Nonstructural empirical auction literature

Kagel, Harstad, Levin (EMA '87)

Some standard result on APV auctions: $\frac{f(x_{-i}|x_i)}{f(x_{-i}'|x_i)} \uparrow x_i$

affiliated private value

for $x_{-i} > x_{-i}'$

1] SPSB is equivalent to the English auction

2] With risk neutrality, an English auction has higher expected revenue than a first-price auction.

3] Committing to release information about values raises expected revenue in a 1st price auction.
- ie if the auctioneer receives a signal, he/she is better off releasing it.

Recruit 6 undergrads / MBAs per session
- 25 auctions
- Pick $x_0 \sim U[25, 125] \equiv U[\underline{x}, \bar{x}]$
- $x_1|x_0, \ldots, x_6|x_0 \overset{iid}{\sim} U[x_0 - \sigma, x_0 + \sigma]$ $\sigma = 6, 12, 24$
- High bid wins x_i in cash

1] Run second price, English auctions

2] Run English and 1st price auctions

3] Sometimes tell bidders just x_i. Other times, tell them x_0 or x_7

Aggregate results:

1] Second price usually raises more revenue than an English auction.

2] English is not better than 1st, at least for $\sigma = 12, 24$

3] On average, do get more revenue when information is released, but only works sometimes.

Micro-level results:

English auction: Theory works well. After about 5 rounds, people drop out at about x_i.

Second-price sealed bid: People bid too high and don't seem to learn.

- It is not very often the case that the second highest bid is between the winner's valuation and bid. There is just not enough feedback in 25 rounds of bidding.

First-price sealed bid:

- $b^*(v) = (x_0 - \sigma) + \frac{N-1}{N}(v - (x_0 - \sigma))$ if x_0 known

- $b^*(v) = v - \frac{\sigma}{2N} + \underbrace{\frac{\sigma}{N(N+1)} \exp\{-\frac{N(v-(x-\sigma))}{2\sigma}\}}$

this is due to the fact that you don't have a uniform prior when your valuation is close to the boundary

- find that the winning bids are about right for $\sigma = 6$ but too high for $\sigma = 12, 24$.

David Reiley (AER '99): Field experiments

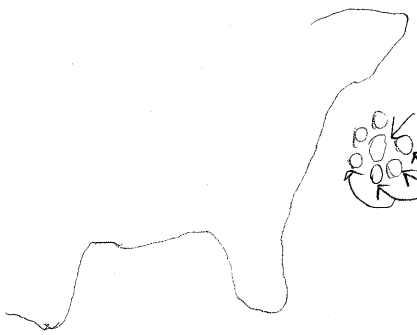
- Online auctions for Magic the Gathering cards
  - real players representative
- incentives
- can't control valuations

t	t'
1st price A	2nd price A
2nd price B	1st price B

- harder to analyze deviations from the theory

Hendricks-Porter (AER '88): Classic reduced form empirical paper.

- US offshore drilling rights auctions
  - wildcat tract
  - drainage tract



- when wildcat tracts are found to have oil, the drainage tracts are more likely to have oil, so they will be sold.

- Wildcat - conditional on drilling, 35% have oil
- drainage - more likely to have oil. More profitable conditional on oil.
  - drainage tracts attract fewer bidders and have higher profits net of winning bid.
    - adverse selection / winner's curse idea.

Model:

Single drainage tract: value $\begin{cases} v & \text{to wildcat owner} \\ v-c & \text{to others} \end{cases}$

N uninformed bidders: signal z such that

$E[v-c \mid z] > R$, $\frac{d}{dz} E[v \mid z] > 0$, $Pr[v-c < R \mid z] > c$

One informed bidder sees v and z.

First-price sealed bid with reservation price R.

Prop: I There is no BNE where the uninformed bidders don't bid.

Pf of I: If they don't bid, informed bidder bids 0 if $v < R$, R if $v > R$.

then bidding $R+\varepsilon$ is profitable

Prop 2 There is no pure strategy BNE with $b_u^*(z) \geq R$

- If u is using pure strategy,

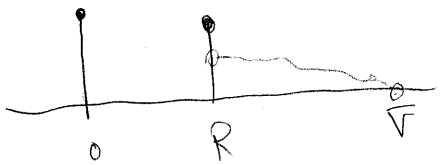
$$BR_I = \begin{cases} b_u^*(z)+\varepsilon & \text{if } v \geq b_u^*(z) \\ 0 & \text{if } v < b_u^*(z) \end{cases}$$

$\Rightarrow u$ loses money

They show that the uninformed mix over $\{0\}, (R, \bar{v})$, where $\bar{v}$ is the upper bound of the support.

The informed bidder bids $b_I^*(v,z) = \begin{cases} 0 & v<R \\ R & \text{if } v \text{ a little bigger than } R \\ g(v,z) & \text{otherwise} \end{cases}$

where g is monotone and continuous.



Predictions:

1] $Pr[b_I^* = 0] < Pr[b_u^* = 0]$

2] I wins with prob $\geq 1/2$

3] $E[\pi_u^*] = 0$

- positive if $b_I^* > 0$
- negative if $b_I^* = 0$

4] For $c \approx 0$, bid distributions for I and U are the same.

5] b_I^* is independent of N

6] $E[\pi_I^*] > 0$

7] $g(v,z)$ is monotone increasing.

Data:

- 100 drainage tracts where someone bid $\geq R$
- Bids of neighbors and non-neighbors
- Ex post oil production and some other characteristics

They find:

1] $\underbrace{Pr[b_I^* = 0]}_{= 0.17} < \underbrace{Pr[b_U^* = 0]}_{= 0.32}$

2] I wins 52% of the time

3] $E[\pi_U^*] \approx 0$

5] and 6] they argue, are true.

4] is messy. They don't do nonparametrics, which is what they would do now.

Structural Estimation

Goal: estimate all the parameters of the model (e.g. $F(v)$)

Next time: patents and technology diffusion.