June 19, 2002

UCLA Department of Economics

Industrial Organization Comprehensive Examination
Spring 2002

Answer all six questions. Each question has equal weight. **(4 hours)**

Part I

1) a) Both Green and Porter (1984) and Rotemberg and Saloner (1986) model collusion in repeated games. Compare and contrast the two models. Be sure to describe the information structure, as well as how exogenous demand shocks play a role in each model..

b) How might you empirically distinguish these two models? Describe the data you would like to have and intuitively how the two models could be tested.

2) Lets consider modeling consumers' decisions when to buy new car. Assume that:

- There is only one type of car with price p which is constant over time
- Consumers own at most one car at a time.
- Consumers choose at the beginning of each year whether to buy a new car.
- Consumers discount the **infinite** future at rate beta

- Single period utility is: U(A) + G

where

-U(A) is the utility derived from owning a car of age A. U(A) declines in A because of increased repair costs or probability of breakdown.

- G is income spent on all other goods $= Y_i - p$ if buy a new car
$= Y_i$ if don't buy a new car

where Y_i is consumer i's per-period income (constant over time).

a) Write down the dynamic decision problem (Bellman Equation) that tells us the EDV of future utilities for the above consumers. Be sure to specify what the state variable(s) are, how they evolve over time, and exactly what random variables the expectations in the Bellman's equation are over.

b) Suppose you are given cross sectional data on a group of consumer. You observe their incomes, age of current car, and whether they decide to buy a new car. Would there be an overfitting problem in applying the above model to this data? Describe it.

c) Write down and describe a modified model that cures this overfitting problem. Re-answer part a) and then argue why the overfitting problem is cured.

PART II

Question 1

Consider a beach that is 2 miles long. 2,000 people are uniformly spread along the beach. At one end of the beach is firm A selling cold (ie. refrigerated) bottles of water. At the other end of the beach is firm B selling warm (ie. non-refrigerated) bottles of water. Everyone on the beach prefers cold water to warm water. There is a travel cost to walking along the beach to either of these firms.

The utility that individual i located at $x_i \in [0, 2]$ obtains from purchasing a bottle of water from firm A is:

$$u_{iA} = 10 - p_A - x_i$$

If individual i were to purchase a bottle of water from firm B, their utility would be:

$$u_{iB} = 8 - p_B - (2 - x_i)$$

Assume there are no fixed costs for any of the firms. Marginal cost for firm A is 3 and the marginal cost for firm B is 1.

(A) Assuming that all consumers will buy a bottle of water from one of these firms, what is the location of the consumer who is indifferent between buying from firm A or firm B?

(B) What is the demand function for firm A?

(C) What is the demand function for firm B?

(D) Write down the profit functions for each of the two firms.

(E) Assuming the firms choose prices, solve for the Nash equilibrium prices.

(F) Compute the matrix of own- and cross-price elasticities at these equilibrium prices.

(G) Calculate the Herfindahl index.

Question 2

(A) Provide a definition of price discrimination.

(B) What is the difference between second-degree and third-degree price discrimination?

(C) Consider the following research question: is the price difference between full-service and self-service gas, at stations which offer both types of service and in markets where there are multiple firms, due to price discrimination?

Outline an empirical strategy for providing an answer to this question, which you could realistically imagine implementing.

An ideal answer will include:

1. a list of the specific variables you would need to collect data for,
2. a clear statement of any assumptions that you will need to rely on in your approach, and
3. the specification, or equation(s), you will estimate.

Part III

1. Consider an economy under two alternative conditions. Under condition (A) the State levies a tax per dollar on the value of all transactions, i.e., an *ad valorem* tax on all transfers of titles to goods and services, while under condition (B) no such tax is levied. In (B), a fixed tax per family is used in place of the *ad valorem* tax to raise revenue for the State. Technical knowledge, preferences, population, and quantities of all raw materials are the same under both conditions. Compare the economy under condition (A) to the economy under condition (B) for each dimension of comparison listed below. Explain why you expect the comparisons you describe to hold. [Note: difficulty of analysis increases monotonically from dimension (a) through (e).]

a) The vertical depth of the typical firm.
b) The horizontal reach of the typical firm.
c) The fraction of the total output in the economy that is produced by the economies household sector.
d) The degree to which corporate ownership is concentrated in the hands of relatively few investor-owners.
e) The difference between (1) market concentration averaged over markets in which lowest unit cost for the typical firm obtains at a small share of the market and (2) market concentration averaged over markets in which lowest unit cost for the typical firm obtains at a large share of the market. (Assume that all markets are such that the lowest unit cost for the typical firm obtains at a fraction of the market that is no greater than 50%.)

2. The market concentration doctrine, initially due to Joe Bain, found support in empirical studies that compared industries by measured accounting profit rates and measured market concentration. These included Bain's original study, which focused only on these two variables, and later studies done by Bain's students (sometimes with his co-authorship). The later studies placed markets into three entry barrier categories, low, medium, and high (based on investigator judgment concerning the importance of scale economies and product differentiation in a market). The relationship between profit rate and market concentration was examined for each barrier category and was found to be weakest in the low barrier to entry markets and highest in the high barrier to entry markets. Are the findings in these later studies inconsistent with the *breakthrough, indivisibility rent*, and *accounting artifact* theories? Explain.