Selected Readings in Micro: Session 2

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New Behavioral IO

	Hyperbolic Discounting	Loss Aversion	Fairness	Self-Serving	Imperfect Bayesian
Monopoly pricing	DellaVigna Malmendier	Heidhues-Koszegi	Rotemberg		
Price discrimination					
Durable goods					
Static oligopoly					
Dynamic oligopoly					
Entry deterrence					
Innovation					

Behavioral IO: New Directions

- Eliaz and Spiegler: "Beyond "Ellison's Matrix": New Directions in Behavioral Industrial Organization", 2015

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- three new directions
  - using equilibrium datasets to identify unobservables that characterize non-rational procedures of consumer choice
  - strengthening the connection between BIO and abstract choice theory
  - integrating BIO models in a larger models of the economy

Eliciting New Unobservables from Equilibrium Datasets

- new models incorporate elements of bounded rationality that require entirely new unobservable primitives that have no counterpart in the standard rational-choice model
- if we assume that a certain dataset was generated by an equilibrium market model with behavioral consumers, can we identify the parameters of the unconventional model of consumer choice?

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- example: in consideration set models, the "new unobservable" is the consideration set formation model/function
- identification: use equilibrium assumptions (advertising competition game) to identify the consideration set function, how about the preferences?

Example: Imperfect Attention

- literature: Manzini and Mariotti (2014, ECMA), Brady and Rehbeck (2016, ECMA)
- bounded rational agent
  - maximizes a preference relation
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- bounded rational agent
  - maximizes a preference relation
  - makes random choice errors due to imperfect attention
- questions
  - whether observed choice data could be rationalized by the model
  - how to infer uniquely both preferences and attention

Random Choice Rule

- nonempty finite set of alternatives X
- a domain $\mathcal{D}$ of subsets (menus) of X
- "richness" assumption: $\{a, b, c\} \in \mathcal{D}$ for all distinct $a, b, c \in X$ and $A \in \mathcal{D}$ whenever $B \in \mathcal{D}$ and $A \subseteq B$
- default alternative x^* (outside option): not choosing anything from the menu
- notation: $X^* = X \bigcup \{x^*\}$

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- default alternative x^* (outside option): not choosing anything from the menu
- notation: $X^* = X \bigcup \{x^*\}$
- random choice rule: $p : X^* \times \mathcal{D} \to [0, 1]$ such that $\sum_{a \in A^*} p(a, A) = 1$ for all $A \in \mathcal{D}$, $p(a, A) = 0$ for all $a \notin A^*$
  - so $p(a, A)$ is effectively the choice probability

Random Consideration/Choice Set Rule

- strict preference ordering $\succ$ on A, and $\phi(A, \succ)$ denotes the most prefered option given $(\succ, A)$
- the preference is applied only to a consideration set $C(A) \subseteq A$ of alternatives
  - allow $C(A)$ to be empty, in which case the agent picks the default option x^*
- for all $A \in \mathcal{D}$, each alternative a has a probability $\gamma(a) \in (0, 1)$ of being in $C(A)$

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- for all $A \in \mathcal{D}$, each alternative a has a probability $\gamma(a) \in (0,1)$ of being in $C(A)$
- Manzini and Mariotti (2014)'s random consideration set rule

$$p_{\succ,\gamma}(a, A) = \gamma(a) \prod_{b \in A : b \succ a} (1 - \gamma(a)) \text{ for all } A \in \mathcal{D}, \text{ for all } a \in A$$

- Brady and Rehbeck (2016)'s random conditional choice set rule (RCCSR)

$$p_{\succ,\pi}(a, A) = \frac{\sum_{B \subseteq A : a \in A} \pi(B)}{\sum_{B \subseteq A} \pi(B)} \text{ for all } A \in \mathcal{D}, \text{ for all } a \in A$$

where π is a full support probability distribution on $\mathcal{D}$

General Random Consideration/Choice Set Rule

- define a probability distribution $\{\mathbf{P}(C, \succ | A) : (C, \succ) \in \mathcal{F}\}$ for all $A \in \mathcal{D}$, where $\mathbf{P}(C, \succ | A)$ is the conditional distribution of consideration set and preference given that A is the choice set
- the random consideration set rule

$$\sigma_{\mathbf{P}}(a, A) = \sum_{(C,\succ)\in\mathcal{F}} 1\left(a \in C \text{ and } a = \phi(C, \succ)\right) \mathbf{P}(C, \succ | A)$$

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- an implicit assumption in the literature
  - consideration set distribution is independent of preference relation, i.e., $\left\{\mathbf{P}(C | \succ, A) : C \in 2^A\right\}$ is invariant when $\succ$ is changed to any $\succ' \neq \succ$
  - maintained in Manzini and Mariotti (2014) and Brady and Rehbeck (2016)
  - rules out some important models, like search models

A Natural Question

- Manzini and Mariotti (2014) and Brady and Rehbeck (2016) provide identification results: $(\succ, \gamma)$ or $(\succ, \pi)$ are uniquely identified from choice data $p(a, A)$

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- Can we still learn anything about (the joint distribution of) preference and attention from choice data with this general random consideration set rule?
  - this could be regarded as providing a foundation for the identification of search models

An Interesting Implication

- Define

$$\delta^{L}(a, A) = \sum_{(C, \succ) \in \mathcal{F}} 1(a = \phi(A, \succ)) \, 1(a \in C) \, \mathbf{P}(C, \succ | A)$$

$$\delta^{U}(a, A) = \sum_{(C, \succ) \in \mathcal{F}} 1(a \in C) \, \mathbf{P}(C, \succ | A)$$

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$$\delta^{U}(a, A) = \sum_{(C,\succ)\in\mathcal{F}} 1\left(a \in C\right) \mathbf{P}\left(C,\succ \mid A\right)$$

Lemma

For any $A \in \mathcal{D}$ and $a \in A$,

$$\delta^{L}(a, A) \leq \sigma_{\mathbf{P}}(a, A) \leq \delta^{U}(a, A)$$

and the inequalities are equalities if and only if $a = \phi(A,\succ)$ for all strict preference ordering $\succ$.

An Identification Result

Theorem

Suppose we observe the random choice rule $p(a, A)$ *for any* $A \in \mathcal{D}$ *and* $a \in A$. *Then the identified set of* $\mathbf{P}(C, \succ | A)$ *is defined by the following restrictions*

$$\begin{cases} \delta^L(a, A) = \delta^U(a, A) = p(a, A), & a = \phi(A, \succ) \\ \delta^L(a, A) < p(a, A) < \delta^U(a, A), & \text{otherwise.} \end{cases} \tag{1}$$

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- if $\mathbf{P}(C, \succ | A)$ is generated by some "deep" structural model with a small number of primitives, then it could be identified from these constraints
- more results are needed... let me know if you are interested!

Basic Theory on Buyer-Seller Networks

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- when we get to bargaining later, we will have to account for informational considerations
- we will also see TIOLI endows, by assumption, all the "bargaining power" to the firms making the offers

The Simplest Model

- one upstream firm U and one downstream firm D
- U needs to sell through D to reach consumers
- D needs U's input to have a product
- U has cost c, D's marginal cost is the unit price it pays U (call it τ)

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- under linear fee contracts, there is double marginalization, i.e., double mark-up
  - one captured by U and paid by D, one captured by D and paid by consumers
- under two-part tariffs, U and D maximize their surplus $=$ revenue of D - costs of U
  - D takes the MC of U and prices to maximize the total revenue, and then reimburses U through the upfront fee
  - if the upstream firm is making the offer, it gets all the profits, and visa versa if the downstream firm is making the offers

Next Class Presentation

- Kranton, Rachel E., and Deborah F. Minehart. 2001. "A Theory of Buyer-Seller Networks" *American Economic Review*, 91(3): 485-508.