IO Field Exam: ECON 220A

This section has several questions related to the papers discussed in class. Please answer all of them in detail.

Question 1: Market Power and Discrete Choice Models (80 Points)

This will be a multi-part question asking about papers covered in class on discrete choice modeling and oligopoly supply models.

A. (10 points) In Bresnahan (1987) the demand model places some strong assumptions on consumer preferences. Write down the model of consumer demand, including a description of product differentiation. Write down both consumer preferences and the closed form solution showing the mass of consumers demanding each product.

B. (10 points) A key question in Bresnahan (1987) is to test for whether firms are colluding or competing. Write down the supply model / model of firm pricing and product ownership. Write down the derived formula for markups. Explain how, with this model, Bresnahan identifies collusive conduct vs. competitive conduct.

C. (10 points) Write down the main likelihood function that Bresnahan (1987) uses to estimate his model. Describe how the maximum likelihood estimation routine works, i.e. how does the routine match the model to the data?

D. (10 points) How does BLP (1995) improve upon Bresnahan (1987) from an identification and choice modeling perspective? List the two prominent advantages of BLP that we discussed in class and describe why each advantage is important to generating better models of competition in the automobile market.

E. (10 points) Fly back in time to 1997 and imagine that a policymaker wants to use the model and estimates in BLP to evaluating the impact of a counterfactual merger between two automobile firms on market prices, demand, and consumer welfare. Describe how you would implement this counterfactual analysis in detail, in the context of the BLP model.

F. (20 points) Both Nevo (2001) and BLP (1995) use IVs to remove bias from demand estimates. Describe the IVs used in each of these papers. Give the logic behind each set of IVs and write down the moment conditions used in Nevo (2001) that leverage the IVs for estimation.

G. (10 points) One key addition made in Nevo (2001) relative to BLP is the addition of demographic variables to the demand model. Write down the Nevo demand framework and describe how the inclusion of demographics impacts estimates of heterogeneity.

Question 2: Selection Markets (50 Points)

A. (10 points) Illustrate the main graphical framework used in EFC (2010) to quantify the welfare loss from adverse selection. Please (i) draw a graph showing the welfare loss from adverse selection in their standard setup and (ii) list the main assumptions about competitive insurance markets contained in their analysis.

B. (20 points) In Handel (2013), consumer inertia leads to reduced adverse selection. Assume instead of inertia that consumers make random active choice mistakes. Use the EFC (2010) graphical framework to show a case where random active choice mistakes leads to a lower welfare loss from adverse selection. Show this in the graphical framework AND write down demand and cost equations to reflect the case with active choice mistakes.

C. (20 points) In Handel Hendel and Whinston (2015) the authors discuss a tradeoff between adverse selection and reclassification risk. First (10 points) write down the Riley equilibrium concept used to model exchange market equilibrium. To do this, describe consumer demand, supply assumptions, and the equilibrium assumptions on permissible deviations. Next (10 points) explain how allowing for borrowing / savings by consumers impacts the key welfare comparative statics. I.e., if borrowing / saving is / is not allowed, how does this impact of the welfare implications of different price discrimination policies?

Question 3: Vertical Markets (30 Points)

A. (10 points) In Crawford and Yurokoglu (2011) they study vertical relationships in cable TV markets. Write a market diagram describing key agents / firms that enter their model. After writing this diagram, write down the Nash bargaining equation between the two upstream types of firms and describe what they do in the paper in regards to identifying bargaining weights separately from marginal costs.

B. (10 points) For Crawford and Yurokoglu (2011), describe their main result related how a la carte channel pricing impacts consumer welfare in the vertical market setup. Provide intuition for the results.

C. (10 points) Ho and Lee (2017) studies hospital-insurer bargaining. They highlight some cases where greater insurer concentration can actually reduce downstream health care prices. Describe the factors behind why this is possible and then discuss the mechanisms behind an alternative cases where increased insurer market power raises prices.

IO 220C Questions

Question 1

Consider the continuous action version of Bajari, Benkard and Levin (2007). There are $i = 1, 2, \cdots N$ firms, making decisions at $t = 0, 1, \cdots, \infty$. Let $\mathbf{s}_t \in S \subset \mathbb{R}^L$ denote commonly observed state variables. Given $\mathbf{s}_t$, firms choose actions simultaneously. Let $a_{i,t} \in \mathbb{R}$ denote firm i's action at period t. Assume that firm i receives a private utility shock $\nu_{i,t} \in \mathbb{R}$ that is privately known. Let $G_i(\cdot)$ denote the distribution of $\nu_{i,t}$. The firm's period profit function π_i depends on the action profile $\mathbf{a}_t$, state $\mathbf{s}_t$ and the utility shock $\nu_{i,t}$ as $\pi_i(\mathbf{a}_t, \mathbf{s}_t, \nu_{i,t})$. Assume that $\partial^2 \pi_i / (\partial a_{i,t} \partial \nu_{i,t}) > 0$ for all $\mathbf{s}_t$. Firms discount future payoffs using a common discount factor β. The state variables follow a first-order Markov process, $\mathbf{s}_{t+1} \sim F(\mathbf{s}_{t+1} | \mathbf{s}_t, \mathbf{a}_t)$.

Assume that the researcher observes the sequence $\{\mathbf{a}_t, \mathbf{s}_t\}_{t=1}^T$. Assume also that $G_i(\cdot)$ and the discount factor β are known to the researcher. The primitives of the model are the profit functions π_i.

(1) Discuss how to estimate the policy function, $\sigma_i(\nu_{i,t}, \mathbf{s}_t) : \mathbb{R} \times \mathbb{R}^L \to \mathbb{R}$. You can assume that the distribution of $a_{i,t}$ is smooth to simplify exposition for this question. Discuss in your answer how you use $\partial^2 \pi_i / (\partial a_{i,t} \partial \nu_{i,t}) > 0$.

(2) Suppose $a_{i,t} \in A_i \subset \mathbb{R}$ where A_i is a finite set, $A_i = \{a_1, \cdots, a_K\}$. Would you still be able to estimate/identify $\sigma_i(\nu_{i,t}, \mathbf{s}_t)$ in this case (under the assumption $\partial^2 \pi_i / (\partial a_{i,t} \partial \nu_{i,t}) > 0$)?

(3) Discuss how Bajari, Benkard and Levin (2007) estimate π_i.

Question 2

Consider a static entry model. Assume that in each market t, there are two potential entrants, $i = 1, 2$ (you can think of Walmart and Kmart, for example). The profit from

entry in market t is given as follows:

$$\pi = \beta_i Z_t - \alpha_i \mathbf{1}_{\{\text{competitor}\}} + \epsilon_{i,t},$$

where $Z_t \in \mathbb{R}^L$ is a vector of market characteristics, $\mathbf{1}_{\{\text{competitor}\}}$ is an indicator function for whether or not there is a competitor, and $\epsilon_{i,t} \in \mathbb{R}$ is an idiosyncratic shock distributed independently across i and t. If firm i is a monopolist, the profit is $\beta_i Z_t + \epsilon_{i,t}$. If the firm is a duopolist, the profit is $\beta_i Z_t - \alpha_i + \epsilon_{i,t}$. Profit from staying out of the market is normalized to 0. Assume that you know the distribution of $\epsilon_{i,t}$ (you can assume that it is uniform [-1,0]). The primitives of the model are $\{\alpha_i, \beta_i\}_{i=1,2}$. The researcher has access to data $\{N_t, Z_t\}_{t=1}^T$, where $N_t \in \{0, 1, 2\}$ is the number of entrants in market t. Each firm makes an entry decision in each market.

(1) Assume that firms observe their own realization $\epsilon_{i,t}$ as well as their opponent's realization $\epsilon_{-i,t}$ (The researcher does not observe the realizations however). Firm i's strategy is $\sigma_i(Z_t, \epsilon_{i,t}, \epsilon_{-i,t}) : \mathbb{R}^L \times \mathbb{R} \times \mathbb{R} \to \{0, 1\}$. Assume that firms are playing Nash equilibrium in each market. Are the primitives of the model identified? Discuss.

(2) Propose an estimator of $\{\alpha_i, \beta_i\}$ that is consistent.

(3) Suppose now that firms only observe their own realization of $\epsilon_{i,t}$, so that their strategy is $\sigma_i(Z_t, \epsilon_{i,t}) : \mathbb{R}^L \times \mathbb{R} \to \{0, 1\}$. Are the primitives of the model identified? If so, propose an estimator.