

Screening for  
Cartels

Joe  
Harrington

Introduction

Why Focus on  
Public  
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Collusion at a  
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Concluding  
Remarks

# Screening for Cartels at Public Procurement Auctions

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# Introduction

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- *Screening* is when a competition authority actively searches markets for cartels.
- Purpose of screening
  - identify markets worthy of investigation
  - induce cartel members to come forward under a leniency program
  - deter cartels from forming.
- Proposal: Screening public procurement auctions for cartels.

# Why Focus on Public Procurement Auctions?

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- 1 Public procurement auctions encompass 45-65% of government expenditure and 13-17% of GDP (International Institute of Sustainable Development, 2008)
- 2 Bidding rings are common at procurement auctions.
- 3 Tacit collusion is unlikely in procurement auctions.
- 4 Data is available.
- 5 Foundation of solid empirical analysis on collusion in procurement auctions
- 6 Potentially large reputation effect.

# Collusion at a Procurement Auction

## Requirements for Successful Collusion

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- 1 Efficiency - the value of the cartel is maximized when the cartel member which most values the contract wins it.
- 2 Stability - it is in the best interests of each cartel member to abide by the collusive agreement.
- 3 Detection avoidance - cartel members do not want to create suspicions that there is a cartel.

# Collusion at a Procurement Auction

## Implementation

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- Selection of a cartel member as the one "designated" to win the contract (or compete against non-cartel members)
  - knockout auction prior to the auction
  - bid rotation - cartel members take turns being the designated cartel member
  - market allocation - customers/regions are distributed among cartel members
- Supportive behavior by non-designated cartel members
  - cover bidding - cartel members submit bids in excess of the designated cartel member's bid
  - bid suppression - cartel members do not participate so as not to compete with the designated cartel member

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- Allocation of contracts or transfers to ensure compliance by all cartel members
  - bid rotation
  - market allocation
  - transfers - designated cartel member which wins a contract transfers part of it (sub-contracting) or makes monetary payments to other cartel members.

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## Issues

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- Identify collusive markers:
  - bids
  - participation
  - patterns in the identity of the winning bidder
- Determine the ease with which a cartel can avoid leaving collusive markers.

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## Bids

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**Collusive Marker:** After controlling for common factors, bidders' bids are positively correlated.

- After controlling for common factors, the competitive model predicts bids are independent.
- Cover bids are positively correlated with the designated cartel member's bid to give the appearance of competition.
- Challenges
  - Need to fully control for common cost and demand factors which would positively correlate bids.
  - A smart cartel can avoid this correlation by scaling upward all cartel members' competitive bids.



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- Bajari and Ye (2003)
- Data: 138 auctions conducted for highway maintenance contracts over 1994-98.

- Estimate reduced form bidding equation

$$\frac{BID_{i,t}}{ENG_t} = \beta_0 + \beta_1 DISTANCE_{i,t} + \beta_2 CAPACITY_{i,t} + \dots + \varepsilon_{i,t}$$

- $BID_{i,t}$  is the bid of firm  $i$  on project  $t$ .
- $ENG_t$  is engineering cost estimate for project  $t$ .
- Cost factors:  $DISTANCE$  between contractor and project,  $CAPACITY$  of contractor, etc.
- Independence Hypothesis: Coefficient of correlation for  $\varepsilon_{i,t}$  and  $\varepsilon_{j,t}$  is zero.

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- Considered the 23 pairs of 11 largest firms that have at least four bids in the same auction.
- Independence was rejected for four pairs of firms.
- Only one of those four pairs (firms 2 and 4) bid against each other regularly.
- Candidate cartel: firms 2 and 4.

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**Collusive Marker:** The lowest bid behaves differently than the non-lowest bids.

- The designated cartel winner's bid is designed to maximize expected profit.
- The other cartel members' bids are designed to avoid winning and creating suspicions.

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- Porter and Zona (1993)
- Data: 116 auctions conducted for highway construction contracts over 1979-1985.
- Empirical model measures the likelihood of the observed ranking of bids at an auction given exogenous variables.
- Estimated three models using: 1) all bids; 2) lowest bid; and 3) non-lowest bids.
- Result: Lowest bid behaved differently than non-lowest bids.

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**Collusive Marker:** Bidders' bids respond to cost and demand factors in a manner contrary to the competitive model.

- This could be due to
  - some bids being cover bids
  - how the designated cartel member responds to competition from non-cartel members
- If a bid encompasses prices on multiple components, are some of the unit prices highly variable across auctions?
  - A non-designated cartel member may increase the unit price of a few component prices to deliver a cover bid.
- Example: School milk (Porter and Zona, 1999)

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**Collusive Marker:** Bids are better explained by a model with fewer bidders than actually participated.

- If there is a bidding ring with cover bidding, some bidders are, effectively, inactive.
- Banerji and Meenakshi (2004)
- Data is for 421 oral ascending bid wheat auctions in India from 1999.
- Participants
  - Three large buyers (total market share of about 45%)
  - Many small buyers.
- Collusion Hypothesis: Observed bids are more consistent with a model with one large buyer than a model with three large buyers.
- Result: Observed bids are "as if" there is only one large buyer at the auction at any time.

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Bids - South Africa: Preferential Bidder Programs

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- P. Bolton, "Government Procurement as a Policy Tool in South Africa," *Journal of Public Procurement* (2006).
- Since 1994, various programs have promoted social objectives at public procurement auctions.
  - Preferential Procurement Policy (2000)
  - Black Economic Empowerment (2003)
- 10-20 points (out of 100) are given to preferred bidders in determining to whom is awarded a contract.

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## Bids - South Africa: Preferential Bidder Programs

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- Determination of a bidder's score (20 point preference)
  - A non-preferential bidder with the lowest bid gets 80 points.
  - A preferential bidder receives points equal to

$$20 + 80 \times \left[ 1 - \left( \frac{\text{bid} - \text{minimum bid}}{\text{bid}} \right) \right].$$

- Implications
  - Empirical analysis can be done with these preference-adjusted scores.
  - Screen for cartels among eligible contractors and among non-eligible contractors.



# Screening for Cartels at Auctions

## Participation

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**Collusive Marker:** After controlling for common factors, bidders' participation decisions are not independent.

- Positive correlation tells a story of cover bidding.
- Negative correlation tells a story of bid suppression.

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## Participation

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- Porter and Zona (1999)
- A contract is for the annual supply of milk in a school district.
- Data for 509 school districts in Ohio over 1980-90.
- Explaining bid submission
  - Estimated the decision of a firm to bid on a contract.
  - Under competition, the decision to submit a bid should be independent across firms.
- Result
  - Independence was rejected: If one suspected firm submitted a bid, it was more likely the others did as well.

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- Explaining bid levels
  - Estimated the relationship between a firm's bid and cost and demand factors (distance between district and plant, district enrollment, etc.)
  - Test: Do some bidders' bids respond to cost and demand factors in a manner contrary to the competitive model?
- Results
  - Unsuspected firms' bids were found to be increasing in the distance between the processing plant and the school district.
  - Bids of the three suspected colluding firms were
    - less sensitive to distance compared to competitive firms
    - *decreasing* in distance for two of the firms.

# Screening for Cartels at Auctions

## Patterns in the Identity of the Winning Bidder

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- Compliance requires that all cartel members adequately share in the gains from colluding
  - bid rotation - firms take turns being the designated cartel member
  - market allocation - customers or regions are allocated across cartel members
  - transfers - monetary or sub-contracts

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**Collusive Marker:** The probability of a bidder winning the current contract is lower if it won the preceding contract.

- Challenge: Distinguishing bid rotation from competition among bidders with capacity constraints.
- Implications for market shares
  - With bid rotation or market allocation, market shares are stable. (Look for stable market shares.) Ex: Texas school milk cartel.
  - With transfers, market shares need not be stable. (Look for evidence of side payments.) Ex: Florida school milk cartel.

# Concluding Remarks

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- Public procurement auctions make up 13-17% of GDP.
- Experience shows that cartels are common at procurement auctions.
- The data and empirical methods are available to screen procurement auctions for cartels.
- Screening for cartels is a potentially important tool to shut down cartels and deter cartel formation.