

RICHARD STEINBERG

London School of Economics
Department of Management, NAB 3.08
Houghton Street
London WC2A 2AE England
Tel +44 (0)20 7106-1207 / Fax 7955-6885

E-mail: r.j.steinberg@lse.ac.uk

Teaching and Research Interests

Operations management: auctions, internet economics, the marketing/operations interface, and transportation networks.

Experience

LONDON SCHOOL OF ECONOMICS, LONDON, ENGLAND

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

STANFORD UNIVERSITY, STANFORD, CALIFORNIA

- 2008. Visiting Scholar, Department of Economics.
- 2003. Visiting Associate Professor of Operations, Information, and Technology, Grad. School of Business.

UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, ENGLAND

- 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

"Congestion-Dependent Pricing and Forward Contracts for Complementary Segments of a Communication Network" (with M. Reiter), to appear in *IEEE/ACM Transactions on Networking*.

"Auction Pricing" in: Özalp Özer and Robert Phillips (editors), *Oxford Handbook of Pricing Management*, Oxford University Press, 2011, to appear.

"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.

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

"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.

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

"Internet Service Classes under Competition" (with R. Gibbens and R. Mason), *IEEE Journal on Selected Areas in Communications* 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 (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.

Work in Progress

“Pricing of Media Service Provision” (with P. Key).

“A Combinatorial Auction Revisited: Refinement and Extension of the PAUSE Auction Procedure” (with S.D. Ahipasaoglu).

“Analytical Results on a Decentralized Auction” (with S.D. Ahipasaoglu).

Other Publications

“E-Auctions for Procurement Operations” (edited with M. Bichler), Special Issue of *Production and Operations Management*, 16 (4), July-August 2007.

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

Signed review of *Traffic Flows on Transportation Networks* by G.F. Newell, *Networks* 13 (1983), 156-157.

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 UK Department of Energy and Climate Change, 1 June 2009. (Available at: http://decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/ccs/ccs.aspx.)

“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, 7 June 2000.

“A Combinatorial Auction with Multiple Winners for COLR” (with F. Kelly), University of Cambridge, 17 March 1997. 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.

“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, January 1994. Prepared at the request of AT&T for use in a legislative or regulatory context.

RESEARCH GRANTS

- ESRC (Economic & Social Research Council, UK). Grant of £291,000 as the Principal Investigator on: “A Comparison of Centralized and Decentralized Combinatorial Auctions,” January 2009.
- CMI (Cambridge-MIT Institute). Grant of £167,000 as Principal Investigator on: “Internet Congestion Control using Pricing,” January 2004.
- CMI (Cambridge-MIT Institute). Grant of £10,000 for workshop (co-organized with Michael Pollitt of Cambridge and Paul Joskow of MIT) on: “Innovation and Liberalization in Network Markets,” January 2001.

OTHER ACADEMIC APPOINTMENTS

- MIT, Cambridge, Massachusetts. Visiting Scientist, Sloan School of Management, 2011.
- University of Oxford, Oxford, England. Academic Visitor, Said School of Business, 2006.
- CORE, Université catholique de Louvain, Louvain-la-Neuve, Belgium. Research Visitor, 2000.
- MIT, Cambridge, Massachusetts. Visiting Scientist, Operations Research Center, 1996.

EDITORIAL SERVICE

Manufacturing and Service Operations Management

- 2002 to present. Senior Editor / Associate Editor.
- 1999-2002. Member of Editorial Review Board.

Received 2010 & 2009 *M&SOM Meritorious Service Award* (S. Graves, Editor in Chief).

Received 2004 *M&SOM Meritorious Service Award* (G. van Ryzin, Editor in Chief).

Production and Operations Management

- 2003-present. Senior Editor, E-Business and Operations.
- 2007-present. Special Issue Associate Editor, "Operations Management in Business to Business Markets."
- 2006-present. Special Issue Associate Editor, "Marketing and Operations Management Interfaces and coordination."

UNIVERSITY SERVICE

Committee Chair

- Chair of Examiners for MSc Operational Research and MSc Decision Sciences, LSE, 2010-2011.
- Chair of Examiners for Options on MSc Management, LSE, 2010-2011.
- Chair of Research Committee, Department of Management, LSE, from 2010.
- Chair of Examiners, Management Studies Tripos, University of Cambridge, 2002-2005.

PhD Examiner

- University of Cambridge, Department of Pure Mathematics and Mathematical Statistics, 2011, 2004.
- London Business School, Management Science and Operations, 2010.
- University of Maastricht, Department of Economics and Business Administration, 2007.
- Columbia University, Department of Electrical Engineering, 1982.

Other

- Member of academic review panel reporting to Dean of Warwick Business School, reviewing Operations Research and Management Science, Operations Management, and Information Systems and Management groups, 2011.

PROFESSIONAL SERVICE

INFORMS

- INFORMS Expository Writing Prize Committee, 2010, 2011
- MSOM Student Paper Competition, Judge, 2006-2010
- MSOM Conference Review Board, 2008, 2009
- George Nicholson Student Paper Competition Committee, 1991

Other

- Member of ESRC (Economic & Social Research Council, UK) Peer Review College, 2010–
- POMS Wickham Skinner Award Committee, 2006
- Reviewer for Fulbright Scholar Award, 1996

SELECTED TALKS AND INVITED CONFERENCES

Keynote Addresses and Featured Talks

NATIONAL AUDIT OFFICE, LONDON, ENGLAND

- Featured speaker, January 2011.
Talk: “Government Auctions for Procurement and Sale”

THE ROYAL SOCIETY, LONDON, ENGLAND

- Featured speaker at workshop, *Net Neutrality*, December 2006.
Talk: “Spectrum Regulation and Auctions”

TSINGHUA UNIVERSITY, BEIJING, CHINA

- Featured speaker in the School of Economics and Management, July 2006.
Talk: “A Contract and Balancing Mechanism for Sharing Capacity in a Communication Network”

COLUMBIA UNIVERSITY, NEW YORK, NEW YORK

- Featured speaker at Symposium, *Wireless Communications and Universal Service*, December 2005.
Talk: “A Combinatorial Auction for Universal Service”

AUSTRIAN COMPUTER SOCIETY, VIENNA, AUSTRIA

- Keynote speaker for conference, *Advanced Internet Charging and QoS Technology*, September 2001.
Talk: “Pricing Internet Service”

THE CATO INSTITUTE, WASHINGTON, DC

- Keynote speaker, Roundtable Luncheon, *New Ideas for Universal Service: Are Auctions the Answer?*, April 1999.
Talk: “New Ideas for Universal Service: Are Auctions the Answer?”

Invited Conferences

UNIVERSITY OF OXFORD, OXFORD, ENGLAND

- *Workshop on Coordination Schemes for Decentralized Supply Chain Planning*, June 2004.

SCHLOSS DAGSTUHL, WADERN, GERMANY

- *Internet Economics*, March 2006 & August 2003.
- *Computing and Markets*, January 2005.
- *Electronic Market Design*, June 2002.

ASPEN WYE RIVER CONFERENCE CENTERS, QUEENSLAND, MARYLAND

- *FCC Conferences on Combinatorial Bidding*, November 2003, October, 2001, May 2000.
These three conferences were set up as forums to help the FCC develop the best large-scale package bidding auctions.

UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, ENGLAND

- *Stochastic Networks Workshop*, December 2000 & December 1996.

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS (IIASA), LAXENBURG, AUSTRIA

- *Task Force Meeting on Cost Allocation*, August 1983.

Conference Session Organization

- Combinatorial Auctions, *International Symposium on Mathematical Programming*, Copenhagen, Aug. 2003.

TEACHING

Courses Taught

MBA / MSc Management

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

MSc OR / MEng / MS

- 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)

Ph.D. Supervision

- Miklós Reiter, 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

British Telecom

- "Pricing Internet Service," Thought Leadership Seminar, Adastral Park, Ipswich, England, May 2004.
This was the first Thought Leadership seminar to be offered by British Telecom.

INDUSTRIAL EXPERIENCE

Bell Laboratories

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

Co-developed 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.

1992-1993: FRIENDS AND FAMILY RESPONSE³

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 on pricing for Caller ID services. Implemented game-theoretic models and linear programming to examine strategies for allocating profits among participating companies.³

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 newsboy inventory 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): "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."

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

SALOMON BROTHERS, NEW YORK, NEW YORK

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. Also developed computer software for government mortgage (GNMA) data.

Consulting

- UK Department of Energy and Climate Change, 2009.
- US Federal Communications Commission, 1997–1998.

MEDIA

Interview with Winifred Robinson regarding Just-In-Time inventory and the Icelandic ash cloud on:

- "You and Yours," *BBC Radio 4*, April 24, 2010

Research on auctions discussed in:

- *The Times Higher Education Supplement*, May 12, 2000, "Rethink on Bids Plan for Net Access," p. 12
- *Financial Times*, May 2, 2000, "Auction Leaves Many a Dream in Tatters," p. 40

Research on transportation paradoxes discussed in:

- Orange County (Calif.) *Register*, Aug. 23, 1993, "Paradox on the Road," Metro Section, pp. 1-2
- *Discover*, May 1992, "Road to Ruin," 56-61
- New York *Times*, Dec. 25, 1990, "What if They Closed 42nd Street and Nobody Noticed?" p. 38
- *American Scientist*, Nov.-Dec. 1988, "The Counterintuitive in Conflict and Cooperation," pp. 577-584

Research on production-marketing joint decision making was featured, with interview, on cable television program:

- "Wharton Business Times Management Report," *Financial News Network*, January 19, 1985

July 2011