UCLA
Dept of Economics

June 2003 4 hours

Qualifying Field Exam in Industrial Organization

There are 3 parts to this test, Part A, Part B, and Part C. Each part contains **2** questions.

Please answer a **total** of **4** questions on the test – **Very importantly**, you **must** answer **at least 1** question from each part!!!!! Thus, you should be answering both questions in 1 of the parts, and one question from each of the other two parts.

PART A

A1) The many empirical studies that have been done comparing accounting measures of profit rates and advertising intensity (that is, advertising expenditures divided by sales) across a sample of industries always reveal a significant positive relationship, even after other variables thought to be relevant, such as market concentration, are taken into account. The meaning of this finding has been debated in the literature of industrial organization, with one side interpreting the relationship as evidence that advertising is a barrier to entry, and the other side as evidence that accounting methods are at fault.

a. What is the nature of the fault that this second view sees in accounting methods?

b. Can this fault lead to underestimates of true profit rates as well as overestimates? Support your answer by algebraically describing the nature of the fault. Given your answer, how do you account for the empirically documented positive correlation between profit rates and advertising intensity?

c. Suppose that it is factually true that all firms in all industries can advertise at identical rates in various media advertising outlets. Should we expect that correctly measured profit rates and advertising intensities will be positively correlated if advertising does create a barrier to entry?

A2) Most academic financial economists believe that corporate takeovers are a cure for management entrenchment problems. These problems include excessive expenditures made by and for top management, including the acquisition for top management of prestige and community stature by making the firm large (larger than it ought to be to serve shareholders). Statistical examination of data relating to takeovers convincingly shows that target company shareholders receive a large premium (on the order of 30 to 40 percent) for tendering their shares to an acquirer. However, shareholders of the acquiring company, on average, realize little or no increase in the price of their shares when tender offers are made.

a. Do these findings refute the belief that takeovers play a role in reducing the severity of management entrenchment problems?

b. On average across a sample of takeovers, as stated above, shareholders of the acquiring company realize no increase in the price of their shares when tender offers are made. However, there is variation in outcomes around this average. What variable(s) would you look at to explain this variation?

PART B

B1) Monopoly and Product quality

Consumers wish to purchase either 0 or 1 unit of commodity 0. All other commodities are divisible. Let $u(z,c)$ be the consumer's utility if he consumes one unit of commodity 0 of quality z and his consumption vector of other commodities is c. Purchasing a unit of zero quality is the same as not purchasing. A monopolist can produce q units of quality z at a cost of $C(z,q) = czq$

(a) If the cost of the purchase is R and the consumer's income is I, explain briefly why, if the other commodities are purchased at fixed prices, the consumer has an indirect utility function $U(z, I-R)$.
(b) If all consumers have the same income, characterize the profit maximizing quality. Will the consumer's utility be $U(0,I)$?

Now suppose that there are two income levels. A fraction f_i of the population have income level I_i. Suppose also that $U(z,I-R) = \alpha \ln(1+z) + \beta \ln(I-R)$. It is illegal for the monopolist to sell at different prices based on income.

(c) Write down the monopolists's optimization problem and then use a neat figure (with z and R on the axes) to characterize the profit maximizing plan of the monopolist. Is it true that the indifference curves for high income types are steeper?
(d) Discuss whether the quality level will be lower or higher than that supplied low and high income customers by a perfectly discriminating monopolist.
(e) Suppose that the commodity is divisible so that the firm chooses both the quality and quantity. Write down (but do not try to solve) the new optimization problem.

B2) 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?

PART C

C1) Consider the "conjectural variations" literature as exemplified by Bresnahan, Sullivan, and others.

a) In this literature, researchers have estimated conjectural variation terms which are essentially the derivative of total market quantity with respect to a firm's own quantity. Do these authors take a **literal** interpretation of the estimate of this term? In other words, if the term is estimated to be 5, do Bresnahan, et. al. really think that a firm believes if it raises quantity by 1, total market quantity will increase by 5? If yes, explain; if not, what do they (Bresnahan, et.al.) believe?

More concretely, consider a group of firms producing a homogeneous good that compete in a cross-section of markets. In each of these markets you observe price, market quantity (**not individual firms quantities**), as well as some exogenous demand (Z) and cost (W) shifters that vary across markets. Assume that demand is an unknown linear function of price.

b) Under what conditions are "conjectural variations" identified by the data? Explain where this identification comes from either graphically or mathematically.

c) Suppose you do not observe any cost shifters W. Are conjectures still identified? Why or why not?

C2) Assume that we observe a large number, R, of independent markets. There are N_r firms in market r, with each firm producing one product. For product j in market r, observed characteristics are denoted by (X_j, W_j), where X_j affects demand, W_j affects marginal costs. The unobserved characteristics of product j are (ξ_j, ω_j), where ξ_j is an unobserved demand characteristic, and ω_j is an unobserved cost characteristic.

Let M_r be the total number of consumers in a market r. The utility of consumer i for product j is given by:

$$U_{ij} = X_j\beta_i + \alpha p_j + \xi_j + \varepsilon_{ij} \qquad j=1,\ldots..,N_r$$

where $(\beta_i, \xi_j, \varepsilon_{ij})$ are unobserved by the researcher. Let u_{i0} be the utility of the outside good. We will normalize u_{i0} to be equal to zero.

Firms are assumed to choose prices simultaneously to maximize profits. (Total costs for firm j are given by $C(q_j, w_j, \omega_j, \gamma)$, where γ is a vector of parameters for the cost function.) Also, assume ξ_j is mean independent of (X,W) and independent across markets. ε_{ij} is i.i.d. extreme value distributed across products and consumers.

For part a) through part c), assume that $\beta_i=\beta$ (no random coefficient).

a) Let s_j be the predicted (by the model) market share of product j. Show that:

$$\ln(s_j) - \ln(s_0) = \delta_j = X_j\beta_i + \alpha p_j + \xi_j \qquad (1)$$

where s_0 is the predicted market share of the outside good.

b) Suppose that you need to estimate equation (1). Will you use OLS or instrumental variable (IV) estimation method? Explain in details about your choice. If you choose IV, list all the instruments that you can use. Explain how you choose your instruments.

c) What are the implied demand substitution patterns of this model? Explain how the model generates them.

d) It is well-known that the substitution patterns in part c) are unreasonable. By allowing β_i to be heterogeneous across consumers (random coefficient), these problems can be alleviated. In this random coefficient framework, outline an algorithm that will allow you to obtain $\delta_j = X_j\beta_i + \alpha p_j + \xi_j$. In particular, explain how you obtain the predicted market shares.

e) Explain why it is important to include an outside good in the model.