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SERIAL OFFENDERS: WHY SOME INDUSTRIES SEEM PRONE TO ENDEMIC COLLUSION

Contribution by Singapore

-- Session IV --

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AUCTION DESIGN INVOLVING GOVERNMENT-RUN AUCTIONS AND SERIAL COLLUSION

-- Singapore --

1. Introduction

1. Governments run auctions as a means of allocating resources (e.g. electricity, spectrum, land etc.) and these are subject to the risks of anticompetitive behavior by tenderers. This most commonly involves collusion, whether tacit or explicit, to avoid competing. Explicit collusion in an auction would take the form of bid rigging, whereas the most common form of tacit collusion in auctions occurs through bid signaling.

2. This paper will discuss the salient design characteristics of government tenders or auctions that can make them susceptible to serial anti-competitive offences and possible design options to mitigate such anti-competitive risks.

3. Government-run tenders or auctions tend to be susceptible to collusion due to three main reasons: (i) access to information in the auction; (ii) repeated interactions between the same competitors; and (iii) the limited number of players participating.

2. Access to Information

4. Access to information could refer to two forms: first, the auction type or design would reveal different levels of information to bidders; and second, the auctioneer (i.e. government) can choose to reveal information about competitors for transparency reasons.

2.1 Auction Type/Design

5. It is typically considered that explicit collusion would be more easily sustained in an *open ascending auction* as opposed to a *sealed bid auction*,[1] given that bidders are unable to clearly monitor deviations from the agreements and inflict punishment in the former. For example, in Singapore, there were multiple instances of bid rigging by motor traders in government run auctions for the disposal of decommissioned/seized motor vehicles during the period 2008 to 2011, where the motor traders colluded to suppress the prices of the motor vehicles purchased. The physical auctions involved were conducted in an open ascending format, which could have helped in sustaining the collusive agreement, given that it was clearly observable who was participating in the auctions and evidence revealed that some of the colluders were approached by the ringleader after these auctions and were asked to refrain from bidding thereafter.

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[1] Paul Milgrom, "Auction Theory" in Truman Bewley (ed), *Advances in Economic Theory – Fifth World Congress*, Cambridge, England: Cambridge University Press.

6.   In relation to tacit collusion, the ability to develop a coordination language would depend on the information made available to competitors through the auction design. There is less possibility of undesirable bid signaling in an *ascending clock auction* since only the total quantity bid is reported.[2] Similarly, in a *combinatorial clock auction*, only aggregate measures, i.e., report on prices and excess demand for each product, are revealed in each round.[3] This gives bidders sufficient information to predict prices, but not enough to provide an avenue for tacit collusion through signaling.

2.2   How can this be mitigated?

7.   As discussed, the choice of auction design could in itself mitigate some concerns regarding information access. There are also additional auction rules and/or features that could further deter collusion.

(a)   Bid Restrictions

8.   Bidders can make alterations to the language of the bids to signal to other players their intentions. This can be through the use of additional numbers being attached in retaliation bids to indicate certain markets they wanted or indicate the possible markets that they could induce punishment in (i.e. code bidding).[4] This problem can be easily rectified through limiting the set of numbers that can be used when designing the auction, through restricting bids to only three significant digits, *1 bid increment bidding*, or *1-9 bid increments*.

(b)   Withdrawal Rules

9.   Withdrawals may be necessary in a *simultaneous ascending auction* where the bidders might fail to obtain the full set of items required to produce the downstream product, and in which case, it would be socially optimal for them to release the items to the market. However, withdrawals have been used in multitudes of ways counter to this intention (i.e. as a signalling mechanism to coordinate bids). One possible solution can be to implement a two-round limit – a bidder can withdraw in at most two rounds. Alternative rules include making withdrawals irreversible or implementing a time lag (e.g. 3 rounds) before allowing bidders to return to bidding on a withdrawn license. These rules make signalling or punishments difficult for bidders.[5]

2.3   Transparency

10.   In the interest of transparency, GeBIZ[6], the government e-procurement portal in Singapore for public sector invitations for quotations and tenders, publishes the identities and the corresponding bids of

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[2] Peter Cramton, *"Ascending Auctions",* European Economic Review 42:3-5, 1998, p. 745-756

[3] Peter Cramton, *"Spectrum Auction Design"*, Review of Industrial Organisation, 42:2, March 2013

[4] Peter Cramton and Jesse A. Schwartz, *Collusive Bidding: Lessons from the FCC Spectrum Auctions*, Journal of Regulatory Economics, 17, p.229-252, May 2000

[5] *Ibid.*

[6] GeBIZ is Singapore government's one-stop e-procurement portal. All public sector invitations for quotations and tenders are posted on GeBIZ. Supplier would have to search for government procurement opportunities, download tender documents and submit bids online through this portal.

Source: https://www.gebiz.gov.sg/

the bidders. However, access to information regarding bidders and their bids may increase the risk of collusion for the following reasons:[7]

(i)   It allows for direct retaliation;
(ii)   Bidders can identify the parties that they would need to cooperate with; and
(iii)   It discourages competitive bidding since some bidders might avoid bidding against certain competitors, e.g., strong bidders with deep financial resources or known for aggressive retaliation.

2.4   How can this be mitigated?

(a)   Limit information revealed as much as possible

11.   Bid signaling can be mitigated by limiting the information revealed. For example, the auctioneer can simply announce the standing high bids in an ascending open auction without the bidders' identities. This forces bidders to make direct, illicit contact if they wish to collude.[8]

12.   Often, only one cartel member would win and pay for the item and the other members of the agreement would receive the agreed payouts separately. Withholding information about the identities of the registered bidders potentially creates opportunities for the winning cartel member to circumvent payments to its co-conspirators. This uncertainty would reduce the level of confidence in coordination and, hence, might lead to them giving up collusion altogether.[9]

13.   However, the release of information can be helpful, for example where items are complements and their relative values are interdependent. For instance, in spectrum allocation, the valuation for one licence could vary in relation to the winners of the other licences in the market or neighbouring markets. In such a scenario, it might be beneficial to both the auctioneer and the bidders, in terms of revenues and efficiency to avoid guesswork and save resources spent on obtaining the information, for the identities to be revealed.[10] As such, auction design needs to weigh the pros and cons of information transparency.

3.   Repeated Interactions

14.   Repeated interactions between the same competitors for the same product provide opportunity to develop coordination strategies and/or punishment mechanisms to sustain collusive agreements. Government auction markets that are recurrent, such as that for electricity where the bidders tend to be same parties given the specialized nature of the product/service, may therefore be more susceptible to collusion.[11]

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[7] Peter Cramton and Jesse A. Schwartz, *Collusive Bidding: Lessons from the FCC Spectrum Auctions*, Journal of Regulatory Economics, 17, p.229-252, May 2000

[8] Peter Cramton, *"Ascending Auctions",* European Economic Review 42:3-5, 1998, p. 745-756

[9] Robert C. Marshall and Leslie M. Marx, *"The Vulnerability of Auctions to Bidder Collusion"*, Working Paper, Aug 2008

[10] Peter Cramton and Jesse A. Schwartz, *Collusive Bidding: Lessons from the FCC Spectrum Auctions*, Journal of Regulatory Economics, 17, p.229-252, May 2000

[11] Paul Klemperer, "*What Really Matters in Auction Design*", Journal of Economic Perspectives, Vol. 16, No. 1, Winter 2002, p. 169-189

15. Repeated interactions between the same competitors can also occur across different products. In the 1999 German simultaneous ascending auction, ten blocks of spectrum were sold with the rule that any new bid on a block had to exceed the previous high bid by at least 10 percent. Mannesman's first bids were 18.18 million deutschmarks per megahertz on blocks 1-5 and 20 million DM per MHz on blocks 6-10. Mannesman's first bid was effectively an offer for T-mobil, the only other credible bidder, to bid 20 million deutschmarks per megahertz on blocks 1-5, but stay out of the auction for blocks 6-10. The auction closed after just 2 rounds with each of the bidders acquiring half the blocks for the same low price.[12] Bidders have incentive to coordinate and learn signals through the language of bids (e.g. through bid value, decimal points etc.), with the objective of obtaining the items on auction at low prices.[13]

16. Punishment mechanisms spanning different markets that the firms compete in can also be set up to sustain collusive arrangements. For instance, firms A and B could have an agreement or tacitly understand that they would not compete with each other for spectrum licenses in two different regions. If firm A reneges and competes for the license in the region operated by firm B, firm B could retaliate by outbidding firm A in the corresponding auction for the region operated by firm A. The likely outcome would be both firms obtaining their respective licenses at a higher price, which would not be preferred.[14]

3.1 How can this be mitigated?

(a) Imposing Reserve Prices

17. Reserve prices refer to the minimum amount winners would need to pay should they win the auction.[15] In other words, the seller would probably not sell the item if the highest bid is below the reserve price.[16] Reserve prices can be seen as catalysts for the auction process, removing the need to go through the initial low price rounds. This, in turn, would give bidders less time to synchronise or tacitly agree in any way.

18. On the flip side, insufficiently high reserve prices could serve to incentivise collusion. At a lower reserve price, stronger bidders in an ascending auction have more incentive to collude at a low price, as opposed to the alternative strategy of bidding high to deter weaker bidders. The lower the reserve price, the higher the probability of collusion occurring.[17] Hence, this has to be taken into consideration in the setting of an optimal reserve price as well. Most of the government-run auctions in Singapore, including the auctions involved in the Motor Vehicles case, do include a reserve price.

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[12] Paul Klemperer, "*What Really Matters in Auction Design*", Journal of Economic Perspectives, Vol. 16, No. 1, Winter 2002, p. 169-189

[13] Peter Cramton, "*Spectrum Auction Design*", Review of Industrial Organisation, 42:2, March 2013

[14] Paul Klemperer, "*What Really Matters in Auction Design*", Journal of Economic Perspectives, Vol. 16, No. 1, Winter 2002, p. 169-189

[15] *Ibid.*

[16] David Easley and Jon Kleinberg, "*Networks, Crowds, and Markets: Reasoning about a Highly Connected World*", Cambridge University Press, 2010, Chap. 9: Auctions

[17] Paul Klemperer, "*What Really Matters in Auction Design*", Journal of Economic Perspectives, Vol. 16, No. 1, Winter 2002, p. 169-189

4.   Limited Players

19.   To ensure quality of bidders, government tenders may entail more stringent participation criteria. This could form a barrier to entry to potential participants. This limits the number of players that can compete in a tender. A collusive agreement is more easily sustained where there are fewer players and less new entrants. This was the case in the Motor Vehicles case where due to the small number of players, new entrants to the auctions could be easily identified and were quickly invited into the cartel.

20.   Further, requirements to submit detailed specifications together with the auction bid can deter entry. There has been instances whereby this onerous requirement by the auctioneer had resulted in participation by the incumbents only, defeating the purpose of conducting an auction.[18] In Singapore, there has also been general feedback in relation to lengthy submission requirements which discourages participation by more players.

4.1   How can this be mitigated?

(a)   Simplifying auctions to encourage entry

21.   The ascending open auction encourages participation because of the ease of understanding the rules of the auction.[19] For the more complex multi-unit auctions, the simultaneous ascending auction has simple rules, but has complicated bidding strategies. In contrast, the combinatorial clock auction has more complex rules, but the strategies are straightforward and can be made easier through the use of aids. For instance, a smart auction system could be developed, to indicate to bidders the rules in place and indicate any violations of the constraints in the bids inputted. The system could also suggest alternative bids that would satisfy the rules involved.[20]

(b)   Reduce certainty of outcome before participation

22.   Another reason that discourages entry is the certainty of the outcome before participation in the auction. For instance, weaker bidders may be concerned that they would definitely lose in an ascending open auction and, hence, may not enter the auction. Choice of the auction design can alleviate this concern. The *Anglo-Dutch auction* is designed with the intention to get round the unwillingness to enter an ascending bid auction against a strong bidder with the incorporation of the sealed bid in the final stage. The sealed bid induces some uncertainty about which of the two finalists will win and entrants may be attracted by the opportunity of reaching the final stage. For example, eBay, which runs an Anglo-Dutch auction, reportedly has far more users than its rival, Yahoo, which runs a standard ascending auction.[21]

23.   Certainty of the winner beforehand is driven, in part, by the information asymmetry between competitors. It might be prudent for the auctioneer to obtain feedback from potential bidders on the appropriate auction format to be used prior to the auction design. Ascending auctions are usually preferred by strong bidders; whereas, weaker bidders tend to prefer sealed bidding.[22] If, for instance, only a sole

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[18] Paul Klemperer, *"What Really Matters in Auction Design"*, Journal of Economic Perspectives, Vol. 16, No. 1, Winter 2002, p. 169-189

[19] Peter Cramton, *"Ascending Auctions"*, European Economic Review 42:3-5, 1998, p. 745-756

[20] Peter Cramton, *"Spectrum Auction Design"*, Review of Industrial Organisation, 42:2, March 2013

[21] Paul Klemperer, *"What Really Matters in Auction Design"*, Journal of Economic Perspectives, Vol. 16, No. 1, Winter 2002, p. 169-189

[22] Peter Cramton, *"Ascending Auctions"*, European Economic Review 42:3-5, 1998, p. 745-756

bidder favours an ascending auction, this might indicate large information asymmetries among bidders in that some bidders may have better information about the value of the items to be auctioned. In such a situation, sealed bid auctions may encourage entry by bidders who have poorer information about the value of the items.

(c)   Imposing a minimum number of bidders required

24.   A more direct approach can also be to impose a requirement for a minimum number of bidders before an auction would be considered valid. For example, the Singapore National Environment Agency's ("NEA") allocation of hawker stalls requires at least one competing bid to be submitted before allocation is made in the first release of the stall. Should this not be met, the stall will be returned to the tender pool for the following month. The stall will only be awarded to a single bidder in the second release of the stall.[23] The National Library Board in Singapore called for a tender recently, for procuring various research-based articles, but only received a single joint bid by a number of writers in the industry. Imposing a minimum number of bidders might help to reduce such an occurrence.

5.   Conclusion

25.   As discussed, government auctions may be susceptible to collusion and serial offending. Auction design can be seen as a preventive measure to such competition concerns – choice of the auction type in itself could reduce the risk of collusion, while encouraging greater entry. There are also a myriad of additional rules that can be included in the auction design to further mitigate competition concerns. Transparency and quality control would also have to be weighed against competition concerns to ensure that not too much information is revealed to market players or that requirements are not so stringent that entry is discouraged disproportionately.

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[23] National Environment Agency, Form of Tender, Appendix B

GLOSSARY

Allocative Efficiency	Attained by allocating items such that the total surplus of buyers and sellers is maximised
Anglo-Dutch auction	Hybrid auction with an ascending open auction system until there are few bidders left. Thereafter, there would be a final sealed bid round. The highest submitted bid would win the auction.
Ascending clock auction	Bidders submit quantities they are willing to buy at the indicated clock price (i.e. the stipulated price that all winning bidders would have to pay at that point of the auction). The clock price is increased if there is excess demand for the quantity available, and bidders submit the quantities they are willing to buy at the new clock price. This process continues until demand is less than supply at the prevailing clock price, and bidders pay the immediate previous round clock price.
Ascending open auction	Bidders are able to observe one another's bids and there is a sequence in the auction through which bidders are able outbid other bidders until the point is reached when the highest bid that is not outbid will win the auction.
Combinatorial clock auction	This auction typically has three rounds. The first round involves simultaneous ascending clock auctions on preset packages of items (e.g. spectrum licences). Bidders bid on any number of categories as they wish and the round would only conclude when there are no additional bids for any of the lots in any category. The second round is a sealed bid auction where bidders would make best and final offers for any combination of items they want. The final round is an assignment round where all bids in the first two rounds are optimized to determine the value-maximising assignment and prices.
Multi-unit ascending auction	This deals with the allocation of multiple units of homogenous items. It can be conducted in two forms: with a demand-schedule or an ascending clock.

In the demand-schedule approach, bidders will submit a demand schedule in each round, which will be aggregated into a demand curve. A clearing price, where demand meets supply, would be determined and any bids below that would be considered a losing bid. For any losing bid, the bidder can increase his bid in the next round. The auction ends when no bidder increases his losing bid.

Sealed bid auction	Bids are submitted to the auctioneer who would determine the winner. The highest submitted bid would win the auction.
Simultaneous ascending auction	This deals with the allocation of multiple units of heterogeneous items. All items would be auctioned at the same time in an ascending open auction format. Bidder can bid on any number of items in every round and the auction only closes when no bidder raises the bid on any of the items. The highest bid for each item would determine its price.
1-bid increment bidding	Known as "click-box bidding", where bidders click on the licences they wish to bid on. All bids are exactly one increment above the standing high bid, rather than allowing bidders to bid any higher dollar amount.
1-9 bid increment bidding	Once some bidder has placed the minimum opening bid, bids in subsequent rounds are constrained to be 1-9 bid increments over the standing high bid.