

Cost Overrun and Auction Format in Public Works

An Analysis of Small Projects

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- After 2006 the law in Italy, like in other EU countries, prescribes the use of a **first-price** auction for procuring most public works
 - In earlier years, many auctions were held using an **average-bid** format with automatic exclusion of ALT (abnormally low tenders)
- **Procurers** usually show **discontent** with using the first-price auction just because of ALT. They believe that this format produces a bad selection of the winner, a test of bid reliability is necessary, but small procurers cannot afford it
- Based on their experience, **cost overrun** (i.e., final cost minus auctioned price) **is larger under the first-price than the average-bid format**

- **Is this claim well-founded?**

- Auctioned contracts are **fixed price** contracts, and hence contract revision is allowed only when some pre-specified events occur outside the contractor's control. **In reality contract revision occurs with high probability**
- A main problem is the **impossibility of disentangling price revision from project revision**
- To minimize this problem, we will **limit attention to small size projects and simple works**

- **This paper checks on empirical data whether the average-bid format indeed helps reducing cost overruns**
- More generally, study the impact of adopting an average-bid format rather than a first-price format
- **We focus on the effect separately by participation mechanism (free or limited)**

- **Panel** dataset of public procurement auctions
- Area: Veneto region (Northeastern Italy)
- Time: projects auctioned in 2004-2006 and completed by March 2009
- 1,093 public projects
- 265 procurers (municipalities represent 58%)
- Auction value: between 150k and 1m euros
- Sectors: mainly road works (40%), and building maintenance (29%)

- In the Veneto region during the sample period there was freedom in the choice of the awarding mechanism
- We observe **four different mechanisms**:
 - First-price format with free participation
 - First-price format with limited participation
 - Average-bid format with free participation
 - Average-bid format with limited participation

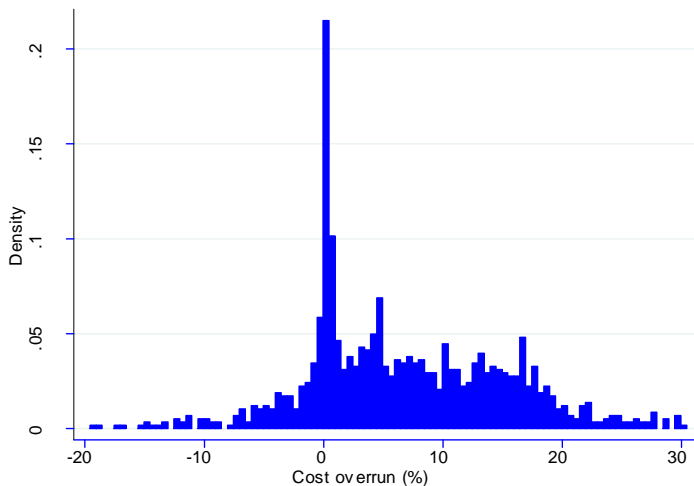
N.	First-price	Average-bid
Free participation	72 (6.59%)	371 (33.94%)
Limited participation	518 (47.39%)	132 (12.08%)

Sample means

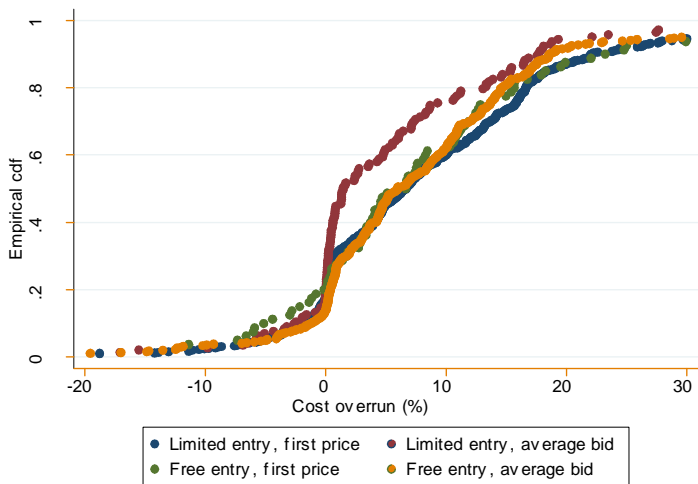
	Sample	Average bid		First price	
		Free	Limited	Free	Limited
reserve price	338,906	411,471	360,977	418,459	270,252
expct work days	203.556	221.914	214.992	223.194	184.765
n. bidders	31.269	72.057	17.455	38.000	4.641
winning disc. (%)	11.982	11.869	13.605	10.505	11.854
cost overrun (%)	8.328	7.903	5.415	9.017	9.278
work delay (%)	122.662	125.849	83.813	133.393	128.787
n. observations	1093	371	132	72	518

- **Average-bid auctions, especially with free entry, receive more bids on average**
- **Auctions with free entry deal with more complex works (higher reserve prices and more work days)**
- On average contracts are 8.27% costlier and 119.70% longer than expected

Distribution of cost overruns



Distribution of cost overruns



- Key variables: Winning discount, Cost overrun, Work delay
- **Today we will focus on cost overrun**
- The specification includes
 - A dummy variable on the auction format (average-bid as opposed to first-price)
 - Variables on the project size and competition, separately by type of participation
- Estimation is performed using a panel regression model with fixed effects
 - We consistently find this model to fit the data better than a panel model with random effects and a pooled regression model

%	cost overrun
average-bid auction, limited entry	-6.562***
log (reserve price), limited entry	0.638
n. exp. work days/100, limited entry	0.013**
n. bidders/100, limited entry	0.195*
average-bid auction, free entry	-0.940
log(reserve price), free entry	1.204
• n. exp. work days/100, free entry	0.000
n. bidders/100, free entry	0.006
auction category: plant	-0.897
auction category: road	-0.393
year: 2004	-3.191***
year: 2006	-0.703
constant	3.308

Note: ***: significant at 10%; **: significant at 5%; *: significant at 1%

COST OVERRUN

- **Auctions with limited entry**

- **positively** related to the number of bidders (0.01)
- **negatively** related to the average bid format (-6.56)

- **Auctions with free entry**

- **no significant** effects
- *Only in auctions with limited entry, following an average-bid procedure reduces the cost overrun by 6.56%. This decrease is quite remarkable, as it is nearly as large as the average cost overrun in the sample (8.33%)*

- **Does the choice of the auction format bias the estimates?**
 - *Considering only auctions procured by municipalities and with reserve price between 283k euros (the median value in the sample) and 1m euros confirms our results*
- **Sample selection?**
 - *Excluding observations from year 2006 confirms our results*
- **Are results driven by project revisions rather than price renegotiation?**
 - *Removing the observations with the top 10% and the bottom 10% cost overrun confirms our results*

SUMMING UP

- The average-bid format provides lower cost overruns *only when participation is limited*
- Hence, the average-bid format alone is not enough to avoid the bad winner selection
- One should also restrict bidders' participation to effectively reduce cost overruns
- **Why?**

- Our data show that, in the average-bid format with free participation, the number of bidders is abnormally high
- A possible explanation is that some bidders participate not to win the auction but to influence the average bid, in favor of a designated partner
- **Restricting participation then curbs collusion**

- In an average-bid auction with collusion, bad winner selection can occur, and it does occur... at least in our toy model (see the paper!)
- It is not surprising that our data show no impact of the average-bid format with free participation:
 - in this format there are high incentives to collude
- A collusion agreement in the average-bid auction is less fragile to deviations than in the first-price auction:
 - in the latter a sole bidder can disrupt the collusive equilibrium, while in the former the defection of several bidders may be ineffective