Fall 2004

AEC 932—Information Economics and Institutions in Agriculture and Natural Resources

Fridays, 9:10 a.m. to noon
Room 49 Agriculture Hall

Instructors

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Course Background and Objectives

Micro-economic literature in the late 1960's began focusing on the importance of information and initiated the relaxation of the Arrow-Debreu-Hahn competitive model assumptions that information is perfect and markets are complete. The Arrow-Debreu-Hahn model recognized risk but in a very stylized way of defining the prices and quantities that cleared the market under all possible states of nature.

The research program on information economics was driven by the desire to make sense out of practical puzzles, on the one hand, and logical extensions to existing models on the other hand. This led to a burgeoning literature on the consequences of asymmetric information, of search, of information as a "commodity," and of circumstances where markets are likely to be replaced with other forms of institutions and organizations. Concepts such as hidden information, hidden action, signaling, screening, optimum contract, segmentation induced by differential information, pooling and separating equilibrium, and hierarchical internal organizations were explored and formalized.

Consider, for example, the following observations:

> "As economic theory has turned more toward the study of information-based market failures, self-reinforcing mechanisms, multiple roles of prices and the general idea of the potential complexity of market interactions, it has inevitably turned to questions that have long exercised development economists"[1]

[1]Bardhan, P. and C. Udry (eds.), *Readings in Development Microeconomics*, "Introduction", Cambridge: MIT Press, 2000.

> The study of ... organization is interesting from another perspective. ... we stress the importance of information, incentives, and the existence of limits to contracts. These three features acquire importance in the context of missing and imperfect markets – the essential ingredient that complicates real economies. If markets were perfect, we would only have to study supply and demand carefully, and be done with it."[2]

Other research themes were already "in play" that provided structure and starting points. Coase's 1937 paper, "The Nature of the Firm" (one of the impetuses to the study of transactions costs and to the transactions approach to modeling in economics) can be thought of as a discussion of the consequences of opportunism, information, and the cost-benefit analysis of alternative approaches to co-ordinating tasks and exchanges.

The economics literature frequently depicts markets and other exchange arrangements as information systems. Much of new institutional economics views institutions as arrangements that have evolved to deal with imperfect information and missing markets.

The following is a characterization of Dixit's Gorman Lectures *Lawlessness and Economics -- Alternative Modes of Governance*:

> How can property rights be protected and contracts be enforced in countries where the rule of law is ineffective or absent? How can firms from advanced market economies do business in such circumstances? In Lawlessness and Economics, Avinash Dixit examines the theory of private institutions that transcend or supplement weak economic governance from the state. In much of the world and through much of history, private mechanisms evolved instead of formal, state-governed institutions--long-term relationships, arbitration, social networks to disseminate information and norms to impose sanctions, and for-profit enforcement services. Even in countries with strong legal systems, many of these institutions continue under the shadow of the law. Numerous case studies and empirical investigations have demonstrated the variety, importance, and merits and drawbacks of such institutions.

Empirical work in all areas of agricultural economics has increasingly incorporated information issues into analyses. The role of information is touched upon in most graduate courses in Agricultural Economics and Economics, yet is not systematically covered in any of them. This course offers a more systematic and "higher level" treatment of information, illustrating with examples of information issues treated by agricultural and natural resource economists.

The course is based on the notion that 900-level courses in the Department should help students: (a) become familiar with the current literature in specific areas of agricultural economics, particularly on analytic techniques that cut across several fields and (b) develop students' skills in

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[2]Ray, D. *Development Economics*. "Ch 11 – Markets in Agriculture: An Introduction", Princeton: Princeton University Press, 1998.

using these analytic tools to a level where the students can use these apply these techniques in their dissertation (and post-dissertation) research. The course builds on concepts such as the agency (principal-agent) problem formulation of asymmetric information issues, the high-exclusion costs of certain types of information, and transaction costs that are introduced in AEC 810, AEC 841 and EC 812B.

AEC 810 discusses basic characteristics of information as a good and implications of those characteristics for the organization of its production. AEC 810 also introduces students to the Williamsonian approach to transaction costs. AEC 841 applies information concepts to the analysis of food system coordination. It looks at the implications of transaction costs for food system organization, views the market as an information system, and introduces the concept of asymmetric information and its implications for contract design. Thus, students coming into AEC 932 should have a basic familiarity with the concepts and be ready to explore how these concepts cut across various fields of agricultural economics and how they can be applied in research.

Course Organization

The course will include four components:
(1) Lectures/discussions, with students playing an **active** role in discussions;
(2) Presentations by faculty of their research that draws on information concepts and a critique by students;
(3) Homework exercises; and
(4) The development and presentation of a research project concept paper by each student.In most cases, the research project concept papers will be drawn from students' PhD dissertation topic.

Text and Other Readings

The core text for the 1st half of the course is Inés Macho-Stadler and David Pérez-Castrillo's *An Introduction to the Economics of Information: Incentives and Contracts* (New York: Oxford University Press, 2nd edition, 2001). We will draw heavily on Yujiro Hayami and Keijuro Otsuka's *The Economics of Contract Choice: An Agrarian Perspective* (Oxford University Press, 1993), and the 1st five chapters are assigned readings.

Bernard Salane's *The Economics on Contracts: A Primer* (MIT Press 1997) also covers similar ground and we will draw on it for examples and applications as well as on Jean-Jacques Laffont and David Martimort's *The Theory of Incentives – The Principal-Agent Model.* The course also draws on journal articles, research reports, and case studies as would be expected at this level.

Debraj Ray's *Development Economics* (Princeton University Press, 1998) also presents many of the applications in a developing country setting and presents a very accessible overview. Stiglitz provides an excellent overview in his "The Contributions of the Economics of Information to 20th

Century Economics", *QJE*, Nov 2000. A revised version of Stglitz's Nobel Lecture is one of the required readings and provides a broad overview of the literature and a less technical and more accessible starting point for some of the landmark papers he has written with colleages. These often were caricatures that were relevant as they stood but also presented a way to frame widely disparate applications.

Note, the term "contract" is used in the very broad context of the agency literature; the principal, for example, may be an individual, a business, a regulatory agency or the "state" in some more general sense.

Research in all areas of economics has a strong economics of information core. Consider, for example, game theoretic strategic interaction applications; information is the core of these models. Freixas and Rochet's *Microeconomics of Banking* , MIT Press, 1999 is an example of an application that is built around agency concepts. For example, they cover the Stiglitz and Wise "Credit Rationing in Markets with Imperfect Information" *AER* (1981), which we incorporate in our discussions. The Stiglitz - Weiss model shows how adverse selection can lead to backward bending supply curves and has been extended to labor markets. Cahuc and Zylberberg's *Labor economics*, MIT Press, 2004 frames a substantial proportion of the issues in an agency context.

Copies of the readings that are not available through JSTOR will be made available. We are also developing a CD with the principal reading.

Prerequisites

EC 812A and EC 812B

Grading:

Exercises: 20%
Project: 30%
Review of student projects and class participation: 10%
Final Exam. 40%

Course Outline

I. [Week 1] Overview

A. Brief review of Arrow-Debreu assumptions about information in the modeling of the coordination of economic activity and the information content of prices.

B. Consequences of relaxing Arrow-Debreu information modeling assumptions to set the stage for the course – particularly, the 1st five weeks:

1. Asymmetric information

    a. Hidden information
    b. Hidden action
    c. Signaling / screening
    d. Monitoring and contract enforcement
    e. Separating and pooling equilibrium

2. Approaches to limit opportunism

    a. 3rd party comparisons

        i. Government standards
        ii. Trade association standards
        iii. *Consumer Reports* – Firms and non-profits providing product testing

    b. Screening

    c. Signaling by firms

        i. Brands
        ii Guarantees

D. Examples of applications

1. Land tenure arrangements (e.g., sharecropping) and the role of rural labor and credit markets (risk, asymmetric information, contracting, signaling, screening, monitoring and monitoring cost, incomplete and missing markets, and how information based market failures in one area flow over into other areas)
2. Contract design /price discovery (e.g., tournaments contracts in crop and livestock production contracts, in management of multi-plant firms, and in employment)
3. Consequences of the replacement of transparent "auction like" commodity markets with contracts on the erosion of public information
4. Grades/standards, quality evaluation, and advertising
5. Food safety regulation/food labeling
6. Design of market information systems in developing countries
7. Buy/make decisions; franchising

8. Partnerships; business alliances; joint ventures

II. [Weeks 2 - 8] Consequences of asymmetric information for contract design and exchange. Work through the basics. Read and discuss some of the classics in the literature. Use applications including those from agricultural economics to make concepts more concrete. Pay some in-class games to illustrate concepts

A. Week 2: Simple benchmark base model in which the assumption the "principal" and "agent" have the same the same information (Stadler and Pérez-Castrillo, Chs. 1 and 2; do Exercise for Chapter 1, p. 279.)

B. Week 3: Moral hazard problem: the agent's behavior is not verifiable by the principal {Read Stadler and Pérez-Castrillo, Ch. 3; Hayami and Otsuka, Chs 2 - 5 (an application that has to deal with the consequences of hidden action, hidden information, signaling, and consequent incomplete and missing markets. Skim 1st time through for an overview and sense of competing theories. Read Stiglitz, "Incentives and Risk Sharing in Sharecropping", *Review of Economic Studies*, 41 (2), 219-56. We are making extensive use of sharecropping as an example since it has one of the most extensive literature's covering imperfect information and missing markets, with both competing theories and substantial empirical work.

C. Institutions as Equilibrium Outcomes to Repeated Games. Tthe formal models we have looked at up to this point have been framed in the context of a single-period game, although there has been some more informal discussion of the economics of reputation. This brief section reviews the more formal modeling of institutions as the rational maximizing outcome of repeated games.

Readings:

a. Staatz. "Introduction to Modeling of Repeated Games." Class handout.
b. Robert Axelrod and William D. Hamilton. "The Evolution of Cooperation." *Science*, vol 211 (21 March 1981): 1390-96.

D. The adverse selection problem: the principal has less information, at the signing of the contract, on one or more characteristics influencing the value of the contract than the agent. Read Stadler and Pérez-Castrillo, Ch 4 and continue working through Hayami and Otsuka, Chs 2 - 5 focusing on hidden information issues Read Rothchild and Stiglitz, "Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect information," *QJE*, (November 1976):629-650 and skim Stiglitz and

Weiss, "Credit Rationing in Markets with Imperfect Information", *American Economic Review*, 71 (3), 393-410. Is a key paper but not very accessible. We will supplement the paper with other sources. These early Stiglitz and co-author papers set the stage for subsequent analyses. The Rothschild and Stiglitz paper contains a graphic treatment of the self-selection problem that is contained in many microeconomic texts. The paper also deals with issues of equilibrium and various possibilities for separating equilibria.

E. Signaling: In many contractual relationships, one of the parties has more information than the other as to some of the relevant variables. When it is beneficial to do so, the informed party will try to signal information to the other party via some action or decision. Read Stadler and Pérez-Castrillo, Ch 4; continue working through Hayami and Otsuka, Chs 2 - 5, focusing on signaling / screening issues. Review the classic Akerlof, "The Market for Lemons: Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics*, (August 1970) 84 (3) : 488 - 500 and read Sheldon, "Contracting, Imperfect Information, and the Food System," *Review of Agricultural Economics*, 18 (1996):7-19; Heuth, et al. "Incentive Instruments in Fruit and Vegetable Contracts: Input Control, Monitoring, Measuring, and Price Risk, *Review of Agricultural Economics*, 21 (2) 374-389 and Heuth and Ligon, "Producer Price Risk and Quality Measurement," *American Journal of Agricultural Economics*, (Aug. 1999) 81: 512-524. The application papers draw on all the concepts we've discussed to this point.

F. Interlinked transactions to deal with incomplete markets. Read Hayami and Otsuka, Ch. 5 and Ray's "Agricultural Markets" chapters. Agricultural specialization/subsistence decisions in the context of missing markets in developing countries.

G. Synthesis and discussion. Ongoing research at MSU that draws on the concepts we've read about and discussed.

III. Implicit expected utility maximization and bounded rationality: Transaction-Cost approaches (post-Coasian approaches–e.g., Williamson). Although we have talked some about transaction costs up to now, we have done so within the assumption of utility maximization under "complete rationality." There is a parallel literature on transactions cost economics (building on the work of Coase, Williamson, and others) that has in some ways developed in parallel with the information economics approaches. These transaction cost approaches assume that actors operate under bounded rationality rather than complete rationality, and the analysis focuses on the transaction as the unit of observation. The approaches also draw on management literature that, unlike the literature we have looked at to date, go beyond treating the firm as a "black box" and

address internal firm organization and how it affects information flows. This section of the course explores these approaches in some depth (which we assume students have already been introduced to in AEC 800, AEC 810, and AEC 841) and compares and contrasts them with the information-economics literature as exemplified in the Macho-Stadler/Perez-Castillo book.

The literature we will explore next also differs from the preceding literature in additional ways: often it is presented in a less mathematically formalized fashion and attempts to analyze how transaction costs affect a broader set of institutions and public policy than just bilateral contracts. The fundamental assumption of the analysis, however, is imperfect information, leading to transaction costs.

Assumed background reading for this section is the following:
Oliver J. Williamson. The Economic Institutions of Capitalism. New York: The Free Press, 1985. Chapter 1. "Transaction Cost Economics," pp. 15-42; and John M. Staatz. "The New Agricultural Economics: Applications of Transaction Cost/Institutional Analysis to Agricultural Economics." Seminar Presented to the Scientific Society for Finnish Agriculture and the Faculty of Agriculture and Forestry,University of Helsinki, 1988 . Copies are in the reference room. Please review these if you are not familiar with Williamson's approach.

A. Transaction costs and the structure of the firm. We begin with Coase, his formulation of transaction costs, and how it has been interpreted with respect to the theory of the firm. Key to this approach is the view of the firm as "a nexus of contracts."

Coase, Ronald H. "The Nature of the Firm." Economica n.s. 4 (1937):386-405. Reprinted in Readings in Price Theory, ed. George G. Stigler and Kenneth H. Boulding, pp. 331-51. Homewood Ill.: Richard D. Irwin, 1952.

___., "The Problem of Social Cost." Journal of Law and Economics vol III (October, 1960): 1-44.

Eisenstadt, Kathleen M. "Agency theory: An Assessment and Review." *Academy of Management Review*, vol 14, no. 1 (1989): 57-74.

Skim the classic articles by Alchian and Demsetz, Jensen and Meckling, and Fama:

Alchian, Armen A. and Harold Demsetz. "Production, Information Costs, and Economic Organization." *American Economic Review*, LXII (Dec., 1972): 777-95.

Jensen, Michael C. and William H. Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3 (1976): 305-360.

Fama, Eugene F. "Agency Problems and the Theory of the Firm." *Journal of Political Economy."* 88, no. 2 (1980): 288-307.

B. Extending the approach–Merging more neoclassical approaches to analyzing imperfect information with organizational theory and greater use of bounded rationality. The focus here is on analyzing the impact of transaction costs on economic coordination and the design/evolution of economic institutions. Discussion of Convention Theory as one attempt to broaden the approach.

David M. Kreps. A Course in Microeconomic Theory. Princeton, NJ: Princeton University Press, 1990. Chapter 20, "Transaction Costs and the Firm.", pp. 743-770.

Loïc Sauvée, "Towards an Institutional Analysis of Vertical Coordination in Agribusiness." In The Industrialization of Agriculture: Vertical Coordination in the U.S. Food System, edited by Jeffrey S. Royer and Richard T. Rogers, pp. 27-71. Brookfield: Ashgate, 1998.

Staatz. "Notes on Convention Theory." Class Handout.

E. Transaction Costs and Analysis of Political Institutions. North and others have taken the basic notions of transaction costs developed by Coase and extended the analysis of political institutions. These readings explore those applications.

1. Weingast, Barry R. and William J. Marshall. "The Industrial Organization of Congress; or, Why Legislatures, Like Firms, Are Not Organized as Markets." *Journal of Political Economy*, 96, no. 1 (1988): 132-163. -Available from JSTOR

2. North, Douglass C. and Barry R. Weingast. "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England." The Journal of Economic History 49, no. 4 (December, 1989): 803-32. -Available from JSTOR

3. Avenir Grief. "Contract Enforceability and Economic Institutions in Early Trade: The Magribi Traders Coalition." *American Economic Review* 83, no. 3 (June 1993):L 525-48. -Available from JSTOR

4. Milgrom, Paul R., Douglass C. North, and Barry W. Weingast. 1990. "The Role of Institutions in the Revival of Trade: The Law Merchant,

Private Judges, and the Champagne Fairs." Economics and Politics 2: 1-23. - Hard copies available for check out in room 219 AGH.

5. Optional: North, Douglass C. Institutions, Institutional Change, and Economic Performance. New York: Cambridge University Press, 1990, chapters 4 and 8.- Hard copies available for check out in room 219 AGH.

V. Policies and programs to reduce information asymmetries, and their possible consequences. Up to now in the course, we have analyzed ways of designing contracts, institutions and organizational structures to deal with incomplete information. An alternative approach (sometimes complementary to, sometimes a substitute for, the approaches we have discussed to date) is to invest in gathering and diffusing more complete information to the market participants. In this section, we will examine some examples, drawing on current research in the Department.

1. Mandatory price reporting
2. Grades and Standards
3. Design of market information systems, especially in Africa.

Readings to be distributed in class.

VI. Student Presentations