Question 1

Consider the following environment. There are $1, 2, \cdots N$ risk-neutral bidders ($N \geq 3$). Each bidder draws an independent private value from a distribution F_i, with common support, say $[0, \bar{V}]$. The bidders participate repeatedly in a first-price sealed-bid auction, i.e., the highest bidder wins and pays its own bid. As a researcher, you have access to data on all of the bids from each auction. You may assume that F_i satisfies standard regularity conditions.

(1) Consider the case in which all of the bidders are bidding competitively. Show that F_i is identified and propose an estimator for F_i.

(2) Consider the case in which a subset of the bidders, say $1, 2, \cdots, N_1$, are colluding ($1 < N_1 < N$). Suppose that collusion is efficient in the sense that the bidder with the highest value bids optimally against the non-colluding bidders and all the other colluding bidders bid phantom bids. Phantom bids are lower than the serious cartel bid but otherwise may or may not be related to the underlying valuation of the bidder. The researcher knows that there is collusion.

Suppose the non-colluding bidders (i.e., bidders $N_1 + 1, \cdots N$) all know the existence of the cartel, the identity of its members and how it operates. The non-colluding bidders take the cartel as given and bids accordingly. Show that F_i is identified for all i and discuss how to construct an estimator for F_i.

(3) Suppose that bidder values are correlated, so that the marginals are given by F_i, but the values are drawn from a joint distribution F. How does your answers to part (1) and part (2) change?

Question 2

Consider the following model of water usage based on Timmins (2003). A farmer has a well whose depth is H. The well can hold a maximum of $V \times H$ water. For simplicity, normalize $V, H = 1$. There is a cost of extracting water from the well that depends on how low the water surface is under ground. If the well is only 30% full, for example, the water surface is 0.7 below ground. Then it costs $c(0.7; \theta_c)$ to extract a unit of water, where $c(\cdot)$ is a known function and θ_c is an unknown parameter. If the farmer wants to extract 0.1 amount of water when the well is 30% full, the extraction cost is $\int_{0.7}^{0.8} c(x; \theta_c)dx$.

The amount of water in the well depends on how much the farmer extracts water as well as the amount of rainfall. If we let $h_t \in [0, 1]$ denote how full the well is at period t, ($h_t = 0$ corresponds to empty well, and $h_t = 1$ corresponds to full well), then $h_{t+1} = \max\{1, h_t - a_t + x_{t+1}\}$, where a_t denotes the amount water the farmer extracts and x_{t+1} is the natural increase from rainfall. Assume that x_{t+1} follows a known distribution F_x. The farmer knows F_x, but not the realization of x_{t+1} when choosing a_t. We assume that $a_t \in [0, h_t]$.

The farmer's current period utility depends on the amount of water the farmer extracts and the cost of extracting water. We let $U(a_t + \epsilon_t; \theta_U)$ ($U(\cdot; \theta_U)$ is incr. and concave) denote the utility of using amount a_t of water. ϵ_t reflects the farmer's idiosyncratic water needs at time t, known to the farmer at time t. It is distributed i.i.d. according to a known distribution F_ϵ. θ_U is an unknown utility parameter. Assume that farmer discounts the future by a known constant $\beta \in (0, 1)$. You can impose additional regularity conditions as needed in answering the following questions.

(1) Write down the Bellman equation for the farmer.

(2) Assume that you have data on h_t, x_t and a_t. Discuss how you can obtain an estimate of the value function by simulation for any value of (θ_c, θ_U).

(3) Discuss how you can obtain estimates of θ_c and θ_U without fully solving for the dynamic model using first-order conditions.

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: Selection Markets (100 Points)

This will be a multi-part question asking about selection markets.

A. (10 points) In Einav Finkelstein and Cullen (2010) the authors set up a simple framework to study adverse selection in competitive insurance markets. Draw a graph related to their framework that describes a competitive market with adverse selection. Label the key objects of interest, including the deadweight loss from adverse selection.

B. (10 points) Handel, Hendel and Whinston also describes equilibria in competitive health insurance markets. Describe **in detail** the key differences in the underlying models in EFC and HWW. Illustrate the difference in an EFC style graph, similar to what you drew in the first part of this question.

C. (10 points) Describe the central tradeoff studied in HHW and what the authors find empirically regarding this tradeoff.

D. (10 points) In Handel (2013) there are two primary sources of descriptive evidence for inertia. Please describe these two sources of evidence and describe which one you think better identifies inertia.

E. (20 points) Write down the demand model from Handel (2013) in detail. Describe in detail (i) how risk preferences are identified and (ii) how inertia (modeled as a switching cost) is identified.

F. (20 points) Now, imagine that the mechanism underlying inertia is not a "switching cost" but is instead some other micro-founded model for inertia, such as rational inattention or naïve inattention (or some other foundation for inertia!). Write down a version of this alternative model that you could estimate, i.e. modify the model in part E. to have this new micro-foundation for inertia.

G. (10 points) Describe in depth how you might empirically test whether your model in F. is a better model than the switching cost model set up in Handel (2013).

H. (10 points) Describe in depth (i) if you think your model in F. would have different implications for adverse selection than the switching cost model in E. and, if so (ii) what would those implications be?

Question 2: Short Questions (50 Points)

A. (10 points) What are the major innovations in the Nevo Econometrica paper on breakfast cereals, relative to BLP (1995)? Describe innovations in (i) demand estimation and (ii) dealing with endogeneity. What are the main results Nevo finds in his paper?

B. (10 points) What are the primary innovations made in BLP (1995) relative to Bresnahan (1987)? Describe innovations in both demand estimation and identification.

C. (10 points) The Berry, Gaynor and Scott Morton (2019) paper we discussed in week one discusses several key issues with recent studies that show a correlation between concentration and high markups. Clearly state <u>three reasons</u> why studies they discuss are problematic, including at least two reasons that do not have to do with issues of causality.

D. (10 points) Bayer et al. (2016) model dynamic demand for housing and discuss the implications for estimating a dynamic model relative to a static model. Explain (i) how the introduce dynamics into the model and (ii) what results they show to illustrate the importance of dynamics.

E. (10 points) Frechette et al. (2019) model equilibrium in taxi markets in Manhattan. They face quite a few identification problems stemming from unobserved behavior from drivers and customers in the data. <u>Pick one of these problems, and describe in detail how they address it in their empirical approach.</u>

IO Field Exam Econ 220B

Consider a market with three symmetrically differentiated products, labeled 1, 2, and 3. Demand for product i is given as a function of the prices of the three goods by the equation:

$$x_i = 1 - p_i + d \sum_{j \neq i} p_j \qquad (*1)$$

Marginal costs are normalized to zero.

Initially there are three firms, each offering one product. Then, firms 1 and 2 merge, creating an asymmetric duopoly market in which the merged firm, which we can call firm "1&2", offers two products, 1 and 2, and firm 3 offers product 3.

(a) Assume that, both before and after the merger, the market operates in the standard Nash-Bertrand fashion in that firms simultaneously set prices. Calculate the price for each product before the merger, and the price for each product after the merger. What is the proportional (or percentage) change in price for product 1? Interpret your answer in terms of the concept of upward pricing pressure.

(b) Now assume instead that, before the merger, the pricing game is: first firm 1 sets its price, and firms 2 and 3 observe that choice; then firms 2 and 3 simultaneously set their prices. Calculate the price for each product.

(c) Continuing from part (b), assume that after the merger, the pricing game is: the merged firm "1&2" sets its prices, and firm 3 observes those choices; then firm 3 sets its price. Calculate the price for product 3.