

Guidelines for Cost-Effective Public Procurement

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About the authors

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In a nutshell

- Public procurement comprises a significant part of GDP in both developing and developed countries.
- I provide fundamental conditions for cost-effective public procurement using empirical findings from Turkish public procurement.
- The presence of a competitive environment (i.e. the number of bidders in auctions) is the major determinant of public procurement efficiency.
- There is an optimal level of competition in public procurement:
 - Procurement costs are higher when the number of bidders is below the optimal level.
 - Too much competition might have unintended effects and increase procurement price.
 - Optimal level of competition changes with respect to procurement type (service, goods, and construction).
 - Depending on the type of procurement, the lowest possible procurement prices are achieved when there are five to 10 bidders.
- Entrant firms decrease procurement costs, but are less likely to survive in the public procurement market compared to incumbents.

Introduction

Government procurement comprises a substantial part of government spending and – in many cases – GDP, which signifies the importance of cost-effective public procurement (PP). For example, procured goods, services, and construction projects in Turkey were valued at approximately 34 billion USD in 2014, which corresponds to slightly more than four percent of the country's GDP. These figures don't only portray the significance of PP auctions for the economy, but also the importance of

improvements for cost saving in these auctions. In this policy brief, I describe the attributes to achieve the lowest possible procurement prices using the findings of research papers Tas (2015) and Tas (2017).

Maintaining a favorable level of competition is essential for well-functioning and cost-effective PP; accordingly, many international organizations and government authorities take action to promote competition in PP. For example, the World Trade Organization designed the Government Procurement Agreement to “ensure open, fair, and transparent conditions of competition in the government procurement markets.”¹ Because competition lowers the probability that a firm wins a contract, firms bid more aggressively to increase their likelihood to win PP contracts. Accordingly, high levels of competition significantly lower procurement costs. To add to this global discussion, I examine the optimal competitive environment for PP auctions by investigating more than half a million PP auctions conducted in Turkey throughout the period 2005-2012. I find that there are two major attributes for maintaining a favorable level of competition:

- Optimal number of bidders should be achieved.
- Entrant firms should be promoted.

Optimal Number of Bidders

Figure 1 below displays the cost-effectiveness of Turkish PP auctions by presenting the ratio of procurement price over estimated cost in 565,298 Turkish PP auctions. Seven percent of procurement prices are above estimated costs. Figure 1 shows that the efficiency of PP auctions differs substantially. Empirical analysis in Tas (2015) shows that the number of firms submitting a bid in PP auctions is the major determinant of procurement efficiency. Auctions with a high number of bidders have significantly lower procurement costs compared to estimated costs.

¹ https://www.wto.org/english/tratop_e/gproc_e/gp_gpa_e.htm

Figure 1: Public Procurement Efficiency

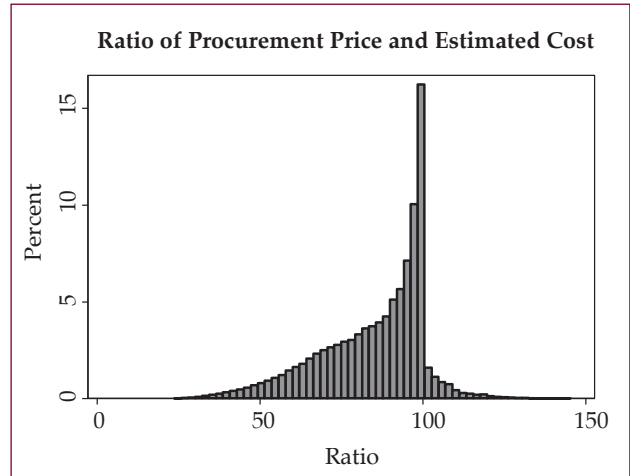
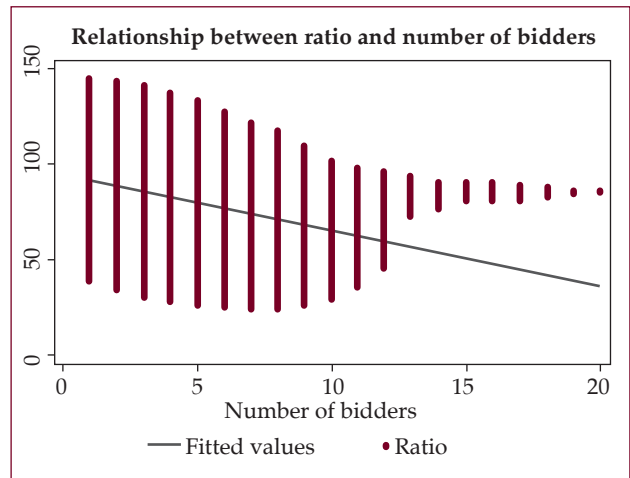


Figure 2 below shows the significant and negative relationship between the ratio of procurement price and estimated cost and the number of bidders.

Figure 2: Relationship between Procurement Efficiency and Competition



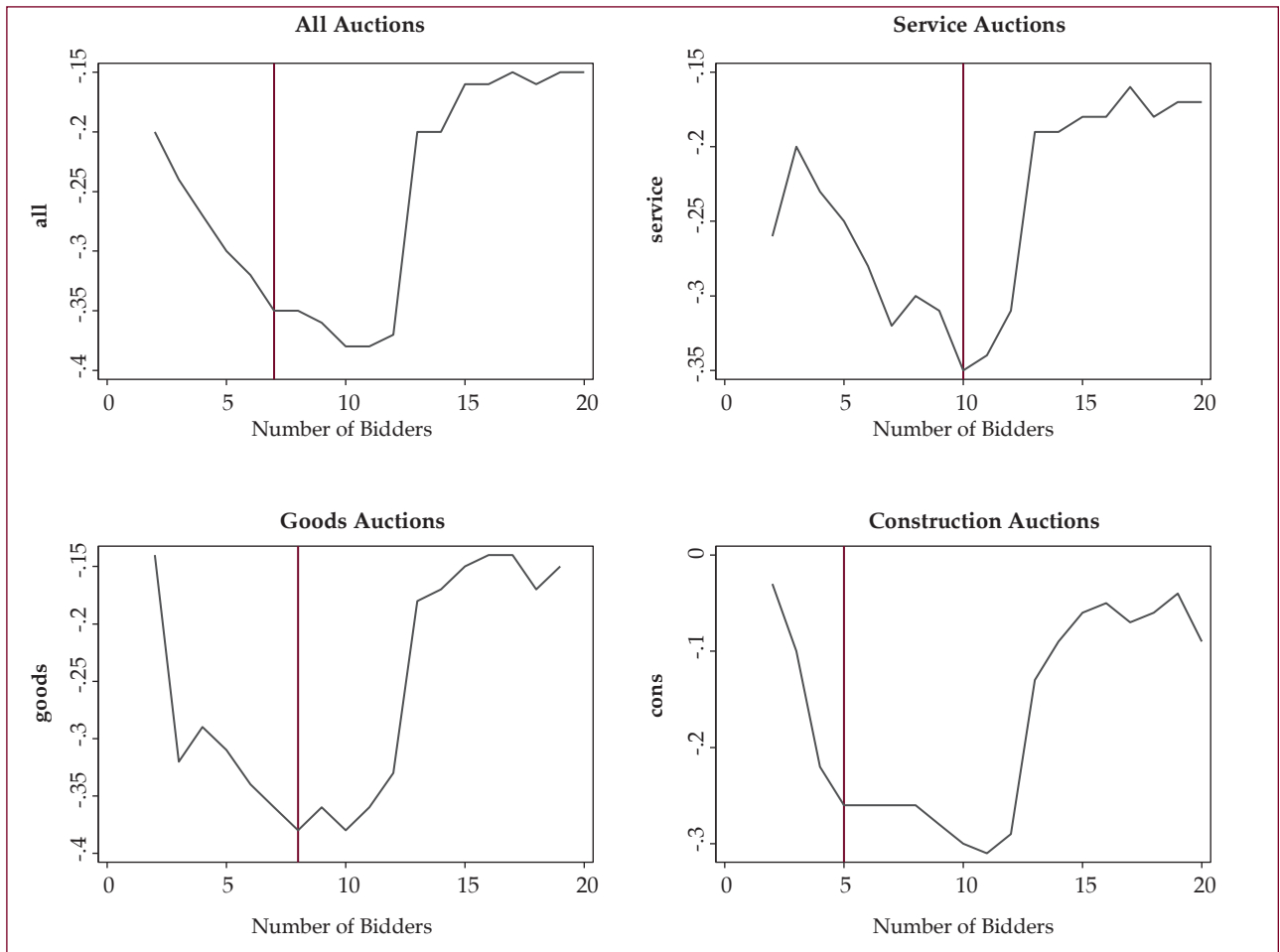
Theoretical arguments about auctions state that procurement prices might increase when the number of bidders grows beyond a cut-off point (Li and Zheng, 2009), as opportunity costs as well as the costs of acquiring information and preparing for the bid increase when competition increases. Accordingly,

firms tend to bid less aggressively when the competition gets fierce.

In Tas (2015), I scrutinize a methodology to identify the optimal number of bidders in PP auctions at which the lowest possible procurement price is achieved. I find that the optimal number of bidders is six when considering all auctions. The optimal level

of competition is achieved at 10 bidders for service auctions, eight bidders for good auctions, and five bidders for construction auctions. Figure 3 presents the procurement price compared to non-competitive auctions with just one bidder. The red lines display the number of bidders that offered the lowest procurement costs.

Figure 3: Optimal Number of Bidders



An interesting result observed from Figure 3 is that procurement costs rise significantly after the optimal competition levels. For example, procurement prices at auctions with 10 bidders are 35 percent lower than non-competitive auctions with just one bid-

der. However, an increase in the number of bidders to 12 diminishes the cost-effectiveness of auctions dramatically; in this case procurement prices are 20 percent lower than non-competitive auctions. When the number of bidders is above optimal competition,

procurement prices are higher compared to optimal competition. Therefore, increasing competition beyond a certain number of bidders may have an adverse effect on the expected auction price.

This is caused by two major factors that affect bidding behavior:

- Preparing and submitting bids at PP auctions is costly. Bidders need to acquire information and prepare bids according to strict rules.
- The “winner’s curse,” which dictates that the winner might miscalculate the cost of a contract and lose money in auctions due to incomplete information, becomes more severe as the number of potential bidders increases. To avoid this, rational bidders bid less aggressively.

From a practical point of view, these findings have important policy implications. Governments can devise policies to attract the optimal number of bidders, which may lead to considerable savings. My empirical results show that increasing the number of bidders by one participant would on average lead to around a one percent decrease in prices compared to the estimated costs. Counter-factual analysis shows that if the number of bidders were at the optimal level for all auctions, the average savings per auction would be 48,457 USD for services, 28,445 USD for goods, and 190,347 USD for construction.

In Tas (2015), I design a nonlinear estimation methodology that can be implemented using only procurement prices, estimated costs, and number of bidders. Policymakers can apply this easy-to-implement methodology using standard econometric tools and software to a wide range of PP data sets to calculate the optimal level of competition. Policymakers can employ them as focal points to analyze whether competitive efficiency is achieved in PP auctions.

Entrants vs Incumbents

One of the major obstacles for viable competition in PP is the disadvantage faced by entrants. Entrants

promote competition by bidding more aggressively and breaking potential collusive agreements by incumbents. I examine the bidding behavior of entrants in Turkish PP auctions and find that promoting entrants can result in significant cost saving by lowering procurement prices. Entrants bid more aggressively and win contracts with significantly lower procurement prices compared to incumbent firms with previous wins. Figure 4 below displays the efficiency of PP contracts won by incumbent and entrant firms.

Figure 4: Efficiency of Contracts Won by Incumbents and Entrants

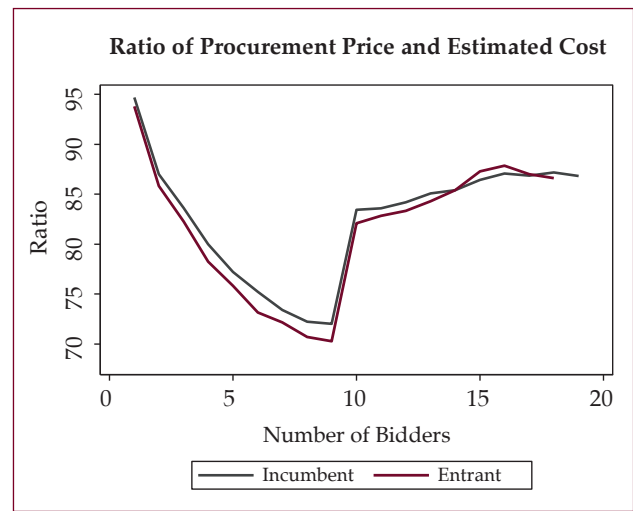


Figure 4 shows that procurement prices are significantly lower compared to estimated costs when contracts are won by entrant firms. On average, the ratio of procurement price to estimated cost is more than one percent lower in auctions won by entrants. This amount corresponds to 3,500 USD for each auction. Although entrants promote competition and lower procurement costs, they cannot survive in the PP market. During the period 2006-2010, 78,206 unique firms won at least one contract among 341,771 auctions. There were 50,034 (64 percent) entrants and 28,172 (36 percent) incumbents. Strikingly, we find that 27,820 entrants (56 percent) did not win another auction after their first win. Entrants struggle to con-

sistently win contracts in the PP market and therefore leave the market prematurely.

Figure 5 displays the total number of wins by entrant and incumbent firms.

Figure 5: Total Number of Wins

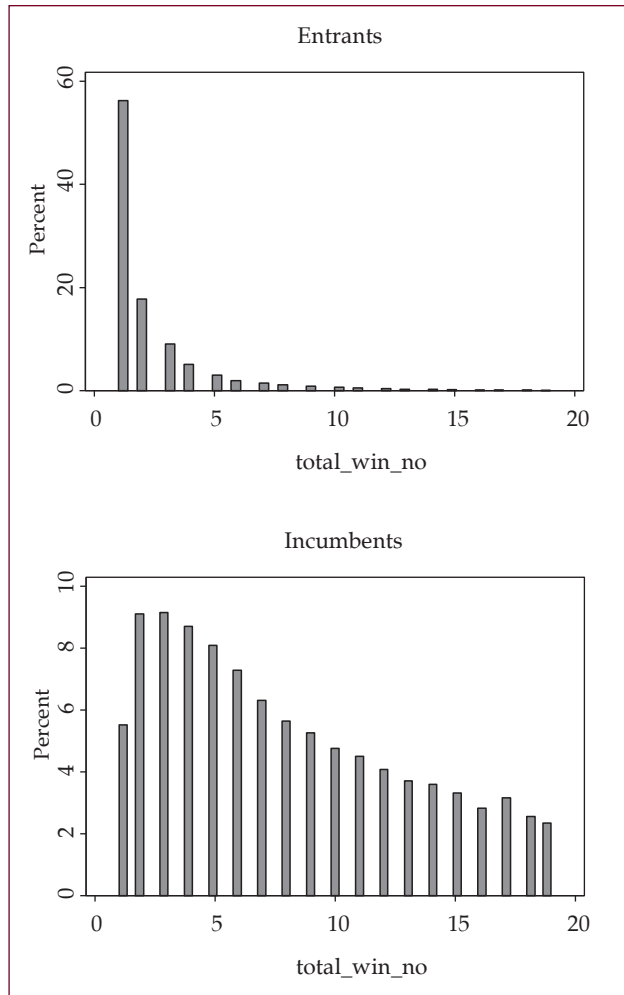
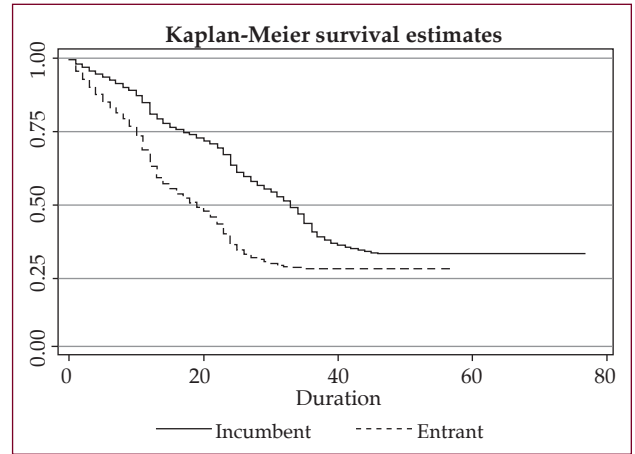


Figure 5 shows that only eight percent of entrants manage to win more than five contracts compared to 75 percent of incumbents. In Tas (2017), I conduct a survival analysis and examine the survival probabilities of entrants and incumbents. As presented in Figure 6, entrants' likelihood of survival is dramatically smaller.

Figure 6: Survival Probabilities of Entrants and Incumbents



I conclude that procurement prices of auctions won by entrants are substantially lower compared to procurement prices of auctions won by incumbents. However, entrants struggle to survive in the PP market and win more auctions after their first contracts. Although participation by entrants improves PP effectiveness, entrants cannot survive in the PP market. Accordingly, policy actions to support entrants should be initiated to sustain an increased level of competition.

These empirical findings show that competition is incremental in achieving procurement effectiveness. Policymakers should act to promote competition to lower government procurement costs. Nourishing entrant firms is an effective way of enhancing competition and decreasing procurement costs. On average, contracts won by entrant firms cost 3,500 USD less in Turkish PP auctions. These results indicate that policymakers should cultivate competition and participation by entrant firms. Policy actions to support entrant firms should be designed in order to promote the survival of entrant firms in the PP market.

In a nutshell, governments can conduct cost-effective PP by fostering competition. Depending on the type of procurement, the lowest possible procurement

prices are achieved when there are five to 10 bidders. Policymakers in both developing and developed countries can use these values as benchmarks and implement the simple estimation methodology developed in Tas (2015) to determine the optimal number of bidders. In addition, entrant firms are essential to promote competition and decrease procurement costs; policymakers should design policies to encourage the participation of entrant firms and increase the likelihood of their survival in the PP market.

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