present
- Member, REF (Research Excellence Framework) Strategy Committee, London School of Economics, 2011-2013
- Chair of Research Committee, Department of Management, London School of Economics, 2010-2013

University of Cambridge

- External Examiner, University of Cambridge Mathematics Tripos, Part II, 2013-2016. Responsible for all courses in probability, statistics, and operations research.
- Chair of Examiners, Management Studies Tripos, University of Cambridge, 2003-2006.

PhD Thesis Committees

- University of Cambridge, Department of Pure Mathematics and Mathematical Statistics, 2011, 2004
- London Business School, Management Science and Operations, 2010
- Columbia University, Department of Electrical Engineering, 1982.

INFORMS (Institute for Operations Research and the Management Sciences) Prize Committees

- Frederick W. Lanchester Prize Committee, 2013, 2014
- Expository Writing Prize Committee, 2010, 2011, 2012 (Chair)
- MSOM Student Paper Competition, Judge, 2006-2011
- MSOM (Manufacturing and Services Operations Management) Annual Conference, Review Board, 2008, 2009
- George Nicholson Student Paper Competition Committee, 1991.

Other Service

- Reviewer, Fulbright Scholar Award, 1996.

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