Feedback and Competition in Procurement e-Auctions

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E-Auctions in procurement

Identify need for tender → Request for Information (RFI) → Request for Price (RFP) → Negotiation
E-Auctions in procurement

- First introduced in mid-1990s
- Pros: savings, efficiency, transparency
- Not yet *the rule* for procurement. Why?
  - Resistance from suppliers & buyers within organization
  - Still more of an *art* than a *science*...
Academics vs. Practitioners

The (economic) science of it...

For simple auctions (winner-takes-all, price only):
  • Focus on *competition* (Bulow & Klemperer 1996)
  • Revenue equivalence, i.e. design is secondary (Vickrey 1961, Myerson 1981)

...and the art (practitioners’ view):

Even simple auctions are not so simple
  • Small changes in the design can have substantial effect on savings
  • These effects are not always in the direction predicted by theory
What we do...

Collaboration between academics and practitioners in framing the question

Focus:
• Feedback during English Reverse Auction
• How does it affect actual competition

Methods:
• Some theory
• Mainly experimental
The English Reverse Auction
The English Reverse Auction

Feedback: Rank Only
The English Reverse Auction

Feedback: Show lead bid
What we (think) we know

**Standard Theory**
- Equivalent to 2nd-price sealed-bid.
- Efficient allocation
- Feedback plays no role

**Experimental evidence**
- Less feedback -> behaviour closer to 1st-price sealed-bid.
- Efficient allocation
- ‘Rank only’ -> lower prices

**Practitioners beg to differ.**

**Practitioners concurr, but also look at initial conditions for competition.**
“Bid compression” and competition

“Be aware of the distance between suppliers before the e-auction begins. If initial RFQ bids differ by more than 10 per cent between the lead bidder and the one in second place (especially if it is a winner-takes-all award strategy), a different format should be considered.”

A Practical Guide to e-Auctions for Procurement, Larsen (2021)

Why care about this?

Opportunity cost and actual competition
• Actual suppliers face an opportunity cost of staying in an auction
• More information can encourage/discourage bidders
Related Literature

• Auction theory & experiments:

• (Behavioral) operations research:

• Practitioners
  Larsen (2021)
The experiment

• UCY LExEcon – Online

• N = 5, fixed groups
• **Cost:** random 1000 number interval in [2000,8000]\(-\)pick 5 numbers
• **Initial offer:** for each bidder pick a number in [1500,3000] and add to cost.
• **Duration:** 60+x seconds (random termination)

• **Exit value:** start at 30 and drop 1 point every 2 sec
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Feedback</th>
<th># of bidders per auction</th>
<th># of auctions per round</th>
<th># of rounds per session</th>
<th># of sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLB</td>
<td>Rank and lead bid</td>
<td>5</td>
<td>2</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>RO</td>
<td>Rank only</td>
<td>5</td>
<td>2</td>
<td>40</td>
<td>4</td>
</tr>
</tbody>
</table>
What did we expect to find

• **Efficiency loss**: when low cost bidders drop out

• **High prices**: when not enough competition to drive down prices

• (rank of) initial offers -> a noisy signal about rank of cost

• Our main assumption: *feedback only changes information availability.*

*When initial offers are close, but bidders do not see that, it is more likely to have “mistaken exits”=> low allocative efficiency, high prices.*
Results

**Average efficient outcomes**

- Large IO spread: Mean of efficient outcomes for both 'rank only' and 'show leading bid' conditions.
- Close IOs': Mean of efficient outcomes for both 'rank only' and 'show leading bid' conditions.

**Average winner's payoff**

- Large IO spread: Mean of payoffs for both 'rank only' and 'show leading bid' conditions.
- Close IOs': Mean of payoffs for both 'rank only' and 'show leading bid' conditions.
Exit behavior

Average exit rate

- Large spread
- Tight spread

Average exit time

- Large spread
- Tight spread

Legend:
- Rank only
- Show leading bid
Kaplan–Meier survival estimates

Analysis time

rank only
show leading bid
Possible explanation

We see:

• Feedback affects outcomes & effect depends on initial conditions

• Feedback affects behavior BUT effect does not depend on initial conditions

Feedback does more than just change the available information:

• Showing the lead bid expands the strategy space

• Given the possibility to exit, some bidders try to “force out” competition.

• We should observe higher heterogeneity in behaviour/individual outcomes in SLB.
Discussion

Increased “transparency” may come with a cost.

If bidders “trust the system”, less information makes them less vulnerable to others’ strategizing

Of course, exiting when you have no chance, is efficient...

We need to better understand bidding behavior before coming up with design recommendations.
Thank you!