

Competition and Performance in Federal Procurement

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February 3, 2020

*Preliminary and Incomplete
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Abstract

We study the effects of intensifying competition for public procurement contracts through advertising. Publicizing contract opportunities promotes bidder participation, potentially leading to cost efficiency gains. Yet extensive advertising could exacerbate adverse selection of bidders on non-contractible quality dimensions. We study this trade-off in the context of procurement contracts for the U.S. Department of Defense. We use a Regression Discontinuity Design, leveraging a regulation that mandates agencies to publicize contract opportunities that are expected to exceed a certain threshold. Our results show that advertised contracts receive considerably more bids and are more likely to be awarded to geographically distant vendors, who have less prior history with the office. However, we find that the post-award performance of publicized contracts worsens, resulting in more cost overruns and delays. The latter effect is driven by goods and services that are relatively more complex, highlighting the role of contract incompleteness. We complement our reduced form results with a model to recover public buyers' preference parameters over price and quality. This model is used to further study the extent to which advertising interacts with adverse selection.

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1. Introduction

The buyer-seller transactions are often governed by adverse-selection; the buyer deals two sources of uncertainty; sellers' production cost *ex-ante* and non-contractible quality provided *ex-post* (Lafont and Tirole, 1990; Hart and Moore, 1988). This paper studies the interplay between policies oriented to enhance competition and cost efficiency *ex-ante* with contract performance *ex-post*. Conceptually, this relationship is ambiguous; it depends on how sellers' unobservable cost correlates with their quality. If the correlation is positive, increasing competition would have positive spillover on quality *ex-post*. Conversely, if the relationship is negative, limited competition would be desired as it enhances quality *ex-post*.

We study the effect of enhanced competition on a set of procurement outcomes in the context of the United States' Department of Defense (DOD) procurement. In particular, we leverage a regulation that mandates procurement agencies to publicize contract opportunities that are expected to exceed \$25,000 in a centralized online website. We exploit the discontinuous nature of publicity requirement to estimate the effect of enhanced information diffusion on three sets of outcomes; competition, buyer-seller relation, and contract performance. We find that publicized contracts attract more bidders and that the new offers are competitive, as the selected contractors are more likely to have fewer past contracts with the office and are located further geographically. Furthermore, publicized solicitations result in poorer *ex-post* performance, as they experience more cost overruns and delays. The latter results are driven by contracts for goods and services that are relatively complex, emphasizing the role of contract incompleteness in procurement.

The trade-off between efficiency *ex-ante* and quality *ex-post* suggests that restricting procurement competition to a limited number of bidders might be convenient. However, the latter is not mechanical but relies on the buyer's willingness to identify the best contractors in these two dimensions. We combine our regression discontinuity estimates with a discrete choice framework to recover buyers' preferences over different procurement outcomes, and simultaneously study how competition is endogenously determined. The estimated parameters allow us to empirically quantify the factors determining the extent of competition observed in the data. In particular, we assess the relative importance of competition, relation with the vendor, and *ex-post* performance when determining the pool of vendors that are invited to bid.

The estimated parameters emphasize a tension between promoting competition and sustaining relationships with vendors, as buyers dislike having only one bidder (monopoly). Moreover, they dislike awarding contractors with fewer past contracts with the agency. The preference for contractors is correlated with performance concerns. However, once controlling for performance, the relation is still a relevant factor. Relative to competition and vendor relation, the contract performance is less relevant in the choice.

There's a growing literature studying the agency problem in the public sector, and the trade-off between rules and discretion (e.g., Duflo et al. (2018)). In the context of public procurement, these trade-offs have been quantified by Coviello et al. (2018) and Carril (2019). Our paper, however,

sheds light on one specific margin that existing literature has paid little attention: the effect of providing discretion on the level of competition that is promoted. To our knowledge, the most related paper is [Kang and Miller \(2017\)](#), which leverages a structural model to quantify the factors that determine the level of competition for IT and telecommunications services by the U.S. government. It considers the possibility of ex-post contract overruns and finds that the cost of reviewing bids is higher than the benefits of increased competition.

Most organizations require goods or services that are hard to fully specify in a formal contract, leading to costly ex-post adaptations. The existing literature has emphasized that if bidders are heterogeneous, competitive bidding may stifle communication between buyers and sellers, preventing the buyer from utilizing private information to reduce competition ([Williamson \(1976\)](#); [Bajari et al. \(2009\)](#); [Bulow and Klemperer \(1996\)](#)). Our results reinforce this tension; however, our setting allows us to identify the level of “contract incompleteness” that increased competition may be undesired.

Finally, this paper contributes to the existing literature on auction entry as advertising increases the number of potential bidders. Standard auction theory predicts that this will lead to an increase in the number of actual bidders and a reduction of the winning bid. However, these predictions are not completely general: If there’s a fixed entry cost for bidders, increasing the set of potential bidders may lead to less entry and/or aggressive bidding strategies, potentially leading to higher procurement cost ([Samuelson \(1985\)](#); [Li and Zheng \(2009\)](#)). In the case of affiliated or common value auctions, an increase in the number of bidders may worsen the winner’s curse, leading to potential increases in procurement costs ([Milgrom and Weber \(1982\)](#); [Bulow and Klemperer \(2002\)](#); [Pinske and Tan \(2005\)](#)). To our knowledge, [Coviello and Mariniello \(2014\)](#) is the only paper that, using quasi-experimental methods, tests the effect of increasing publicity of Italian procurement auctions on participation and outcomes. In their context, works over 500 thousand euros need to be publicized in local newspapers. Even though our identification strategy is similar, there are stark differences that arguably make our research broader in context and scope.¹

The rest of the paper proceeds as follows. Section 2 provides a brief background on the US Defense procurement system, its regulation, and the data. In Section 3, we introduce the empirical strategy and discuss identification. In section 4, we present our main findings, and section 5 concludes. Importantly, the model is omitted in this version of the paper.

¹First, our study leverages a significantly larger sample which includes the whole range of goods and services purchased by the DoD, the additional sample size and the product heterogeneity allows us to explore important margins that are relevant for the underlying mechanisms that drive the results (e.g., contract incompleteness). Second, in our setting, information diffusion takes place through a centralized internet platform, with lower information transmission frictions relative to other channels ([Goldfarb and Tucker \(2019\)](#)). Third, in our context, competition is a genuine concern: the average number of bidders per solicitation is 2 (the median tender has only one bidder), while the average number of bidders in [Coviello and Mariniello \(2014\)](#) is 37. Finally, while [Coviello and Mariniello \(2014\)](#) focus on a specific type of procurement contest, we study the effects of publicity on procurement outcomes more generally, not restricting the attention to a particular type of procurement mechanism.

2. Setting and Data

2.1. US Federal Procurement

Procurement is a large component of the federal budget. In fiscal year 2017, contract awards totalled \$792 billions, representing 13% of total federal spending, and almost 40% of discretionary spending.² The contract awarding occur at highly decentralized levels. Contracts are awarded by over 3,000 contracting offices that are part of an executive or independent agency.³ The workforce in charge of public contracting is made up of over 35,000 contracting officers whose primary role is to plan, carry out, and follow up purchases made by their units.

Contracting officers' scope of action is defined and limited by the Federal Acquisition Regulation (FAR). The FAR lays out policy goals and guiding principles, as well as a uniform set of detailed policies and procedures to guide the procurement process. Our analysis leverages a specific section of the FAR — Part 5 (*Publicizing Contract Actions*) as a convenient natural experiment to study the effect the effect of information diffusion.

2.2. Publicity requirements: Federal Business Opportunities

The Federal Acquisition Regulation (FAR Part 5) mandates contract publicity to “increase competition”, “broaden industry participation”, and “assist small businesses (and other minority businesses) in obtaining contracts”. Since October 1, 2001, contract actions expected to exceed \$25,000 must be synopsisized in an online government-wide point of entry called Federal Business Opportunities (commonly known as FedBizOpps or FBO).⁴ Contracts that do not exceed this threshold need not be publicized in FBO, as procurement officers should diffuse information “by displaying in a public place”, or by any “appropriate electronic means.” Notably, around 20% of the contracts below the threshold are publicized in FBO. A contract synopsis is required to contain contract specifications, technical data, and other pertinent information determined necessary by the contracting officer.

2.3. Data

The main source of data is the Federal Procurement Data System - Next Generation (FPDS-NG), which tracks the universe of federal contract awards.⁵ An observation in this dataset is a *contract action*, representing either an initial award or a follow-on action, such as a modification, termination,

²Discretionary spending excludes mandatory programs, like Social Security and Medicare, as well as interest on debt.

³Executive agencies are headed by a Cabinet secretary, like the Department of Defense, the Department of State, or the Department of Health and Human Services. Independent agencies are not part of the Cabinet, and examples include the Central Intelligence Agency, the Environmental Protection Agency, and the Federal Trade Commission.

⁴This regulation allows for exemptions; the procurement officer is permitted not to publicize the contract if she determines that it compromises national security, or the nature of the file does not make it cost-effective or practicable, or it is not in the government's interest.

⁵The data is publicly available and can be downloaded from www.usaspending.gov

renewal, or exercise of options. We collapse all actions by contract ID, so that the unit of observation is a contract. For each observation, we observe detailed information including the dollar value of the funds obligated, a four-digit code describing the product or service, codes for the agency, sub-agency, and contracting office making the purchase, the identity of the private vendor, the type of contract pricing, the extent of competition in the award, characteristics of the solicitation procedure, the number of offers received, and the applicability of a variety of laws and statutes.

The analysis sample consists on all definitive contracts⁶ between \$ 5,000 and \$ 45,000 awarded between fiscal years 2011 and 2017 by the Department of Defense (DOD),⁷ for products and services other than Research and Development (R&D).⁸ Table 1 presents summary statistics of the sample. We see that more than 60% of the awards are competitively awarded, and virtually all contracts are fixed-price (as opposed to cost-plus). 72% of the contracts in the sample use simplified acquisition procedure and 35% were set aside to small or other minority businesses. This is a setting where competition is limited: the average contract receives 2.4 offers, with the median contract receiving a single offer. The bulk of contracts are awarded to businesses located in the same state as the procurement office and small⁹. In total, our sample includes 240,514 contracts awarded by 760 contracting offices to 59,697 different firms.

The sample consists on awards for a vast number of different goods and services. Each award is classified into one of 1,918 possible standardized 4-digit alphanumeric codes. These can be aggregated into 101 broader 2-digit product categories, 77 goods and 24 services. Table 2 shows the top 10 most common 2-digit good and service categories. The most common product categories are ADP Equipment Software, Medical Equipment and Supplies and Maintenance and Repair Equipment.

3. Empirical Strategy

3.1. Regression Discontinuity Design

We estimate the effect of publicizing contract solicitations on procurement outcomes by exploiting the discontinuous nature of the publicity requirements around \$ 25,000. We run a regression Discontinuity Design (RDD) to test how enhanced publicity affects contract outcomes, using contract sizes as running variable.

⁶Federal contracts can be broadly categorized into two types: definitive contracts (DCs) and indefinite delivery vehicles (IDVs). DCs are stand-alone one-time agreements with a single vendor for the purchase of goods or services under specified terms and conditions. On the other hand, IDVs are agreements with one or more vendors, and are characterized by uncertainty at the time of the award over the exact quantity, timing of delivery, or scope of the agreement. DCs and IDVs each account roughly for half of the contract spending. We focus exclusively on DCs, as it simplifies the analysis to think about regulation shaping the acquisition of well-defined requirements involving a bilateral relationship within a single government unit and a private firm.

⁷The Department of Defense represents 55% overall federal spending and more than 60% in the restricted sample.

⁸Most R& D awards correspond to grants from the Small Business Innovation Research program. We exclude from the analysis contracts that are not classified in a product category, and a couple of product categories that are (almost) always exempted by FAR Part 5.

⁹According to the Small Business Association (SBA)

3.2. Identification

The causal interpretation of the RDD relies that the assignment is “as good as random,” i.e., depends on agents’ inability to precisely controlling the assignment variable near the cutoff (Lee and Lemieux, 2010). In our context, it relies on the inexistence of manipulation of the contract’s size and design around the threshold. These two concerns are discussed and tested below:

The adoption of publicity is permitted for contracts that do not exceed the regulation threshold, it would only impacts agent’s payoffs if it is considered “undesired,” in which case the officers may want to *reduce* the size of the contract to avoid being impacted by the requirement.¹⁰ Reducing the size of the contracts can be achieved by reducing the number of items to be purchased or splitting the contract into two or more for the same good or service. Carril (2019) documents that splitting contracts is uncommon in the data as the Federal Acquisition Regulation explicitly forbids this practice.¹¹ Hence, contract size manipulations would be associated with reducing the quantity of the item purchased - an action that reduces the benefit of the contract.

To shed light on the existence of design responses to the regulation, we examine contracting activity around the \$25,000 threshold. Figure 1(a) plots the number of contracts in bins of \$100. The distributions of contract values shows the presence of round number effects expressed as spikes in the frequency of contracts in all bins that contain multiples of \$5,000 and \$10,000. This means that even in the absence of any regulation, we might have expected some spike at \$25,000, which would be confounded with excess of mass due to the regulation. The Figure 1(b) corrects for these round number effects using the approach proposed by Kleven and Mazhar (2013), who documented a similar phenomenon in the context of income taxation.

To accurately quantify existence and magnitude of excess of mass near the regulation threshold we generate a counterfactual distribution by fitting a polynomial interpolation using parts of the distribution that are far from the threshold to obtain information about the counterfactual close to it (Chetty et al., 2011; Saez, 2010; Kleven and Mazhar, 2013). The Figure 1(c) compares the actual distribution with a 5-degree polynomial interpolation. We find that the bin containing contracts between \$24,000 and \$25,000 has 5 % more contracts that the counterfactual distribution. The magnitude of the excess of demand is suggestive that contract size manipulation does not seem to be a first order concern to invalidate the analysis.

The second margin of manipulation could take place in the design of the contract solicitations. For example, if a procurement officer has an implicit preference for a particular profile of vendors that under enhanced competition might not win the contract, then she could modify solicitation attributes before it is published to enhance increase the likelihood of awarding this profile of ven-

¹⁰Over the threshold, publicity can be avoided if the officer provides written note to apply for an exemption, which arguably involves a cost. Although the adoption of exemption is not uncommon: 40% of the contracts above the threshold apply for exemptions.

¹¹19FAR 13.003(c)(2) states that officers shall not “break down requirements aggregating more than the simplified acquisition threshold (...) into several purchases that are less than the applicable threshold.” This prohibition is featured explicitly in most agencies’ manuals and guidance documents, and it is not uncommon for audit processes to be triggered by suspicions of split purchase.

dors. This hypothesis can be tested by comparing the solicitation attributes on either side of the threshold. The figures [A1](#), [A2](#) and [A3](#) test this hypothesis by running RDD regressions on observable characteristics of the solicitation; contract' set aside, reduced competition, and type of product solicited. We rule out this concern as none of the tests resulted in statistically significant differences.

4. Results

In this section, we discuss the main results of the analysis. We first document how regulation affects the probability of posting solicitations in FBO. Then, how procurement outcomes vary as a result of enhanced publicity.

4.1. Publicity Adoption

The Federal Acquisition Regulation mandates that contracts that are expected to exceed \$ 25,000 must be published in FBO. Figure 2 describes how the probability of appearing in FBO depends on the size of the contract. There are a few things to consider here: First, there are almost 20% of contracts that are (voluntarily) posted in FBO below the regulation threshold, this figure suggests that that FBO publicity is “desired” for a subset of contracts. Second, there’s a sharp discontinuity around \$25,000, the fraction of publicized contracts jump from 20% of right below the threshold to 60% right above it. The latter is suggestive that the regulation has a bite. This discontinuity is exploited to study the effects of publicity on contract outcomes. Finally, roughly 40% of contracts subject to regulation are not published as they use exemptions. Conceptually, the adoption of exemptions informs that for a fraction of contracts, officers “dislike” publicity enough to bear the cost of applying for an exemption.

4.2. Procurement Outcomes

We study the effects of publicity on three sets of outcomes; competition, relation with the awardee, and contractor’s performance ex-post. Most of existing literature study these variables independently,¹² yet studying them jointly allows for a more comprehensive understanding of the moving parts and implications of policies oriented to enhance competition.

4.2.1. Competition: Figure 3 shows how enhancing solicitation publicity impacts the number of offers contracts receive around the threshold. We see that the contracts exposed to enhanced advertising increase the number of bidders substantially; the instrumental variable coefficient is 0.816, which informs that publicized contracts received one third more offers than non-publicized contracts. As the standard auction theory predicts, conditional on the underlying cost structure, the

¹²See for example, [Athey \(2001\)](#); [Li and Zheng \(2009\)](#) (competition), [Macleod and Malcomson \(1989\)](#); [Bajari et al. \(2009\)](#); [Malcomson \(2012\)](#) (relations), and [Bajari et al. \(2014\)](#); [Decarolis et al. \(2018\)](#); [Ryan \(2019\)](#) (ex-post renegotiation and performance)

impact of an additional offer depends on the total number of competing bids. Since competition is limited in this context, the additional offers have a positive probability of being awarded.

4.2.2. Relation between Public Buyer and Awarded Contractor: We use different variables to gauge how publicity affects the relationship between the public buyer and the awarded contractor. First, we study the geographic location of the awarded contractors: Figure 4 shows that publicized contracts are awarded to contractors located 53% more distant from the buyer. The figures 5 and 6 show that publicity increases the probability of awarding a contractor located in a different state or located outside of the country. Secondly, we evaluate the previous relationship between the buyer and the awardee based on the number of past contracts with the office. Figure 7 shows that publicized contracts are awarded to contractors that have fewer past contracts with the office. Figure 8 shows that publicity increases the probability of assigning a contractor that is “new” to the office.

4.2.3. Performance: Diffusing information more broadly enhances competition by allowing the participation of vendors that would otherwise not have bid. If vendors are heterogeneous in unobservable quality, opening the solicitation to a larger pool of bidders may allow lower-quality bidders to win the contract. Thus, the (ex-ante) efficiency gains associated with enhanced competition can be offset by poorer (ex-post) contract performance.¹³ We test this hypothesis by studying two rough measures of contract performance; cost overruns and delays.¹⁴ Figures 9 and 10 show that publicized contracts experience more cost overruns and delays. These results inform about a negative correlation between unobservable ex-ante efficiency and ex-post quality.

What’s driving the adverse effects of enhanced competition on performance? Two heterogeneities could explain these results: vendors’ “types” or buyer-specific incentives. The former is stable for a vendor across different contracts, the latter depends on the buyer-specific incentives to exert effort, so it should vary across contracts. The table 3 presents the RD results separating by type of product category (columns 2 and 3) and including firm-specific fixed effects (columns 4 and 5). The adverse effects disappear when we include firm-specific fixed effects in the regression, i.e., firms do not modify their behavior when they face more competition. From the table 3, we deduct that in the absence of publicity requirements; the buyer invites a limited set of bidders that, on average, perform better ex-post.

4.3. Incomplete Contracts

The concern about *ex-post* performance is tightly connected with contractual incompleteness (Hart and Moore, 1988). Some transactions are easy to specify on a contract, yet others are more complex and involve countless possible contingencies. The scope of contract incompleteness is mainly explained by the nature of the good or service that it is purchased. For example, a contract for a

¹³This hypothesis assumes buyers’ preferences are positively correlated with quality.

¹⁴These two variables have been used by existing literature (Kang and Miller, 2017; Decarolis et al., 2018).

commodity, e.g., gasoline, is easier to stipulate than a contract for an ad-hoc service. In our study, we have 1,918 product categories. We note that some of them rarely experience performance issues *ex-post*, whereas, for others, it is widespread.

We showed that, on average, increasing competition deteriorates contract performance. However, this relation might be specific to specific types of product categories. We explore how the performance effect depends on the scope of contract incompleteness by separating the analysis on whether the contract requires a good or a service, as, in the absence of publicity requirements, services experience cost overruns or delays three times more often than goods. Table 3 shows that there's a highly non-linear relation between contract incompleteness and the effect of enhanced competition. Publicizing contracts has a null impact on the performance of goods. However, it increases the probability of overruns by 61% for services. The latter has relevant implications on how the policies geared towards enhancing competition should be designed. The Federal Acquisition Regulation mostly does not recognize different types nor complexities of product categories.¹⁵ Our results suggest that that accommodating the rules to different product categories could yield positive welfare gains.

5. Conclusion

This paper studies the interplay between policies oriented to enhance competition and cost efficiency *ex-ante* with contract performance *ex-post*. We leverage a discontinuity on the level of publicity that contract solicitations get to study the effect of enhanced information diffusion on three sets of outcomes; competition, buyer-seller relation, and contract performance. We find that publicized contracts attract more bidders and that the new offers are competitive, as the selected contractors are more likely to have fewer past contracts with the office and are located further geographically. Furthermore, publicized solicitations result in poorer *ex-post* performance, as they experience more cost overruns and delays. The latter results are driven by contracts for goods and services that are relatively complex, emphasizing the role of contract incompleteness in procurement. The paper discusses the importance of buyers selecting the best set of contractors and relevant policy implications to improve the Federal Acquisition Regulation in the United States.

¹⁵The FAR makes some distinctions based on size of the contracts.

References

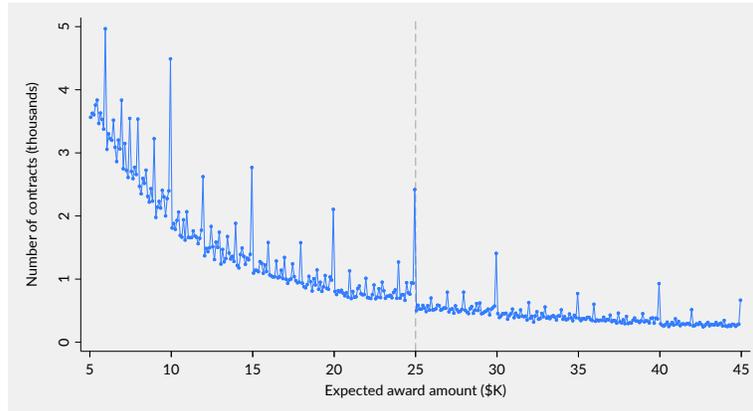
- Athey, S. (2001). Single crossing properties and the existence of pure strategy equilibria in games of incomplete information. *Econometrica* 69(4), 861–889.
- Bajari, P., S. Houghton, and S. Tadelis (2014). Bidding for Incomplete Contracts: An Empirical Analysis. *American Economic Review* 104(4), 1288–1319.
- Bajari, P., R. McMillan, and S. Tadelis (2009). Auctions versus negotiations in procurement: An empirical analysis. *Journal of Law, Economics, and Organization* 25(2), 372–399.
- Bulow, J. and P. Klemperer (1996). Auctions Versus Negotiations. *American Economic Review*.
- Bulow, J. and P. Klemperer (2002). Prices and the Winner’s Curse. *RAND Journal of Economics* 33(1), 1–21.
- Carril, R. (2019). Rules Versus Discretion in Public Procurement.
- Chetty, R., J. N. Friedman, T. Olsen, and L. Pistaferri (2011). Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records. *Quarterly Journal of Economics* 126(2), 749–804.
- Coviello, D., A. Guglielmo, and G. Spagnolo (2018). The Effect of Discretion on Procurement Performance. *Management Science* 64.
- Coviello, D. and M. Mariniello (2014). Publicity requirements in public procurement: Evidence from a regression discontinuity design. *Journal of Public Economics* 109, 76–100.
- Decarolis, F., L. M. Giuffrida, E. Iossa, V. Mollisi, and G. Spagnolo (2018). Bureaucratic Competence and Procurement Outcomes. *National Bureau of Economic Research Working Paper Series No. 24201*.
- Duflo, E., M. Greenstone, R. Pande, and N. Ryan (2018). The Value of Regulatory Discretion: Estimates From Environmental Inspections in India. *Econometrica* 86(6), 2123–2160.
- FAR. *Federal Acquisition Regulation*. General Services Administration, Department of Defense, National Aeronautics and Space Administration.
- Goldfarb, A. and C. Tucker (2019). Digital economics. *Journal of Economic Literature* 57(1), 3–43.
- Hart, O. and J. Moore (1988). Incomplete Contracts and Renegotiation. *Econometrica* 56(4), 755–785.
- Kang, K. and R. A. Miller (2017). Winning by Default: Why is there so Little Competition in Government Procurement? pp. 1–63.
- Kleven, H. J. and W. Mazhar (2013). Using Notches To Uncover Optimization Frictions And Structural Elasticities: Theory and Evidence from Pakistan. *The Quarterly Journal of Economics* 128(December), 669–723.

- Laffont, J.-J. and J. Tirole (1990). Adverse Selection and Renegotiation in Procurement. *The Review of Economic Studies* 57(4), 597.
- Lee, D. S. and T. Lemieux (2010). Regression Discontinuity Design in Economics. *Journal of Economic Literature* 20(1), 281–355.
- Li, T. and X. Zheng (2009). Entry and competition effects in first-price auctions: Theory and evidence from procurement auctions. *Review of Economic Studies* 76(4), 1397–1429.
- Macleod, W. B. and J. M. Malcomson (1989). Implicit Contracts, Incentive Compatibility, and Involuntary Unemployment. *Econometrica*.
- Malcomson, J. M. (2012). Relational incentive contracts. *The Handbook of Organizational Economics* (508), 1014–1065.
- Milgrom, P. R. and R. J. Weber (1982). A Theory of Auctions and Competitive Bidding. *Econometrica* 50(5), 1089.
- Pinske, J. and G. Tan (2005). The Affiliation Effect in First-Price Auctions. *Econometrica* 73(1), 263–277.
- Ryan, N. (2019). Contract Enforcement and Productive Efficiency: Evidence from the Bidding and Renegotiation of Power Contracts in India.
- Saez, E. (2010). Do Taxpayers Bunch at Kink Points? *American Economic Journal: Economic Policy* 2(August), 180–212.
- Samuelson, W. F. (1985). Competitive Bidding with Entry Costs. *Economics Letters* 17, 53–57.
- Williamson, O. E. (1976). Transaction-Cost Economics : The Governance of Contractual Relations. *Journal of Law & Economics* 22(2), 233–261.

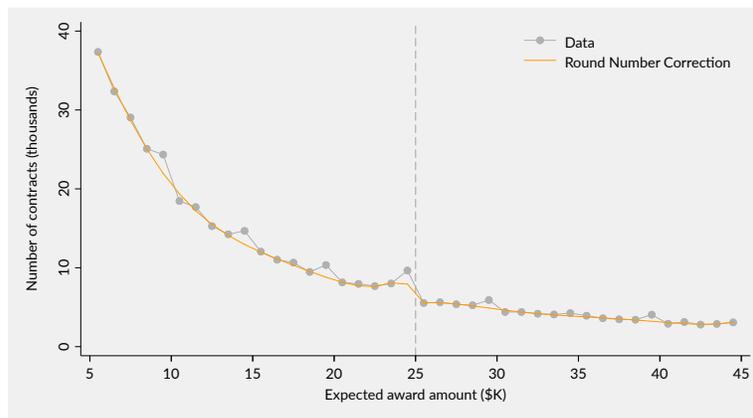
Figures

Figure 1: Distribution of Contract Sizes

(a) Actual Distribution



(b) Correcting for Round Numbers



(c) 5-degree Polynomial Interpolation

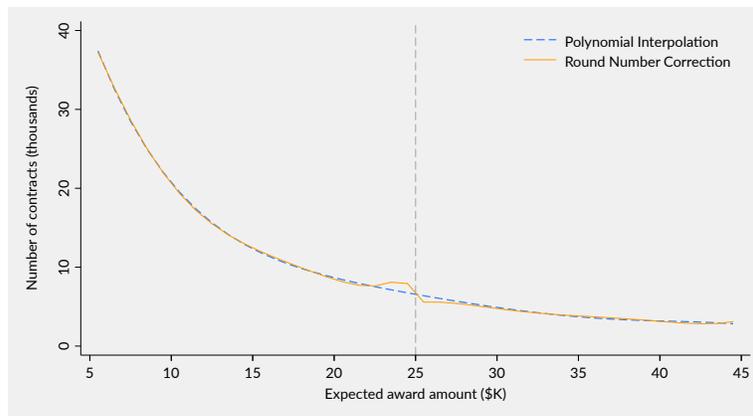


Figure 2: Share of Contracts Posted in FBO

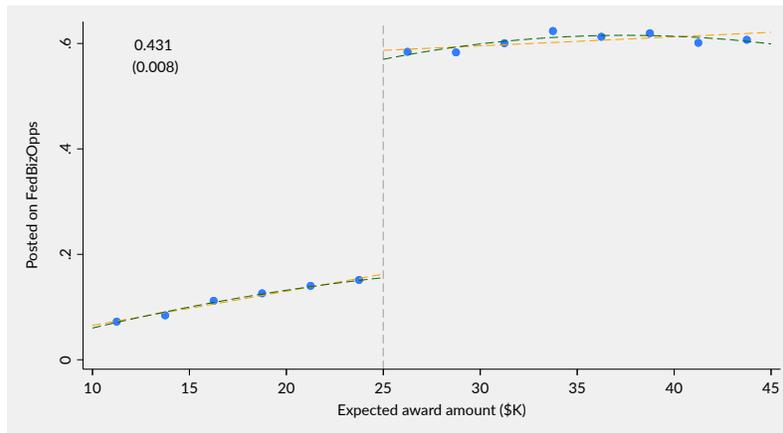


Figure 3: Number of Offers

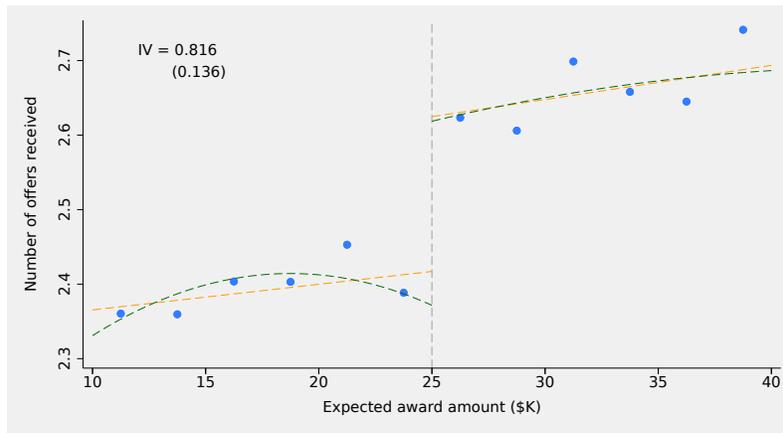


Figure 4: Log Distance between Firm and Office

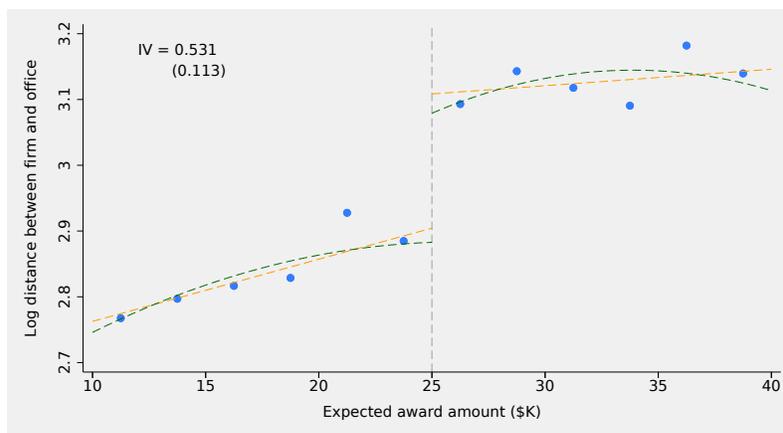


Figure 5: Contractor is Located in Office's State

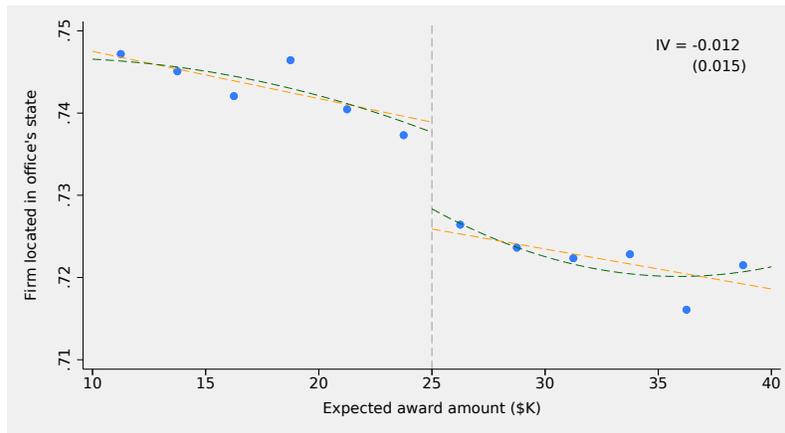


Figure 6: Contractor is located Outside of the Country

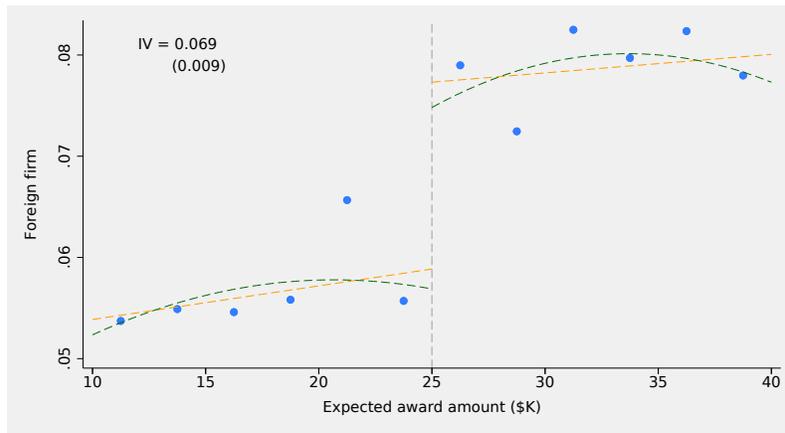


Figure 7: Share of Past Product-Dollars awarded to Contractor

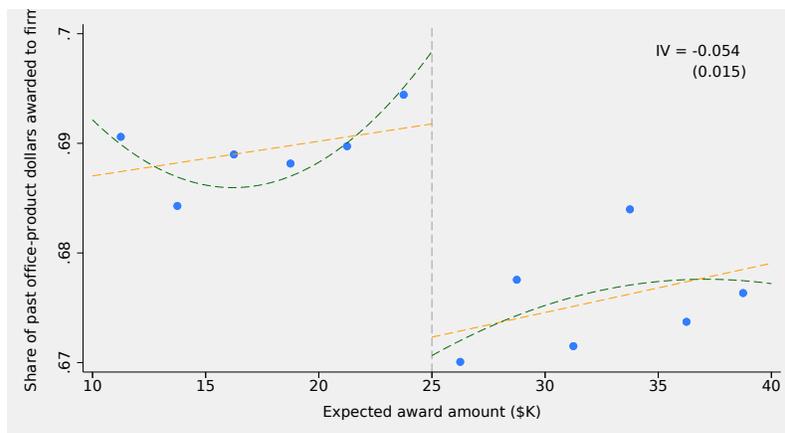


Figure 8: Firm with no Previous Awards from Office

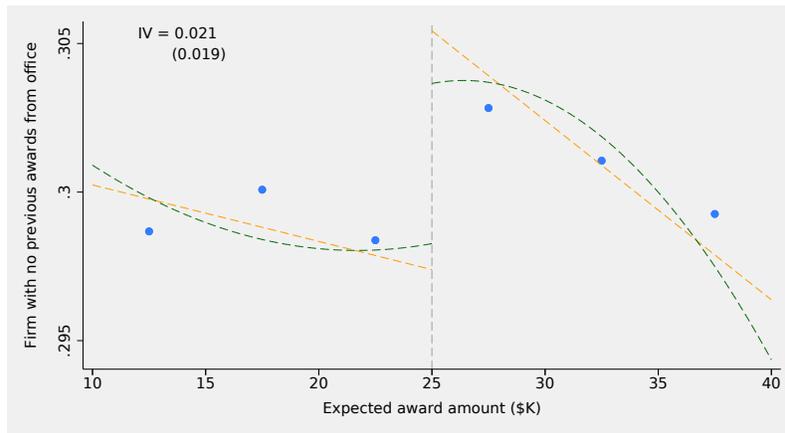


Figure 9: Any Cost-Overruns

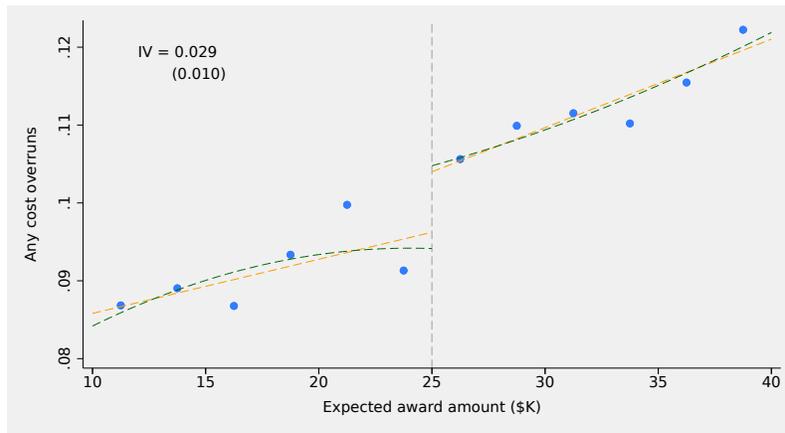
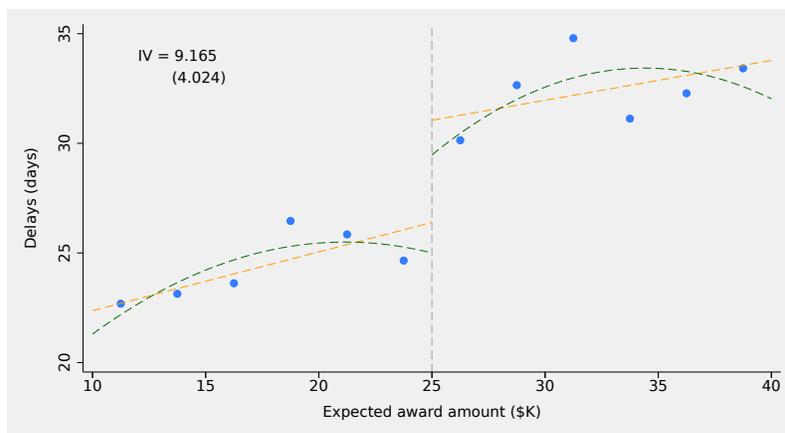


Figure 10: Delays



Tables

Table 1: Summary Statistics

	Mean
<i>Contract Characteristics</i>	
Expected Award Amount	22,070
Expected Duration (days)	55.15
Fixed-Price Contract	0.999
Competitively Awarded	0.614
Set Aside Award	0.357
Simplified Procedure	0.728
<i>Competition</i>	
Number of Offers	2.452
One Offer	0.530
<i>Contracting Office Characteristics</i>	
Navy	0.422
Army	0.402
Air Force	0.134
Other	0.043
<i>Awarded Firm Characteristics</i>	
Foreign	0.092
Within-State Firm	0.741
Small Business	0.620
Womam Owned Business	0.137
<i>Sample</i>	
No. of Contracts	240,514
No. of Contracting Offices	760
No. of Firms	59,697

Table 2: Top Product Categories

Rank	Goods		Services	
	Name	N Contracts/year	Name	N Contracts/year
1	ADP Equipment and Software	3,005	Maintenance/Repair of Equipment	2,430
2	Medical Equipment and Supplies	2,998	Support Services (Professional)	1,187
3	Laboratory Equipment	1,643	Utilities And Housekeeping	1,096
4	Electrical Equipment Components	1,593	Transport, Travel, Relocation	854
5	Communication/Coherent Radiation	1,202	ADP and Telecommunications	806
6	Furniture	810	Lease/Rent Equipment	753
7	Power Distribution Equipment	697	Maintenance of Real Property	688
8	Ship And Marine Equipment	574	Education And Training	560
9	Hardware And Abrasives	530	Construct Of Structures/Facilities	335
10	Construction And Building Material	459	Social Services	286

Table 3: RD Estimates on “Any Cost Overruns”

VARIABLES	(1) All	(2) Good	(3) Service	(4) Good	(5) Service
RD_Estimate	0.0305*** (0.0100)	0.00491 (0.00787)	0.102*** (0.0280)	0.0128 (0.00864)	0.0217 (0.0276)
Mean Dep Var Left	0.093	0.055	0.166	0.053	0.183
Firm FE	No	No	No	Yes	Yes
Original N Obs	243395	167388	76007	147467	58163
Effective N left	41027	39212	10011	24785	7259
Effective N right	25698	22755	6269	15410	4507

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix A: Additional Figures

Figure A1: Set Aside

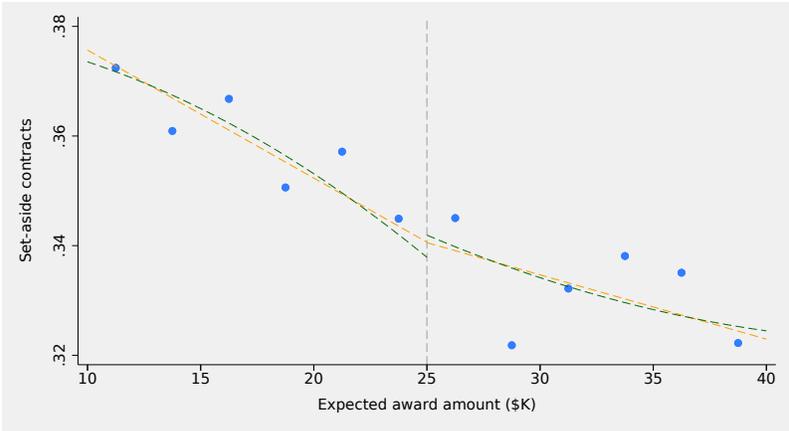


Figure A2: Competed Contract

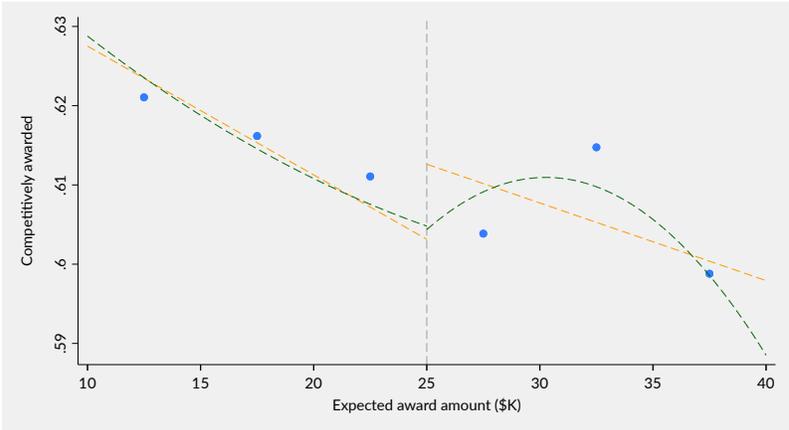


Figure A3: Service

