UCLA Department of Economics

Second-Year Field Examination in
INDUSTRIAL ORGANIZATION

Spring 2005

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

There are THREE parts with two questions in each part in the exam.
Answer FOUR questions, at least one in each part.

Use a separate bluebook for each part.

GOOD LUCK!

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Qualifying Exam in INDUSTRIAL ORGANIZATION

Attempt four (4) questions only.

You must answer at lest one from each of the three sections.

Part A:

A.1. A privately held proprietorship is owned by its proprietor. The publicly held corporation is owned by its shareholders.

(a) In both cases, the firm's equity is provided by its "owners," but do the two sets of owners have the same claims on "their firm's" assets? What is the relevance of claims on assets to management entrenchment problems?

(b) You are provided with complete lists of privately held and publicly held firms. Is there some characteristic of firms that provides a clue as to which firms appear on which of these two lists? Explain your reasoning.

(c) Consider closed-end and open-end mutual funds, relating the ownership arrangements they use to your answers to parts A and B above.

A.2. The firm in economic theory frequently is described in two ways. One relates to its costs of production, and, in particular, to the degree to which scale economies are absent or are present. A limiting case is the perfectly competitive market, usually taken as a market in which firm scale economies are very limited or are completely. Consider successive alternative market situations in which scale economies become more and more important, but let entry into these markets be open to one and all who think they can compete successfully. Describe and explain the relationship between product price and average unit cost that is likely to show itself as scale economies become more important. Does the relationship you describe depend on collusion between existing firms or will it exist even if all existing firms take product price as given and beyond control? Does your answer have relevance for the market concentration doctrine that has at times been operative in the application of U. S. antitrust law?

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Part B:

B.1. Duopoly

A differentiated duopoly faces demand curves given by

$$q_1 = 1 - p_1 + \beta p_2 \quad \text{and} \quad q_2 = 1 - p_2 + \beta p_1$$

where q_i denotes the quantity demanded of firm i and p_i denotes the price of firm i, and $\beta \in (0,1)$ is a demand parameter. Suppose for both firms, the marginal cost of production is zero. Each firm discounts future returns at a common factor of $\delta < 1$.

(a) Suppose the firms play only once and set prices simultaneously. Derive the best replies of each firm and determine the Nash equilibrium. How does the equilibrium outcome depend on β? Why?

(b) Determine the most profitable collusive prices (i.e., joint profit maximizing prices).

(c) Determine the range of discount factors under which the firms are able to support the collusive prices computed in (b) as a subgame perfect equilibrium in an infinite horizon game when the punishment to cheating is reversion to the static Nash equilibrium forever. What happens when $\beta \to 0$ or $\beta \to 1$? Why?

B.2: Bidding

(a) Solve for the symmetric equilibrium bid function for a sealed high bid auction if buyer j's valuation is $v_j = x_j + y$ where y is public information and x_j is known only to buyer j and is an independent draw from a distribution with support $[0,1]$ and c.d.f $F(x \mid y)$.

(b) Sketch a proof that the minimum bid must be y.

(c) Characterize the equilibrium if the seller sets a reserve price r.

(d) "As the number of bidders increases, the seller increases expected revenue by raising the reserve price." True or False? Explain.

(e) An econometrician observes the public signal y, and estimates the c.d.f. of the equilibrium bid distribution $G(b)$. How can he estimate the valuations of the bidders?

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Part C:

Problem 1. Consider the following industry equilibrium problem. To enter a firm must pay a cost of entry c_e.All entrants get an initial draw $s = 0$. Letting q_t denote the output of firm t, the evolution of s_t is given by:

$$s_{t+1} = (1 - \delta) s_t + \lambda q_t,$$

where $0 < \delta < 1$ and $0 \leq \lambda \leq 1$.

The firm's cost of production is given by:

$$C(q, s) = \frac{(q - \alpha s)^2}{2}$$

Notice that there are no fixed costs.

At the beginning of each period, a firm gets an outside opportunity V_0 normally distributed with mean $\bar{x}$ and variance σ^2. To obtain this value, a firm must exit.

1. Assuming there was no outside value (i.e. $V_0 = 0$ with probability one):

   (a) write down a dynamic programming problem for the firm's optimal choice of output as a function of the state variable s.

   (b) Explain why the optimal output choice function will be of the form
   $$q = a + bs.$$

2. Write down the dynamic programming problem of a firm in case the outside value is as in the original statement of the problem (normally distributed with mean $\bar{x}$ and variance σ^2.). Intuitively explain how the presence of this outside value is likely to affect the optimal output decision of the firm.

3. Define an industry equilibrium and a stationary equilibrium for this problem. Explain why there is a unique equilibrium and a unique stationary equilibrium.

4. Analyze the effect of an increase in $\bar{x}$ on the stationary equilibrium.

5. Discuss what qualitative facts about firm dynamics this model may be able/not able to explain. (In your analysis use q as a measure of firm size -e.g. assume it is linearly related to the employment of the firm.)

Problem 2. All potential entrants are identical and face the following technology. At entry firms get a draw for a productivity parameter $\theta \in \{0, 1\}$. This draw is permanent but not observed by the firm (as in Jovanovic's selection model.) An entrant gets $\theta = 1$ with probability $\lambda > 0$. This is also the initial prior which is updated using Bayes rule. Each period, a firm has the following random output: with probability $p \in (0, 1)$ it produces output θ and with probability $1 - p$ it produces zero. Cost of production is zero. All firms have the same fixed cost $f > 0$ and there is an entry cost $c_e \geq 0$. Demand is given by an aggregate demand function $p = D(Q)$.

1. Define an industry equilibrium for the industry.

2. Provide an argument to demonstrate that there is a unique equilibrium path (starting from no firms) and that this equilibrium path involves a constant price.

3. Let $\bar{v}$ denote the value of a firm that has learned to have $\theta = 1$ and v_t the value of a firm that entered t periods ago and had all zero output realizations. Write down the Bellman equation connecting these value functions.

4. Define a stationary equilibrium for the industry. Will there be entry and exit?

5. Suppose that $c_e = 0$. Describe completely the equilibrium path. Is the number of firms increasing, decreasing or constant?