Suggested Paper Topics

EC630   **Mathematical Economics**   Fall 2002

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The purpose of the paper is to integrate and apply the mathematical tools and concepts developed during the semester. Grades will be based upon the originality and quality of the economic analysis conducted in the paper. Style counts--in so far as good reasoning is best revealed by clear well-organized prose. A sophisticated mathematical analysis is not necessarily complicated, but is designed to shed new penetrating light on a question of interest.

All papers should be typed double or triple spaced and be *five to seven* pages in length, as necessary. Complete bibliographical information should appear at the end of the paper for all materials referred to in writing the paper.

Some Ideas for Topics Include:

1. Terrorism

    A. There are two sides to the problem of terrorism either or both of which can be modeled using economic tools. Consider the supply of terror. A terrorist leader has resources at his disposal which can be used to advance his political and economic purposes. Suppose that these purposes can be advanced in several ways. How might a terrorist leader allocate his resources among alternative uses to maximize his objectives? How would changes in relative prices, productivity, opportunity cost, membership, etc. affect the level and allocation of his resources?

    B. On the other hand, suppose that the targets of terrorism take steps to prevent or at least discourage terrorist attacks. Given that terrorists are rational in the sense that they allocate resources to advance consistent goals, how should a country use its resources to minimize damages from terrorism? Now suppose that the resources used to discourage terrorism can be used to discourage other crimes that also impose significant damages on victims (say murder), how should resources be allocated among anti-terrorist and anti-murder activities?

    C. A and B can be combined, and other related questions can be addressed. Is there a tradeoff between national security and privacy?

2. Addiction/Habit Formation

    A. One of the cornerstones of many "principles" level treatments of costs is that "sunk costs are sunk," which means that costs borne in the past are irrelevant to current decision making. However, it is possible that such past costs matter because they have directly or indirectly altered current tastes or circumstances. (Your current marginal costs may reflect past investments in fixed capital of one kind or another.)

    B. Develop a two period intertemporal choice model (either by a firm or consumer) to examine the possibility that past choices (consumption or investment choices in period 1) affect choices in the future (choices in period 2).

    C. One example of such intertemporal dependence in consumption is addition or habit formation. Show how such variables as, income, subjective rate of time discount and/or risk aversion may affect one's rational investment in habit forming activities in period 1.

3. The Mathematics of Entrepreneurship

    A. Israel Kirzner is well known for his model of Entrepreneurship in which he argues that entrepreneurship is a kind of market oriented "alertness." He argues that what he means by alertness can not be analyzed using neoclassical tools.

    B. However, it is possible to model alertness of a sort using an information/search model. Show how one can analyze entrepreneurship as investment in information about market opportunities. Consider (some of) the effects of expected returns, varying skills at detection, learning, and simple luck on the realized return from such "entrepreneurial" efforts.

4. The Nature of Goods and Purposes of Consumption

    A. Kevin Lancaster developed an extension of the theory of demand in which he argued that what we normally called "goods" like automobiles are really clusters of attributes (reliable transportation, economical, horsepower, aesthetic character, color, shape, power, sex appeal...). These attributes may be varied by manufactures to produce new goods. In fact, a lot of product innovation is simply a variation on existing products with a "new" cluster of already well known attributes. (To make your analysis tractable assume that there are just two attributes of interest for consumers.)

    B. Analyze a monopoly model of the production of a two attribute good where the monopolist faces a downward sloping demand curve for each of the two attributes. [That is a demand function of the sort, $Qd(P, A1, A2, Y)$, where $A1$ and $A2$ are the two attributes that can be varied.]

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C. To show how variation in tastes would affect the goods produced in such markets, suppose that there are two or three kinds of consumers who place value on the two attributes (in their utility functions). Show how the firm's profit maximizing bundle of these characteristics has to "weight" the preferences of its consumers. Discuss the factors (numbers of each type of consumer, substitutability, income etc.) which influence the characteristics of the good that the firm actually produces?

5. The Economics of Christmas.

A. Very few of the characteristics of the American style Christmas holiday season have been carefully analyzed. Consider the gift giving tradition. If this is entirely motivated by altruism, why should it be so concentrated during one day of the year? If it is a religious holiday, why do atheists give gifts? Analyze one of these puzzles using the tools developed in class.

B. One of the consequences of Christmas gift giving is that many industries have a strong peak demand. Analyze the mal-investments that result (if any) as a result of the American Christmas tradition of large scale gift giving. In order to demonstrate a mal-investment you'll have to show how a superior result could be obtained. (Alternatively, you might attempt to show that some implication of the cyclic demand for gift giving looks suboptimal, but is really optimal once properly analyzed.)

6. The Economics of Dictatorship

A. Consider the situation of a tax revenue maximizing dictator. He is somewhat uncertain about his term of office because other potential dictators and democratic revolution are possibilities. He can spend money on public services that increase national income, on security services that increase his likelihood of staying in office, and on private consumption. Suppose that he uses a proportional income tax as his tax instrument? Does the dictator have an incentive to maximize GNP? Personal Income? Security?

B. All governments have environmental policies of some kind. What would the environmental policies of a dictator look like? Does the dictator's personal objective function (and risk of over throw) affect his environmental policies? How would international trade opportunities affect the environmental decisions of neighboring dictators?

C. It is often risky for a dictator's agents to provide him with accurate information, especially regarding failures. Such news is often interpreted as evidence of the agent's own failings. Develop a model of supplying information (reporting) to a dictator about one's own performance in a setting where the agent's expected income increases as the dictator's estimate of the agent's performance increases. How can this dilemma be solved?

7. The Economics of Lotteries

A. The overwhelming majority of states now run state lotteries where about half the revenues generated by them is returned to person's who purchase lottery tickets and the other half is used to fund state services and pay for administering the lottery game(s). Construct a model that explains why a risk averse or risk neutral person might play such a lottery game.

B. During the last few years of the Vietnam war, the US government used a lottery system to "draft" persons for the Army. Analyze the Governments use of a lottery based draft as opposed to some other procedure (say raising salaries) for increasing troop size. Determine why a government (dictator/median voter) might prefer a lottery draft system to a volunteer (salary-based) system? Determine also whether the economic cost of a draft system is higher or lower than a salary system. (Assume that there are two kinds of "draftees" high civilian marginal product and low civilian marginal product who have the same military marginal product.)

C. It can be argued that a better way of staffing the representative portion of a democratic government is through lotteries. That is to say, instead of elections, one should randomly select persons from the population at large to form a representative sample--and let them make choices. Construct a model that would allow you to characterize the advantages and disadvantages of such a system over an electoral system that always elected a "faithful" representative of the median voter.

8. **Your choice**

A. *You may also choose a topic of your interest, but you have to obtain my permission first. To do this, simply tell me briefly what you want to work on after class, via e-mail, or in the office.*

B. *The requirement of "permission" is mostly to ensure that it is an area where you may be able to makes some useful progress.*

C. *That is to say, I will try to determine whether (i) the topic will "work" for the purposes of this class (showing off the tool bag as an analytical tool), (ii) whether "you" can manage the topic, and (iii) whether it is an area where there is not much formal research.*