Discussion: Simultaneous First-Price Auctions with Preferences over Combinations

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Interactions 2015
Yet another auction paper?

1. But *really*, this is as important as it gets...
2. Almost ALL empirical procurement auction papers in literature study multiple auction settings, but very few mention cross-auction effects
   - Wolak (2005), Reguant (2014) - intertemporal linkages, complementary bidding mechanisms in electricity
   - Bajari and Fox (2013) – complementarities between spectrum licenses in FCC auctions
This paper:

1. Intuitive and plausible ID ideas to solve important problem
2. Are cost-complementarities/capacity constraints important?
   - If project size/bidder size small, complementarity; if large, capacity constraint
   - Suggests U-shaped cost curves
3. Should procurement agencies consider the use of “better” simultaneous auction procedures? Perhaps…
(Super rough) Outline of (vast) theory literature

- VCG gets you strategy-proofness, efficiency, but...
  - \(2^K\) bundles: computational complexity, "message space" problem
  - Collusion

- Simultaneous ascending auctions (Ausubel, Milgrom, Wilson et al.)
  - More practical method for bidders to express preferences
  - Gets you strategy proofness, efficiency if objects are non-complements
  - "Exposure" problem – suppose you were bidding for chopsticks (Rosenthal and Szentes), but suddenly one of the chopsticks became too expensive...

- CS literature: "worst case" bounds (any BNE achieves 1/2 of social welfare in case of non-complements, etc.)
Bidding for \{Apple, Orange\}:

\[
\max(v_A - b_A) P_A^{\text{win}}(b_A) + (v_O - b_O) P_O^{\text{win}}(b_O) + v_{AO} P_A^{\text{win}} P_O^{\text{win}}
\]
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Assumption: \(v_A\) and \(v_O\) are stochastic, private info; \(v_{AO}\) stable across auctions and not private info (is this essential?).
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\[
v_A + v_{AO}P_{O}^{\text{win}}(b_O) = b_A + \frac{P_{A}^{\text{win}}(b_A)}{p_{A}^{\text{win}}(b_A)}
\]

\[
v_O + v_{AO}P_{A}^{\text{win}}(b_A) = b_O + \frac{P_{O}^{\text{win}}(b_O)}{p_{O}^{\text{win}}(b_O)}
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Bidding for \{\textit{Apple, Orange}\}:

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Assumption: $v_A$ and $v_O$ are stochastic, private info; $v_{AO}$ stable across auctions and not private info (is this essential?).

$$v_A + v_{AO} P_{O}^{\text{win}}(b_O) = b_A + \frac{P_{A}^{\text{win}}(b_A)}{p_{A}^{\text{win}}(b_A)}$$

$$v_O + v_{AO} P_{A}^{\text{win}}(b_A) = b_O + \frac{P_{O}^{\text{win}}(b_O)}{p_{O}^{\text{win}}(b_O)}$$

- Sign of $v_{AO}$ affects “shading” incentive
- RHS is “in the data” (GPV ECMA 2000).
- How to tease out $v_{AO}$?
Solution: estimate $v_A + v_{AO} P^\text{win}_O(b_O)$, then regress on (estimated) $P^\text{win}_O(b_O)$.

Need an exclusion restriction: something that shifts around $P^\text{win}_O(.)$, but does not affect $v_A$.

Luckily these exist naturally: number of competitors in auction $O$ will affect probability of winning an orange, but should probably not affect $v_A$. 
Comment #1
- Motivating “reduced form” analysis regresses bidder $i$’s bid on auction $k$ on (average no. of) competitors in \textit{all} auctions other than $k$.
- But why not run this regression on no. of competitors in the other auctions that bidder $i$ actually bid on?
Comment #2

- Costly entry
- If I see a bidder place bids on only 2 auctions out of 100, does this mean s/he has value 0 for the remaining 98 objects?
- It is possible that a counterfactual “package bidding” mechanism may lower such costs, and hence bidders may “enter” more auctions
Comment #3

- Counterfactual uses VCG mechanism as benchmark against simultaneous first price
- VCG heavily criticized due to collusion and “exploding message space” concerns
- But other existing multi-object auction mechanisms such as simultaneous ascending auctions shown not to be efficient/stable in the presence of complementarities
- I would love to see how popular mechanisms like SAA perform under the estimated, “realistic” complementarity structures