Rajnish Kumar

Curriculum Vitae

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Rice University, 6100 Main St.
Economics Department, MS 22
Houston, TX 77251-1892, USA

RESEARCH INTERESTS

Microeconomic Theory, Game Theory, Mechanism Design, Implementation, Social Choice Theory, Cost Sharing, Network Economics and Mathematical Economics.

TEACHING INTERESTS

Microeconomics, Game Theory, Mathematical Economics and Managerial Economics at undergraduate, masters, MBA and Ph.D. level.

EDUCATION

Rice University, Houston, TX, USA
Ph.D. in Economics, May 2010 (expected)
Dissertation Title: Essays on Implementation and Network Cost Sharing.
Committee Chair: Dr. Herve Moulin

M.A. in Economics, January 2010 (expected)

Indian Statistical Institute, Delhi, India
M.S. in Quantitative Economics, 2004

Delhi University, Delhi, India
B.A. in Economics, 2001

FELLOWSHIPS AND AWARDS

Graduate Scholarship, Fall 2009
Rice University Fellowship, 2005-2009
Government of India Scholarship, 2002-2004

WORK EXPERIENCE

India Development Foundation, Gurgaon, India
Research Associate, 2004-2005

TEACHING AND RESEARCH EXPERIENCE

Instructor

Fall 2008, Principles of Economics I (Econ 211)

Teaching Assistant

Spring 2009, Introduction to Game Theory (Econ 340.1), Professor Simon Grant
Spring 2008, Corporate Finance (Econ 448.1), Professor Camelia Bejan
Fall 2007, Introduction to Game Theory (Econ 340.1) Professor Simon Grant
Spring 2007, Corporate Finance (Econ 448.1) Professor Camelia Bejan
Spring 2006, Principles of Economics I (Econ 211) Professor Ronald Soligo
Fall 2005, Principles of Economics I (Econ 211) Professor Ronald Soligo

RESEARCH PAPERS

Job Market Paper:

"Secure Implementation in Production Economies"

Abstract: One thing that has been assumed for a long time is that whenever there is dominant strategy equilibrium in the game form of any mechanism and the outcome corresponding to that strategy profile is socially optimal, people will play that particular equilibrium strategy profile. The theory has been silent on why they will play that particular strategy profile when there are other (Nash) equilibria. The Nash/Bayes' Nash implementation being a possible solution to this problem suffers from the drawback of either the requirement of the designer knowing the (common) prior (in case of Bayes' Nash implementation) or the requirement of the players predicting the actions of other players and collaborate without pre-talk (in case of Nash implementation with absence of dominant strategy or unique Nash).

Secure implementation [Saijo et al. (2007)] is a relatively new concept in the theory of mechanism design and implementation. This requires double implementation in Dominant Strategy Equilibrium and Nash Equilibrium by the same Mechanism. This concept has worked well in some particular environments and has been tested on data [Cason et al. (2006)]. Unsurprisingly, being stronger than both the two above said concepts of implementation, there are many impossibility results in specific environments with richer domains. We look for secure implementability in production economies with divisible goods. We find that a very broad generalization of "Serial" Social Choice Function (SCF) [Moulin and Shenker (92)] as defined in [Shenker (92)] is securely implementable. We call such functions as Generalized Serial SCF (GSS). We also find that under certain conditions the Fixed Path SCFs are special cases of GSS and thus they are also securely Implementable. We conjecture that these are the only securely implementable SCFs in our environment if we add few desirable axioms.

Working Paper:

"Implementing Efficient Graphs in Connection Networks", *Joint work with Ruben Juarez*

Abstract: We consider the problem of sharing the cost of a network which meets the connection demands of a set of agents. The agents simultaneously choose a path in the network connecting the demand nodes of the agents, and a mechanism splits the total cost of the network formed among the participants.

The recent literature has converged to the *Shapley mechanism* (Sh) which splits the cost of edges equally among its users. Two reasons motivate us to look at alternatives mechanisms. First, Sh is inefficient, asymmetric and discontinuous at equilibrium. Second, Sh requires an amount of information which may not be practical in many settings.

We characterize a class of mechanisms in a setting of minimal information requirement, specifically when the inputs of a mechanism are the total cost of the network formed and the cost of the paths demanded by the agents. The Average Cost mechanism (AC) and other asymmetric mechanisms implement the efficient connection. These mechanisms are characterized under three alternative robust properties of efficient implementation.

We also show that efficiency and individual rationality are mutually incompatible. The Egalitarian mechanism (EG), a variation of AC that meets individual rationality, is an optimal mechanism (under the price of stability measure) across all individually rational mechanisms. EG outperforms Sh on the grounds of information requirements, stability and symmetry at equilibrium. Moreover, EG is no more inefficient than Sh.

Publications:

Book:

SMALL AREA ESTIMATES OF SELECTED WELFARE INDICATORS: RESULTS FOR UTTARANCHAL. November 2005, United Nations World Food Programme. Co-authored with Shubhashis Gangopadhayay, PAN Network, Maithili Ramachandran, T.O.Sridevi, Brinda Viswanathan and Wilima Wadhwa.

CONFERENCE AND SEMINAR PRESENTATIONS

"Mechanism Design in Queuing and Sequencing Problems", Rice University Student Brown Bag Workshop, 2006

"Secure Implementation in Production Economies", 9th International Meeting of the Society for Social Choice and Welfare. Montreal, Canada (June 2008)

"Secure Implementation in Production Economies", Third World Congress of The Game Theory Society. Evanston, Illinois, USA (July 2008)

"Implementing Efficient Graphs in Connection Networks", 8th Hawaii International Conference on Social Sciences. Honolulu, Hawaii, USA (June 2009)

"Implementing Efficient Graphs in Connection Networks", Society for Economic Design-Conference on Economic Design. Maastricht, The Netherlands (June 2009)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Society for Social Choice and Welfare
Game Theory Society
Society for Economic Design

COMPUTER SKILLS

Software: Matlab, Stata, Eviews, SPSS, MS Office applications, Mathematica and Maple.

CITIZENSHIP

Indian

REFERENCES

Dr. Herve Moulin (Advisor)
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