DEBRAJ RAY

Debraj Ray, Professor of Economics at NYU, is best known for his 848-page textbook, Development Economics, which has been widely praised as the best of its kind and the standard within the industry.

His scholarship in the field of economics is highly eclectic and encompasses several different areas. His major contributions center on welfare economics, cooperative game theory, development economics and intergenerational conflict.

Ray earned his B.A. from Presidency College, University of Calcutta, in 1977 and his M.A. from Cornell in 1981. In 1983 he received his Ph.D. from Cornell and has held many teaching and research positions since then: at Stanford, the Indian Technical Institute, as well as visiting professorships in Argentina, Spain, China, Kuwait and at MIT.

His outstanding scholarly achievements, exceptional teaching, and noted service to the profession have been corroborated by his receiving numerous awards, including a Guggenheim Fellowship, an appointment as a Fellow of the Econometric Society and several teaching awards. Ray has established himself as one of the nations most productive, creative and competent theorists. He has been a Professor of Economics at NYU since 1999.
Professor Debraj Ray of Boston University is by all counts a distinguished economist with a long and enviable record of outstanding scholarly achievement, exceptional teaching, and noted service to the profession. As the Department of Economics report points out, "at the age of 41, he has established himself as one of the nations most creative, productive, and competent theorists." This view is shared by ten distinguished outside referees (seven solicited from the Department and three from the FAS Dean), which includes two Nobel Laureates. Because of the clear-cut nature of this case, this report will be short and to the point.

Professor Ray received his Ph.D. in 1983 from Cornell University. After several years of teaching and research appointments at Stanford and the Indian Statistical Institute, he joined the Economics Department of Boston University in 1991 as professor and Director of the Institute for Economic Development. He has concurrently held several visiting appointments at major institutions in China, Argentina, Kuwait, Spain, and at New York University (Fall 1997) and MIT (Spring 1998).

Ray has received a significant number of awards and honors during his career. These include a Guggenheim, appointment as a Fellow of the Econometric Society, and two awards from the Indian Econometric Society and the Indian National Science Academy. He has also served, or is currently serving, on the editorial boards of
six respected economics journals. In addition, he has been awarded two major teaching prizes from Stanford and Boston University, respectively. It is clear that Ray is valued in the profession by his peers for significant scholarship and by his students for outstanding teaching.

Ray's publication record is extensive with some 55 major scholarly papers, a large number of which have appeared in the profession's most outstanding journals. These include research articles in publications such as *Journal of Economic Theory*, *Journal of Development Economics*, *Games and Economic Behavior*, *Econometrics*, *Review of Economic Studies*, *Economic Journal*, and others. He has also written a major text of some 848 pages on *Development Economics*, published by Princeton University Press in 1998, which is praised by economists as the best of its kind. An article on the textbook in the *Chronicle of Higher Education* of September 25, 1998 quotes fellow economists praising the text as the "field's definitive textbook," "an excellent and revolutionary book," and "a real beauty."

Ray's scholarly contributions are eclectic and encompass several different areas. As the Department's report indicates, and as corroborated by the outside evaluators, Ray's contributions center on development economics, welfare economics, cooperative game theory, and intergenerational conflict. Almost without exception, the outside reviewers applaud Ray for his "unusually wide range of interests." They also praise him for his "unrivaled theoretical firepower," "very creative work," "high degree of
originality," and "outstanding [work as a] development economist." Most reviewers underline the importance of Ray's contributions to development economics and cooperative game theory. As Professor David Pearce of Yale University says, "if you are looking for a microeconomist with a serious interest in development, you could do no better." Several others point out that Ray "would be a valuable addition to many of the top-ten departments." The two Nobel prize winners (Amartya Sen and Kenneth Arrow) both reaffirm, in similar language, that Ray is an excellent theorist and an outstanding development economist.

Based on Professor Debraj Ray's record as a scholar and teacher, and his service to the profession, I recommend enthusiastically that New York University offer him an appointment as Professor of Economics in the Faculty of Arts and Science.

Respectfully submitted,

Farhad Kazemi
P & T Discussion and Vote

Discussion at the P & T meeting (February 8, 1999) was brief. All those who spoke supported the appointment as a major and significant addition to the Department and the University. It was pointed out that Professor Ray has collaborated with some 23 colleagues in his research and writing. This is a good indicator of his collegiality. Several members praised the docket presented by the Economics Department as excellent with plenty of information and data on Ray's research, teaching, and professional service. One colleague mentioned that although all letters of evaluation were strong, those solicited by the Department were somewhat stronger.

The final vote in support of the appointment was unanimous.

Farhad Kazemi

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Research Contributions of Debraj Ray

Debraj Ray has made major contributions to a host of fields in economics and game theory. His training at Cornell emphasized classical capital theory and growth and he has published a large number of papers in this area. However, from the beginning of his career as an assistant professor at Stanford he began developing interests in other areas. These include his collaboration with Douglas Bernheim on the problem of modeling intergenerational conflict, his work with Partha Dasgupta on malnutrition and involuntary unemployment, his continuing work with Rajiv Vohra on the foundations of cooperative game theory, his work with Esteban on polarization and social conflict, his work with Mookherjee and others on evolutionary game theory, and work with a number of co-authors on the microeconomics of developing economies. There are few economists who can claim this breadth of work and in each of these areas Ray has published in top journals and is acknowledged to be at the forefront of research. In addition, his recent textbook, Development Economics published this year by Princeton University Press, has already established itself as the industry leader and standard within the field (see the attached article which appeared in the September 25, 1998 issue of the Chronicle of Higher Education).

In his work Debraj Ray has made contributions to a number of fields including Economic Development, Welfare Economics, Economic Theory and Game Theory, and Intergenerational conflict. In the report below I will outline these contributions.

Contribution to Development Economics


Dasgupta and Ray "Inequality as a Determinant of Malnutrition and Underemployment: Policy" Economic Journal 97 (1987) 177-188.

Poverty is a major fact of the world today. A large part of the world’s population is undernourished. A lot of research into poverty and undernourishment has focused on inequality and questions of fairness, but little attention has been paid to the implications of poverty in general or undernourishment in particular for the allocation of resources. This paper makes a seminal contribution in beginning the positive analysis of the effects of undernourishment on market allocations.

The key observation on which this analysis is based comes from the “efficiency-wage” literature. Since labor power depends on consumption, undernourished workers cannot work as hard (do not have as much labor power) as well-nourished workers. It is also assumed that the returns to consumption are increasing at low levels of consumption.
This raises the possibility of underemployment if workers do not earn enough to produce the amount of labor power required to earn the market wage. In other words, if there is an excess supply of workers at a given wage, a classic remedy is to lower the wage to clear the market. However, if people are already below subsistence, such a policy clearly will not work. Peasants with land can consume more than landless peasants because they receive non-wage income. This will allow firms to lower the wage to landed peasants since this will not deprive them of subsistence. However, at this low wage landless peasant cannot compete (the scale of their consumption is too low to allow them to produce labor power as cheaply as the landed peasants). Hence we find involuntary unemployment. The labor market fails to allocate correctly. Furthermore, it is clear that the market failure depends on the distribution of wealth (land). Although the model is quite simple, it is very rich in terms of the behavior it can generate. For example, there are several different qualitative regimes, which have different properties from the standard competitive equilibrium. The analysis also gives rise to useful policy recommendations. First of all, only redistribution will solve the problem of involuntary employment. In the second paper, they show how land reform will eliminate involuntary employment.

Apart from the innovative approach to the problem of involuntary unemployment, which seems to me to be a major contribution, these papers are attractive for the following reasons:

1) They use simple, creative modeling to address important policy issues;
2) They base theory on a descriptive empirical foundation;
3) They rigorously analyze all of the possibilities in the model.


One of the hypotheses about credit lending in developing countries is that information in informal markets allows for more complete risk sharing and consumption smoothing. This paper addresses one aspect of this problem. How is it that credit contracts are enforced in the absence of perfect and complete information? If a debtor can run away, what incentive does he have to repay his debt? To prevent this Ray posits the following model: A certain fraction of the population is myopic and therefore likely to default. As a result, lenders will not deal with such people, at least without a period of testing. This testing imposes a cost on anyone trying to establish a new relationship. That means that is time consuming and costly to cheat on an existing relationship if establishing a new one is too hard. This cost will deter economic agents with high discount factors from destroying the relationship capital that they have built up. In other words, they will repay their debts.

The story (model) told in this paper is both plausible and insightful. It is motivated by a real and important phenomenon, the informal credit markets of India.
Contributions to Welfare Economics

Debraj Ray has contributed to the literature on welfare economics from many different angles. Here I will talk about only one of these, the measurement of income polarization. The related research is conducted jointly with J.M. Esteban (Universidad Autonoma de Barcelona). In my opinion, this particular research constitutes one of Ray’s most original contributions.


One of the most commonly used social welfare indicators is the degree of income inequality within a society. But why do we really care about inequality? One of the most common answers to this question is that high levels of inequality causes political unrest and social conflict, the results of which could be disastrous. Yet, income inequality is only one welfare criterion that gives us information about the level of social conflict. Esteban and Ray point to another one that is arguably a more relevant social welfare indicator: the degree of polarization within an income distribution.

Esteban and Ray (1994) start from the following primitives: “Social tension” is created when

(i) there are few significantly sized groups of individuals in the society;

(ii) there is a high degree of homogeneity within each group;

(iii) there is a high degree of heterogeneity across groups.

Let us for the moment assume that the attribute that defines the relevant subgroups is “income.” (I should mention, however, that there may be a conceptual difficulty at this point; such attributes are presumably multi-dimensional.)

If the above attributes are a pre-condition for social conflict a relevant question is then whether the notion of “income inequality” captures all of these considerations. (Here, by income inequality, I mean what is captured by the Lorenz ordering and/or the principle of equalizing (Dalton) transfers). Under the Lorenz ordering, we are concerned about what fraction of the income is going to what fraction of the population. The first observation of Esteban and Ray is that the Lorenz ordering (in which income distributions are ranked according to this principle) is a very poor indicator of social conflict insofar as the aforementioned primitives are concerned. As captured by these primitives, it is demonstrated that there is essentially no link between income inequality and polarization. This, I believe, is the main contribution of the paper.

The second main contribution is the axiomatic development of a unique income polarization measure. The axioms are essentially the above mentioned primitives along with a weak technical requirement of continuity. This measure is basically the only one that is currently available. Given that the Esteban and Ray measure is a convincing measure of polarization, it is likely to become quite popular. In fact, there have already
been a number of applied researchers who report the degree of polarization of the income distributions (as measured by the Esteban-Ray index) along with the usual welfare indicators like income inequality and poverty.

There is of course room to be critical about the approach developed by Esteban and Ray. Income is not the only attribute that creates social reference groups; culture, origin and other demographic factors also play an important role. Moreover, since polarization is such a new welfare notion, it is probably more sensible at this point to develop ordinal methods for measuring it (like the Lorenz ordering). Finally, it is not immediately clear how primitive the “primitives” of Esteban and Ray are. In particular, what sort of models of conflict would actually predict that social conflict is increasing in polarization? (Incidentally, in very recent work presented at NYU, Esteban and Ray try to tackle precisely this problem.) Despite any of this, what is true, however, is that Esteban and Ray (1994) is an important paper that leads welfare economists to view the notions of social welfare and income inequality in a new light.

**Contributions to Cooperative Game Theory**

Game theory has classically been divided into two groups of theory: cooperative and non-cooperative theory. They differ basically by their assumptions about the ability of players to communicate with each other and make binding commitments. In cooperative game theory such commitments are allowed while in non-cooperative game theory they are not. The strength of cooperative is that it presents a natural approach to the problem of coalition formation. One question not directly asked by the literature is if coalitions are allowed and the contracts creating them are enforceable, which coalitions will actually form in a situation of strategic interaction. To answer this question properly, one must show how one can go from a non-cooperative game to a cooperative game by making the commitment part of strategy options in the non-cooperative game. (D. Ray and R. Vohra, (1996), “Equilibrium Binding Agreements,” *Journal of Economic Theory*).

Given this structure, Ray and Vohra proceed to study the coalition structures that are candidates of equilibrium. While this sounds like a very abstract approach, which may fail to produce a concrete insight, this is in fact not true. One main finding of the paper is the following: in games with at least three players, the unique equilibrium coalition structure may admit a unique binding agreement that is inefficient. This is quite interesting, in that the Coase “theorem” of economics would maintain that in the absence of any informational imperfections, all gains from cooperation must be exploited by means of binding agreements. The present approach, therefore, provides an additional and novel reason for the potential failure of the Coase theorem: when one introduces the coalitional considerations to the bargaining process, inefficiency may result due to the induced externalities across coalitions.

“A Theory of Endogenous Coalition Structure,” D. Ray and R. Vohra, ((1997), unpublished), essentially picks off where the previous paper has left off. The main
question is the following: given this data, what sort of coalitions are likely to be formed? The authors model this very elegantly through a bargaining model that parallels the multiplayer Rubinstein bargaining model. Timing of offers is exogenously given; it will be interesting to relax this assumption along the lines of the earlier work of Admati and Perry. A proposer in this model proposes (according to an exogenous protocol) a coalition and a payoff division within the proposed coalition. Thus, the model examines the endogenous determination of both the coalition structure and the payoff division among the players. One main finding is: every pure strategy no-delay equilibrium yields a unique coalition structure.

**Contributions to Intergenerational Conflict**


One of the most frustrating problems existing between generations is the fact that while we might take actions today for the benefit of our children, when the time comes for them to act, they may not choose as we had wished them to. The preferences of the next generation are not consistent with ours. A few studies in the nineteen-seventies considered models with intertemporally inconsistent preferences, but these did not get very far because of the technical difficulties involved. The work of Bernheim and Ray attacked this difficult problem head on. The framework assumed a standard neoclassical growth model in which successive generations make decisions based on their own consumption and that of the succeeding generation. One problem in such contexts is that there may be no equilibrium to the game played between generations. Ray and Bernheim prove the existence of such an equilibrium in the context of these games. This line of reasoning is continued in “Non-paternalistic Intergenerational Altruism,” *Journal of Economic Theory* 41 (1987) 177-188. This paper assumes that the utility of a generation depends on its own consumption and the utilities of subsequent generations and studies existence of a particular type of equilibrium a Markov subgame perfect equilibrium. The framework allows for intertemporal inconsistency of intergenerational preferences. Existence of Markov subgame perfect equilibrium is demonstrated. What comes as a surprise is the possibility that equilibrium is inefficient if one generation’s altruism extends to more than one subsequent generation. This paper is an impressive piece of mathematical economics and the inefficiency result is striking.
Promotion and Tenure Docket for Debraj Ray

We, the undersigned, attest that we have read Debraj Ray's promotion and tenure docket.

Professor Andrew Schotter,
Chairman

Professor Andrew Caplin

Professor Christopher Flinn

Professor Douglas Gale

Professor Mark Gertler

Professor Ishaq Nadiri
Debraj Ray

1. **Date of Birth**: September 3, 1957

2. **Current Position**: Professor of Economics and Director of Graduate Studies

3. **Address**: Department of Economics, New York University, 269 Mercer Street 7th Floor, New York, NY 10003. Tel. 212-998-8906, Fax 212-995-4186, email: debraj.ray@nyu.edu
web page: http://www.econ.nyu.edu/user/debraj

4. **Education**:

5. **Research Interests**: Development Economics, Microeconomic Theory, Game Theory

6. **Teaching Experience**: Development Economics at both the undergraduate and doctoral levels, since 1982 (at Stanford, the Indian Statistical Institute (ISI), Boston University (BU), Harvard, and New York University (NYU)), Economic Dynamics (at Stanford, the ISI, and BU), Game Theory (at MIT and the ISI) Industrial Organization, Real Analysis (at the ISI), Intermediate Microeconomics (Stanford, NYU).

7. **Other Academic Positions**:
   2. Visiting Professor, Massachusetts Institute of Technology, Spring 1998.
   3. Oskar Morgenstern Visiting Professor of Economics, New York University, Fall 1997.
   4. Research Affiliate, Instituto de Análisis Económico (CSIC), Barcelona (current).
   5. Visiting Professor, Department of Economics, Harvard University, Fall 1993.
   7. Visting Professor, Instituto de Análisis Económico, Universidad Autónoma de Barcelona, 05/1990–12/1990
   9. Visiting Professor, Kuwait Institute for Scientific Research, 06/1989
   10. Visiting Professor, The People's University of China, Beijing, 06/1987
   11. Associate Professor, Indian Statistical Institute, 1986–1989
8. Selected Honors and Awards

2. Gittner Teaching Award, Economics Department, Boston University, 1996.
6. Dean’s Award for Distinguished Teaching, Stanford University, 1985.

9. Publications:


Book Reviews are not included in this CV.

10. Working Papers and Manuscripts In Preparation

   1. Aspiration-Based Reinforcement Learning in Repeated Games: An Overview (with J. Bendor and D. Mookherjee), submitted for publication.

   2. Endogenous Group Formation in Risk-Sharing Agreements (with G. Genicot), to be submitted for publication.

   3. Cooperation without Information Flows: Application to Informal Credit Markets (with P. Ghosh), to be submitted for publication.

   4. Persistent Inequality (with D. Mookherjee), submitted for publication.


   6. Inequality, Public Allocation and Development (with J. Esteban), under preparation.


   8. Reinforcement Learning in Repeated Games (with J. Bendor and D. Mookherjee), submitted for publication.


  11. Coalition Formation as a Dynamic Process (with H. Konishi), submitted for publication.

11. Selected Professional Activities


8. Member, Program Committee for the 1997 New Orleans Meeting of the Econometric Society.

9. Member, Program Committee for the 1993 Summer Meeting of the Econometric Society.


11. Organizer, NorthEast Universities Development Consortium Conference, Boston University, 1992


13. Member, Program Committee for the 2001 Summer Meeting of the Econometric Society.

A list of papers presented at conferences and seminars, as well as grant activity, is available on request.
Debraj Ray

1999 Publications


**Remark.** After I received and accepted an offer from NYU in 1998, I did not participate in the merit review process that took place at Boston University in the beginning of 1999. I therefore request that my 1998 publications (around and after my NYU negotiations) be included in this report.


2000 Publications

**Books**


**Journal Articles**


Social Decision Rules are Not Immune to Conflict (with J. Esteban), forthcoming, *Economics of Governance*.

**Articles in Books**
