UCLA Department of Economics

Second-Year Field Examination in
INDUSTRIAL ORGANIZATION

Spring 2006

This is a 4 hour closed book/closed notes exam.

Answer FIVE of the six questions

BE SURE TO CLEARLY NUMBER EACH QUESTION.

GOOD LUCK!

1)

Second Degree Price Discrimination

The population is split evenly between three types of consumer. Each consumer's type is private information. Demand price functions are given below. The unit cost of production is 10.

$$p_1(q) = 15 - 2q, \quad p_2(q) = 20 - 2q, \quad p_3(q) = 30 - 2q$$

(a) Let (q_t, R_t) be the choice of type t, given the alternatives offered by a monopolist, where q_t is the number of units sold and R_t is the monopolist's total markup over his cost (i.e. his profit.) Why is it necessarily the case that $q_1 \le q_2 \le q_3$?

(b) Taking account of only the local downward constraints and participation constraints, solve for the profit maximizing $R = (R_1, R_2, R_3)$ for any given $q = (q_1, q_2, q_3)$.

(c) Explain carefully why the other constraints are also satisfied.

(d) Solve for the profit-maximizing scheme of the monopolist.

(e) In qualitative terms, how would the solution change if instead $p_2(q) = 20 + \delta - 2q$, where δ is positive and small?

2)

Holdup Problem and Asset Ownership

An upstream firm is run by a manager M1 and a down stream firm is run by a manager M2. The total value of their trade depends on the relation-specific investments made by the two managers. Specifically, suppose $x = \ln(e_1) + \ln(e_2)$. In addition, each manager can also exert efforts in improving his outside option. Let manager 1's outside option be $y_1 = \alpha \ln(r_1)$ where r_1 is his investment in outside option and $0 < \alpha < 1$ is a positive constant. Similarly, let manager 2's outside option be $y_2 = \beta \ln(r_2)$ where r_2 is her investment in outside option and $0 < \beta < 1$ is a positive constant. Manager i's investment cost is $c_i = k(e_i + r_i)$, where k is a positive constant.

(a) Derive the first best investment decisions.

(b) Suppose investments are not contractible, nor is total profit. The two managers first make investments simultaneously, then bargain over the division of the total profit according to the Nash Bargaining Solution. Derive the equilibrium outcome in which the two managers trade with each other.

(c) Now suppose there is a physical asset. Without owning the asset, a manager cannot obtain any outside option. Derive the total surplus under manager 1 ownership and manager 2 ownership (again, focus on the trade equilibrium). What implications can we get from comparing the total surpluses?

(d) Suppose each manager initially owns one asset. Each manager needs his asset in order to obtain any outside option. What is the optimal ownership structure?

3) Consider the following Cobb-Douglas production function in logs

$$y_{it} = \beta_0 + \beta_1 k_{it} + \beta_2 l_{it} + \omega_{it} + \epsilon_{it}$$

where y_{it}, k_{it}, and l_{it} are logs of output and the respective inputs, and ω_{it} and ϵ_{it} are two econometric unobservables. As in class, suppose that ω_{it} is potentially observed by firms when making their input choices, while ϵ_{it} is just measurement error that is uncorrelated with input choices. Suppose that in addition to observing y_{it}, k_{it}, and l_{it} , the econometrician also observes i_{it}, the investment decision of firm i in period t.

a) Describe the problem with estimating the above production function with OLS. Which way would you expect the coefficient estimates to be biased?

b) Write down the key assumptions of the Olley-Pakes (1996) methodology for estimating the above production function.

c) Describe the "first stage" of the Olley-Pakes estimation procedure.

d) Describe the "second stage" of the Olley-Pakes procedure.

4) Consider the following "aggregated" logit model of demand:

$$\ln(\frac{s_j}{s_0}) = X_j\beta - \alpha p_j + \xi_j$$

where s_j is the market share of good j (s_0 is the market share of the outside alternative), X_j are observed characteristics of good j, p_j is the price of good j, and ξ_j is an unobserved (to the econometrician) characteristic of good j.

a) What is the problem with estimating the above equation with OLS? Which way would you expect the coefficient estimates to be biased?

b) Describe **two** distinct classes of instruments that have been proposed to "solve" this endogeneity problem. For each type of instrument, be sure to describe 1) why it might be reasonable to assume it is a valid instrument, and 2) potential problems/caveats of the instrument.

5)

There are two locations $\{l, r\}$. There is a set of potential entrants to this industry with entry cost $c_e > 0$. After paying this cost, an entrant gets shocks φ_l, φ_r indicating its initial productivity, depending on which location it chooses to enter (can only choose one.) Suppose the draws for each of these shocks are independent and from the same initial distribution G. Suppose the process for φ the cost function for production and initial distribution G satisfy all the assumptions in my JEDC paper, so that there will be a stationary equilibrium with entry and exit at each location. Suppose demand functions at these locations are $D_l(p_l)$ and $D_r(p_r)$, respectively, where $D_l(p_l) = \gamma D_r(p_r)$ and $\gamma > 1$.

1. Define a stationary equlibrium with entry and exit (from both locations) and equilibrium prices p_l, p_r.
2. In which market will the rate of turnover be higher? Is this model consistent with the observation that the average size of firms is larger in larger markets? *Explain throughly.*
3. Extend the model to allowing incumbent firms to enter the other market at a cost. Make the necessary assumptions so that the model is consistent with the fact that firms that enter into a second market are more likely to survive than firms that originally start in that market. Write down the dynamic programming problem of an incumbent firm explicitly.
4. Intuitively (or analytically) explain what differences would you observe in the behavior of markets and firms between the two models.

6)

Consider the following dynamic model. Firms can enter the market by paying a cost of entry c_e. Once they enter they can produce a maximum of one unit at marginal cost c. While in the industry and in every period firms have the option to invest in R&D, paying a cost x and being succesful with probability p. If succesful, the capacity of production of the firm increases to two units at the same marginal cost c. Aggregate demand in the industry is $D(p)$.

1. Show that in equilibrium there will only be entry the first period.
2. Give conditions on the parameters so that there is no exit in equilibrium and in the limit all firms increase their capacity.
3. Give conditions on the parameter values so that there is exit in equilibrium. Explain thoroughly the properties of the equilibrium for this case.