University of California, Davis   Date: July 3, 2007
Department of Economics   Time: 3 hours
Industrial Organization   Reading Time: 20 minutes

PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE

Answer **four** of the six questions. You must choose at least one question from each of the three sections (A, B, and C) of the exam.

Section A

1. There are two players, 1 and 2. Each player owns a firm in a Cournot duopoly. The inverse demand function is P = 60 − Q and both firms have the same cost function characterized by a constant marginal cost equal to 12 and zero fixed cost. The firms are run by managers who make all the relevant decisions. *The objective of a manager is to maximize his own income.* In the following assume that $\alpha \in (0,1)$. Consider the following game. First the owner of firm 1 (player 1) decides whether to appoint a manager with a profit-sharing contract (the manager of firm 1 gets the fraction α of the profit of firm 1) or a revenue-sharing contract (the manager of firm 1 gets the fraction α of the revenue of firm 1). Then player 1's decision is made public and the owner of firm 2 (player 2) makes a similar decision. Then player 2's decision is made public and, afterwards, the managers simultaneously and independently compete in output levels. Note that the value of α is fixed and is not subject to choice. The only choice each player has is between a profit-sharing and a revenue-sharing contract.

(a) Sketch the extensive-from game.

(b) Find the pure-strategy subgame-perfect equilibria of this game. [Hint: your answer will have to distinguish between different values of α.]

(c) For the case where $\alpha = \dfrac{1}{20}$ find the payoffs of the two players at the subgame-perfect equilibrium.

(d) For the case where $\alpha = \dfrac{1}{20}$ give an intuitive explanation for the equilibrium: why do the players make those choices at the subgame-perfect equilibrium?

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2. HAL and JCN are the only producers of personal computers. Their computers are considered to be perfect substitutes by consumers. The demand function for computers is given by (Q denotes industry output and P price):

$$Q = 500 - \frac{P}{2}.$$

HAL and JCN compete in output levels (Cournot competition). JCN is a fully integrated firm (it produces all its inputs) and has a constant unit cost of production equal to 3. HAL, on the other hand, buys the CPUs from Entil (each computer requires one CPU). Entil publicly announces the (unit) price of CPUs and HAL takes that price as given and decides how many CPUs to buy. Besides the CPU, each computer requires a bundle of inputs that HAL produces internally at a (constant) cost of 1. Entil's (constant) cost of producing one CPU is 2. After many years of operation as separate firms, Entil and HAL apply to the government for permission to merge. Assume that the government is exclusively concerned with the welfare of consumers. Should the government allow the merger to take place? (give a detailed proof of your claim).

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Section B

Question 3

(a) Discuss the logit demand model. In particular, discuss the assumptions underlying the model and the data needed to estimate the model.

(b) The next few questions deal with Berry, Levinsohn and Pakes (*Econometrica* 1995) which estimates a model partially based on the logit demand model. Discuss the empirical setting of the model and the data.

(c) Discuss the major differences between BLP and a "standard" logit demand model as well as any issues/weaknesses with the standard model that BLP seek to address.

(d) Give a brief overview of BLP's estimation strategy. Given the nature of their data are there additional hurdles that the authors must overcome? Discuss their results.

(e) Compare and contrast BLP with Goldberg (*Econometrica* 1995). What are the similarities between the two papers? What the key differences in the data and estimation strategies? In doing so discuss Glodberg's empirical model and how it relates to the logit demand model.

Question 4

This question relates to "New Empirical Industrial Organization" studies that seek to estimate market power levels without marginal costs data.

(a) Discuss the identification strategy of NEIO models. That is, what equation NEIO papers are estimating as well as the theoretical underpinnings of this key equation?

(b) The NEIO model has been challenged on at least two fronts. Discuss two challenges to the validity of the NEIO model. Be as specific as you can.

(c) Discuss Genesove and Mullin (Rand 1998). What is the empirical setting, what is the key feature of their data, what is the main research question and what are the key results?

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Section C

5. The next few questions deal with Guerre, Perrigne, and Vuong, "Optimal Nonparametric Estimation of First-Price Auctions", (*Econometrica*, 2000) and Haile, Hong, and Shum, "Nonparametric Tests for Common Values in First-Price Sealed-Bid Auctions", (2005).

(a) Consider a single-object, first-price sealed-bid auction with independent private values. There are N potential bidders. Assume N is exogenous and known. Bidders are symmetric and risk-neutral. Each bidder draws his or her private value v_i from a common distribution $F(v)$ and $F(v)$ has a support $[0, \infty)$. Assume there is no reserve price for simplicity.
Derive symmetric Bayesian Nash equilibrium bidding strategies, $\beta(v_i)$. (Consider increasing and differentiable strategies only.)

(b) Describe, as fully as you can, the nonparametric identification result of GPV (2000).

(c) Describe the two-step nonparametric estimation strategy of GPV (2000).

(d) Discuss, in general, the advantages and disadvantages of nonparametric estimation strategies compared to parametric estimation strategies in empirical auctions literature.

(e) In Haile, Hong, and Shum (2005), their nonparametric test of common values depends on the following theorem. Prove the theorem.
Theorem Under standard assumptions of symmetry, affiliation, nondegeneracy and an additional assumption of exogenous participation, $v(x, x, n)$ is invariant to n for all x in a PV model, but strictly decreasing in n for all x in a CV model, where $v(x, x', n) = \mathrm{E}[V_i \,|\, X_i = x, \max_{j \neq i} X_j = x']$.

6. This question deals with Chevalier and Ellison, "Risk Taking by Mutual Funds as a Response to Incentives", (1997, *JPE*) and Chevalier and Ellison, "Career Concerns of Mutual Fund Managers", (1999, *QJE*).

(a) In Chevalier and Ellison (1997, *JPE*), what is assumed to be the objective of mutual fund managers? And what is the implicit incentive contract that the fund managers are facing? Also, explain the role of nonlinearity in the incentive structure.

(b) Give a brief overview of the empirical strategy employed by Chevalier and Ellison (1997, *JPE*) to examine whether mutual funds respond to the above incentives. What are the data used? Discuss the empirical results.

(c) In Chevalier and Ellison (1999, *QJE*), what is assumed to be the objective of mutual fund managers? How are the implicit incentive structures different between younger managers and older managers? Why are they different?

(d) Give a brief overview of the empirical strategy employed by Chevalier and Ellison (1999, *QJE*) to see whether managers react to the career concerns. Discuss the empirical results.

(e) Compare the two papers. What are the similarities and what are the differences?