EC 812 -- L1: Introduction: Modeling Human Decision Making

I. Introduction

Economics is sometimes said to be "the study of Rational Choice in a setting of scarcity." However, if one examines topics covered in micro economics text books, it is clear that description is a bit broader than what the mainstream regards as the core of modern economics. The implicit text book definition of economics seems to be "the study of market transactions and the behavior of markets in changing circumstances of one kind or another." Thus, text books cover such questions as: What determines the prices at which goods and services are exchanged? What factors influence a firm's decision to produce goods and services to sell? How do differences in market structure (number of firms, rate of innovation, ease of entry, etc.) affect market prices and the welfare of market participants?

A good deal of progress has been made on most of these issues, although it is fair to say that the basic consensus answers to most of these questions have not changed very much in this century. The theories and data have become more sophisticated, and generally more mathematical--especially in the last fifty years, but the fundamental questions and broadly competing answers have not changed very much during this time.

On the other hand, it is fair to say that a sizable minority of individual's who are employed as economists work on other questions. They conceptualize problems in Political Science, Sociology, Legal Studies, Anthropology, Political Philosophy, and so on, in a manner that allows methodological individualism to be applied, often with great returns, to questions that ordinarily might be seen as outside the bounds of economics as defined by the coverage of text books. Most of that work is within the broader definition of economics, e. g. the study of the implications of choice in a setting of scarcity. Political wheeling and dealing is seen as a form of complex exchange. The criminal justice system is seen as a method of pricing illegal activities. Politicians, status seekers, altruists and criminals are all seen as rational decision makers pursuing well-defined goals in a setting of scarcity.

A good deal of the work that our department is known for is at the interdisciplinary boundary of economics and other social sciences especially political science and the law. The economics discipline, if not the text book writers, do recognize the importance of these pioneers by publishing their results in top journals and with such rewards as the Nobel prize. (Consider for example the Nobel prizes of Herbert Simon, F. A. Hayek, Gary Becker and James Buchanan, for example.) Many of these scholars expend relatively little energy analyzing "ordinary" economic transactions.

Be that as it may, most of this course will be devoted to exploring variations in the traditional neoclassical themes regarding ordinary economic transactions. Here at GMU there are a wide variety of field courses where these other topics are developed at great length, and while I expect to spend a bit of time of these areas, you should enroll in those courses if you are interested in an in-depth coverage. The purpose of the Micro sequence it to provide you with a core set of tools (ideas, intuitions, mathematical models, and aptitude for interpreting the world in economic terms) that will allow you to approach economic problems with greater sophistication than you have now. (I will often use nontraditional examples as a means of seeing whether you can "see" how to apply traditional economic tools to non-market decision making.)

II. Utility Maximizing Choice: Traditional Model

A. The traditional neoclassical consumer *economicus* chooses between two or more goods or two or more activities in order to maximize a well defined objective function, normally called utility, $U = u(X_1, X_2)$, subject to an opportunity set, usually represented as a budget constraint, $W = P_1X_1 + P_2X_2$.

  i. Goods are assumed to have positive marginal utility. (U is assumed to have positive first derivatives.)

  ii. Marginal utility is generally assumed to decline as the quantity of the good increases either because of partial satiation with the good, or because of "highest valued uses are done first." So the second derivatives of U are generally presumed to be negative.

  iii. (Recall, from math econ, the various assumptions that one has to make about preferences to be able to represent decision making with a continuous differentiable utility function.)

B. We can use the objective function and budget constraint to characterize the individual's demand for either or both goods, and further to analyze how those demands are affected by changes in prices, or wealth (their endowments).

  i. For example, solve in the constraint for X_1 and substituting the result into the objective function yields $U = u(X1, (W - P_1X_1)/P_2)$

  ii. Differentiating with respect to X_1 yields a single first order condition:

  $$U_{X1} - U_{X2} (P1/P2) = 0$$

  iii. (Subscripted variables denote partial derivatives with respect to the variable subscripted.)

iv. The first term is the subjective marginal benefit (marginal utility) of X1 and the second is the marginal cost of X1 in terms of lost utility from X2. (That is to say, the second term is the marginal subjective opportunity cost of X1.)

v. The consumer purchases X1 up to the point where its marginal benefit equals its marginal opportunity cost. (Depict this.)

C. The implicit function theorem allows us to characterize this individual's demand for X_1 with a differentiable function. It implicitly describes how his ideal level of X_1 varies with parameters of his choice problem,

$$X^*_1 = x_1(P_1, P_2, W)$$

i. One can use the implicit function differentiation rule to determine qualitatively how this individual's ideal consumption level varies with his personal wealth, the price of the good, or that of the alternative good.

ii. For example, define the first order condition above ("b") as H, then from the implicit function differentiation rule, the derivative of X^*_1 with respect to P1 is $\quad X^*1_{P1} = H_{P1}/ - (H_{X1})$

a. or writing out the two relevent partial derivatives of H,

$$X^*1_{P1} = \frac{[\, U1_{X1X2}\,(-X1/P2) + U_{X2X2}(X1/P2)(P1/P2) + U_{X2}\,(-1/P2)\,]}{- [\, U_{X1X1} - 2\,U_{X1X2}\,(P1/P2) + U_{X2X2}\,(P1/P2)^2\,]} < 0$$

III. This very lean model of consumer choice can be generalized in a variety of ways to address optimizing behavior in non-market circumstances, and to analyze features taken as given in the basic model such as the evolution of tastes through time, the nature of goods and services, habit formation, etc.

A. For example, consider a model of individual choice that focuses on choosing the characteristics of the goods consumed rather than assume that "goods" as such are fully defined.

i. The pioneering work in this area was done by Kelvin Lancaster (1971).

ii. His model is widely used by marketing experts to design new products and or to appraise lumpy goods like housing where a given unit of housing may be more or less pleasing to the individual as its attributes: the number of rooms, its location, its color and style, etc., vary.

iii. Here individuals may be able to design their own goods, or may attempt to purchase the best of the available goods (with less than an ideal mix of attributes).

iv. The Lancasterian decision maker maximizes: U = u (Q1A1, Q1A2, Q2) where good 1 has two desired attributes available in fixed amounts (A1 and A2), and good 2 (Q2) is an ordinary (1-dimensioned) good.

B. Becker's Household Production Function

i. A similar, and for many purposes richer, method of augmenting the model of individual choice was developed by Gary Becker (1976). Here, individuals demand goods and services not for their own sake but for their use in producing other goods which are themselves arguments in the individual's utility function.

ii. In some cases, this "household production" may be simply combining flour, sugar, eggs, etc. to make a cake or sandwich.

iii. In other cases, it might be the generation of more abstract goods: friendship, virtue, status, etc.

iv. Moreover, insofar as experience, can make one more "skilled" at household production, such models can be used to represent habit formation and addiction.

v. Here U = u (Q1, h(Q2, Q3,)), where goods 2 and 3 are inputs to the household production function.

C. Altruism: Does Economic Man Have to be Self Centered?

i. The *usual model of economic behavior assumes that decision makers care only about their own welfare, narrowly defined.* (This behavior is sometimes described as "wealth maximizing behavior," why?)

ii. However, the rational choice framework can readily be extended to model both altruistic and envious behavior.

a. For example, the behavior of an altruist can be represented as that which maximizes a utility function like the following: $U^a = u^a (Y^a -G, u^o(Y^o+G))$ where Y^a is the altruists income and G is a gift that he plans to make, u^o is the utility function of the other individual that the altruist cares about.

b. In this manner, various forms of charitable behavior can be modeled. Becker (1981) uses such models for some purposes to represent household decision making. Robert Barro (1974) and others use extended forms of this model to represent intergenerational decision making.

IV. Problem:

A. Suppose that Crusoe has a mildly altruistic tendency, so that he feels duty bound to share some of the island's bounty with Friday.

a. Model Crusoe's gift giving decision. Explain your results and assumptions.

b. Contrast this decision with that the taxation decision he would make if he receives, say, t% of Friday's production. Assume that a high t reduces Friday's production, so Yf = (1-t)F(t). What tax rate should a non altruistic Crusoe set? An altrusitic Crusoe? Explain your results.