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Do information frictions and corruption perceptions kill competition? A field experiment on public procurement in Uganda

This paper considers whether information frictions and corruption perceptions deter firms from doing business with the government in Uganda.

Emanuele Colonnelli
Francesco Loiacono
Edwin Muhumuza
Edoardo Teso

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DO INFORMATION FRICTIONS AND CORRUPTION PERCEPTIONS KILL COMPETITION? A FIELD EXPERIMENT ON PUBLIC PROCUREMENT IN UGANDA

EMANUELE COLONNELLI*, FRANCESCO LOIACONO†, EDWIN MUHUMUZA‡, AND EDOARDO TESO§

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Abstract. We study whether information frictions and corruption perceptions deter firms from doing business with the government. We conduct two randomized controlled trials (RCTs) in collaboration with the public procurement and anti-corruption agency in Uganda. The first RCT provides firms with direct and timely access to information about government tenders over a two-year period. The second RCT provides firms with access to structured information on anti-corruption audits and on other firms' perceptions about public entities' integrity. We find that increasing information on available procurement opportunities alone does not increase firm participation in public procurement. However, addressing firms' misperceptions about the integrity of public entities increases firms' total number of bids and total government contracts won. Our findings point to the limits of transparency reforms that aim to increase competition in public procurement without accounting for firms' perceptions about government corruption and inefficiency.

Keywords: corruption, public procurement, information frictions, firms, RCT. Uganda

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* Booth School of Business, University of Chicago, and NBER, CEPR, BREAD, J-PAL. email: emanuele.colonnelli@chicagobooth.edu.

† European Bank for Reconstruction and Development. email: loiaconf@ebrd.com.

‡ Open Contracting Partnership. email: emuhumuza8@gmail.com.

§ Kellogg School of Management, Northwestern, and NBER, CEPR. email: edoardo.teso@kellogg.northwestern.edu.

1. Introduction

Public procurement—labeled by the World Bank "an essential element of the poverty reduction focus" (World Bank, 2014)—accounts for a staggering 14.5% of GDP in low-income countries, making it the primary area of government investment.[1] A well functioning public procurement market is crucial both for effective public service delivery, and because of its potential in promoting and sustaining private sector's growth (Ferraz et al., 2015). Yet, procurement in developing countries is often considered inefficient, opaque and, most prominently, ridden by corruption (Bosio et al., 2022). These issues may arguably deter firms from doing business with the government, thus limiting competition. As a result, e-procurement reforms by international organizations and national governments became widespread around the world, with a key goal of increasing competition in the market. These reforms typically focus on higher market transparency and reduced corruption as first-order objectives.

In this paper, we study the role of information frictions and corruption perceptions in the procurement market as barriers to firms' ability and willingness to do business with the government. First, especially in countries with limited state capacity, firms often find it challenging to access timely information about available procurement opportunities, because of the lack of a centralized procurement system to disseminate tender notices. Second, firms often complain about the lack of information regarding levels of corruption and inefficiency (henceforth, *integrity*, following Bosio et al., 2022) of the public entities managing the contracts. As a consequence in a context widely perceived as inefficient and corrupt, firms might simply refrain from doing business with the government.

Our study consists of two interrelated nationwide randomized controlled trials (RCTs) that we designed in collaboration with the Public Procurement and Disposal of Public Assets Authority (PPDA), the national public procurement supervisory agency and anti-corruption body in Uganda. First, we tackle the lack of information about tenders through the direct provision of such information to firms. Second, we directly provide firms with multiple sources of information about the corruption and inefficiency of different public entities to allow them to form more accurate perceptions of the entities' integrity. The RCTs were motivated by and took place concurrently with Uganda's plans to develop an e-procurement system.

[1]Public procurement is large in developed countries as well, accounting, for example, for 29.1% of total expenditures and 11.9% of GDP among OECD countries.

We start with a simple descriptive analysis of the public procurement market in Uganda. Using contract-level data from PPDA, we show that the market is characterized by limited competition and by a tendency of firms to participate only once in the market. Small, young, and rural firms are especially less likely to do business with the government. Using new firm-level surveys, we then show that the two information frictions we focus on—lack of transparency about tenders and widespread perceptions of corruption—are first-order concerns for a majority of the firms in our study sample.

In the first RCT (*Experiment #1*), we aimed to lower information frictions about available procurement opportunities for a random subset of 3,045 Ugandan firms that expressed interest in doing business with the government. Uganda, like most countries in Africa, lacks a centralized, nationwide e-procurement portal where firms can obtain timely information about available tender opportunities. In this context, firms face difficulties in obtaining information about all contracts of potential interest (which are usually advertised across a variety of different newspapers and websites), and mostly rely on informal information networks. In practice, our RCT aims to approximate the existence of a centralized portal for tender notices. For this purpose, we created the "Transparency Project," an organization of field research associates who, from October 2019 to July 2021, collected daily all new tender notices across all public entities in the country.[2] The team then sent bi-weekly, personalized newsletters (via email, text messages, and WhatsApp) containing all relevant tenders to 50% of firms in our sample.

The results from Experiment #1 show that solely reducing information frictions on procurement opportunities is not enough to increase firm participation in the procurement market. At baseline, a large share of firms listed the lack of transparency about available opportunities as a crucial barrier to increasing their participation in the market. Our Transparency Project was successful in increasing information about tenders: treated firms were actively consulting the newsletters throughout the duration of our experiment, and they reported less concern about this information friction at endline. However, they did not increase their participation in procurement over the two years of the experiment, neither at midline nor at endline. Importantly, we fail to find significant effects not only on the number of bids submitted and contracts won, but also on a series of intermediate actions that firms take before submitting a bid (such as consulting the details of the contract documentation at the public entity's premises, or buying the bidding documents). These findings suggest that treated firms were not

[2]During the time the project was "live," our team regularly updated a Transparency Project website with contact information and other details about the independence and not-for-profit nature of our organization.

more likely to even *attempt* to submit a bid upon learning about an interesting tender. Furthermore, we do not find any significant effect on procurement participation for the subset of treated firms to whom we gave an additional, significant nudge to participate in procurement.[3] In other words, despite having full and timely information about available tender opportunities, firms did not increase their participation in procurement in any meaningful way, pointing to the presence of additional, complementary frictions.

In the second RCT (*Experiment #2*), we focused on firms' perceptions about the integrity of the public entities in charge of procurement contracts.[4] This RCT, which was conducted on a new sample of 524 firms also interested in doing business with the government, had two components. First, we designed an incentivized field experiment to identify whether a firm's perceptions about the integrity of a specific public entity is a relevant determinant of the firm's willingness to do business with the government. Inspired by the experimental paradigm of Kessler et al. (2019), firms were asked to evaluate and rate a set of hypothetical but real-looking tender notices, whose components we randomized. Crucial to the experiment, respondents have an incentive to accurately report their preferences because, based on their ratings, they will obtain access to regular information regarding tenders matching their preferences (as part of our Transparency Project). We can then analyze how a firm's perceptions of public entities' integrity, which we elicit in our baseline survey, correlates with firms' ratings of tenders in our incentive-compatible design.

Subsequently, with our main intervention we provided a random subset of firms with structured information regarding the levels of integrity of public entities. This information, which firms received in the form of well-organized physical reports, comes from one of two possible sources. Half of the treated firms received the "market perceptions" report, which provides a *wisdom of the crowd* assessment of integrity based on survey data on perceptions that we collected from more than 2,000 firms with knowledge of the public entities. The other half of the treated firms received the "audit scores" report, which contains summarized results of all audits conducted by our partner PPDA, which regularly scored public entities across various dimensions of efficiency and corruption over the past decade. The goal of this information treatment is to allow firms to form

[3]This nudge consisted of a one-time reimbursement for the purchase of the documents necessary to submit a bid, as well as a detailed explanation of the specific steps necessary to submit a bid. The nudge has the double objectives of alleviating possible monetary and knowledge constraints.

[4]Our definition of integrity includes both active waste, which is the result of corruption of procurement officers, and passive waste, which is the result of lack of effort resulting in inefficient procurement processes (Bandiera et al., 2009).

more accurate perceptions about specific public entities. Importantly, all treated and control firms also received the bi-weekly newsletter with information on tender opportunities from our Transparency Project, which ensures that this baseline information friction is shut down for all firms.

The results from Experiment #2 are as follows. First, we show that firms' perceptions about the integrity of specific public entities matter for their participation in procurement. Specifically, our incentivized tender rating experiment reveals that, after holding fixed other characteristics of the advertised tender (like the value of the contract, the administrative burden required to bid, etc.), a firm's perception about public entities' integrity matters considerably: more negative perceptions about entities' efficiency and corruption are associated with a much lower firms' interest in bidding for the tender.

Second, we show that firms' perceptions deviate substantially from the information contained in the market perceptions report and in the audits report. Importantly, firms can be strongly *pessimistic* about the integrity of specific PDEs, relative to the information provided in the reports. This suggests that both a wisdom of the crowd assessment and the results of government audits might be used by firms to update their perceptions of specific public entities, potentially making them more optimistic about some PDEs and more likely to engage in procurement.

Third, and consistent with our hypothesis, our main results show that firms receiving our reports bid more and win more procurement contracts over the subsequent seven months. We find suggestive evidence that information coming from market participants is more effective than information coming from government audits, pointing to a higher level of trust in peers compared to the anti-corruption government agency. This increased participation is directed towards public entities listed as having the highest integrity in our reports. Importantly, we find evidence for a channel whereby firms update their priors upon receiving the reports, as the effects are driven by higher firms' engagement with entities the firm had overly pessimistic views about.

Taken together, our findings point to the limits of transparency reforms that aim to increase competition in public procurement without accounting for firms' perceptions about government corruption and inefficiency. Based on our findings, our partner PPDA adopted several measures to increase private sector's trust in public entities. These measures included the development of a public relations and communications strategy and an outreach program to business organizations to reassure them of the integrity of public entities, as well as the promotion of a whistle-blower program for

firms to report cases of corruption as a way of building confidence in the integrity of the overall system.

Our paper contributes to several strands of literature. First, our field experiment directly speaks to a recent and growing literature on public procurement in developing countries. In their overview of procurement laws and practices across 187 countries, Bosio et al. (2022) underline the relationship between state capacity and regulations in driving the quality of public procurement. Studies in this literature have focused on specific aspects of capacity and regulation, including e-procurement (Lewis-Faupel et al., 2016), government audits (Gerardino et al., 2023), bureaucratic quality (Best et al., 2023), and procurement officers' incentives (Bandiera et al., 2021).[5] Our study is a nation-wide RCT on public procurement in Africa, which allows us to isolate the role of information frictions and corruption perceptions as potential barriers to increasing competition in the broad market for government contracts.[6] On the one hand, our transparency experiment shows no effect from increasing information about the availability of tenders—a key component of all e-procurement reforms. On the other hand, a novel contribution of our study is to highlight the role of perceptions about government corruption and inefficiency as a key barrier preventing higher competition: in contexts ridden by corruption, firms might refrain from doing business with certain government entities if they lack reliable and positive information about their integrity. In this sense, we relate to work on the public disclosure of anti-corruption audits (Ferraz and Finan, 2008, 2011; Bobonis et al., 2016; Zamboni and Litschig, 2018; Arias et al., 2022), and on the (nearly universally positive) effects of transparency on procurement outcomes in advanced economies (Coviello and Mariniello, 2014; Carril et al., 2022; Duguay et al., 2023).

More broadly, we connect to the literature on how corruption and government interference affect private sector development.[7] Studies on the role of corruption for firm and economic growth include Mauro (1995); Bliss and Tella (1997); Kaufmann and Wei (1999); Svensson (2003); Fisman and Svensson (2007); Olken and Barron (2009); Olken and Pande (2012b); Cole and Tran (2011); Sequeira and Djankov (2014); Bai

[5]For a broader review of recent work on state capacity and development, see Finan et al. (2017) and Besley et al. (2022). Related work focused specifically on public procurement includes Bandiera et al. (2009); Decarolis et al. (2016); Coviello et al. (2018); Decarolis et al. (2020b); Szucs (2023). A review of field experiments about institutions is provided by Callen et al. (2023).

[6]See Kang and Miller (2022) for an analysis of limited competition in the U.S. federal procurement market.

[7]See Shleifer and Vishny (1993); Svensson (2005); Hanna et al. (2011); Banerjee et al. (2012); Olken and Pande (2012a); Banerjee et al. (2013); Rose-Ackerman and Palifka (2016); Fisman and Golden (2017) for reviews and discussions of the literature on corruption.

et al. (2017); Colonnelli and Prem (2022); Decarolis et al. (2020a); de la Sierra et al. (2022); Fenizia and Saggio (2024). Our emphasis on "corruption perceptions" is closely linked to the seminal work in Indonesia by Olken (2007, 2009). While most of the work focuses on the (universally negative) consequences of corruption, our study adds a wrinkle to the argument. We highlight how widespread perceptions that government entities are corrupt might lead to a limited pool of firms participating in public procurement. This—on top of potential corruption in the selection of firms being awarded the contract—may have damaging welfare consequences if it results in a *negative selection* of firms willing to do business with the government in the first place.[8]

Finally, our paper speaks to the literature on firm growth in developing countries, and specifically to recent work looking at the constraints that prevent the emergence of larger, high-growth firms (Bloom et al., 2013; Banerjee and Duflo, 2014; McKenzie, 2017).[9] Most closely related are studies focusing on the role of information frictions in market access, and specifically RCTs such as Atkin et al. (2017) on randomizing access to foreign markets for rug producers in Egypt and Hjort et al. (2020) on teaching firms in Liberia how "to sell" to large buyers, including governments.[10] We place direct emphasis on firm-government interactions, which remain largely overlooked despite the government being typically the largest national customer in all low-income countries. We further provide some of the first empirical evidence of how perceptions of corruptions and political favoritism may *exclude* firms from specific markets, thus speaking to a related and large literature on the distortionary effects of political connections (Fisman, 2001; Khwaja and Mian, 2005; Faccio, 2006; Schoenherr, 2019).

Our paper is organized as follows. Section 2 discusses the public procurement market in Uganda and the main sources of data used in the paper. Section 3 describes the design and results from the RCT studying the impact of increasing information about public procurement opportunities. Section 4 focuses on the RCT addressing misperceptions about the integrity of public entities. Section 5 concludes.

2. Context and Data

In this section, we first briefly describe a few important features of the public procurement market in Uganda (section 2.1). We then outline the various data sources

[8]Our effects on perceptions about the government echo the findings in Colonnelli et al. (2024), who show that firms in China shy away from doing business with government investors because of fear of political interference.

[9]See Woodruff (2018); McKenzie et al. (2021); Verhoogen (2023) for recent reviews of related work.

[10]See also Jensen and Miller (2018) and Aker et al. (2020) for recent studies on information frictions in market access within low-income countries.

we use to identify and characterize firms and public entities operating in the market (section 2.2). Next, in section 2.3, we list the various firm-level surveys we conducted for our two RCTs, on which we will expand later in the paper. Finally, we provide some descriptive facts motivating our experimental designs (section 2.4).

2.1. **Public Procurement in Uganda.** The government represents the largest potential "customer" of private sector firms in Uganda. According to the Ministry of Finance, public procurement accounts for nearly 30% of the country's GDP.[11]

The public procurement process is largely decentralized. All tenders are initiated by a public entity—a so-called "Procurement and Disposing Entity" (henceforth, *PDE*). PDEs are either local or central government bodies, and include a mix of municipal governments, ministries, public hospitals and schools, as well as specialized agencies in charge of specific governments services (e.g., the Uganda National Roads Authority, and the National Water and Sewerage Corporation). Each PDE employs several public officials specifically in charge of procurement.

The sector is regulated by an autonomous, independent body called the Public Procurement and Disposal of Public Assets Authority (PPDA), which was established in 2003 and functions as a so-called "accountability institution" in charge of anti-corruption.[12] PPDA is our main partner in the study enabling data access.

A simplified outline of the procurement process is the following. At the beginning of a fiscal year (henceforth, *f.y.*)—which runs from July 1st to June 30th—each PDE is asked to make public a procurement plan, namely a tentative list of tenders the PDE plans to advertise during the fiscal year. Then, for each tender, each PDE needs to first select a "procurement selection method." Broadly, procurement officers can choose between a *discretionary* method—typically allowed only for small contracts below approximately USD 2,500 or for "emergency" situations—or a *competitive* method—which represents the bulk of procurement activity in Uganda.

There are several types of tenders characterized by a competitive selection process, such as "requests for proposals," "restricted bidding," or "open bidding." Requests for proposals involve the pre-selection of a limited number of firms (usually a minimum

[11]See The National Public Sector Procurement Policy (last accessed September 2023).

[12]All PDEs are legally required to follow PPDA regulations and to act based on PPDA recommendations on procurement-related policies to implement. PPDA ensures that PDEs and their officials are subject to regular training programs, it conducts regular audits of procurement procedures and their performance, and while it does not have prosecutorial powers, it does cooperate with the Inspector General of Government to prosecute firms and individuals found guilty of procurement-specific irregularities. For more details on the public procurement regulation in Uganda, see Colonnelli et al. (2018) and Hoekman et al. (2022).

of three) that are invited to bid, with the pre-selection often based on relatively lax guidelines that procurement officers are asked to follow. These tenders represent 3.6% of the total contract value in f.y. 2018-2019 (the last year before the start of our first RCT). Restricted bidding is considered slightly more competitive, because while it involves a strict set of requirements for firms to participate, in principle all firms meeting the requirements can submit a bid. They represent 2.4% of the total contract value in f.y. 2018–2019. Open bidding, on the other hand, is the most competitive type of tender and open to all firms, and accounts for the largest share of public procurement activity (approximately 90% of total contract value in f.y. 2018–2019). The remaining small share of the total contract value in f.y. 2018–2019 is divided between direct procurement (1.6%), microprocurement (1.5%), and other form of non-competitive tenders (0.2%).

For open bidding contracts, PDEs are required to publish a "tender notice" describing the characteristics and value of the contract and the procedures that interested firms should follow in order to submit a bid. Regulations require PDEs to advertise their tenders in at least one newspaper of wide circulation and to provide a sufficient number of days for firms to see the tender and submit the bid. PDEs are further encouraged, though not required, to advertise tenders through the radio, internet, and by physically posting the tender notice at their premises. We discuss these issues in more detail in Section 3.

2.2. **Administrative Data Sources.** Lack of data is a common concern when studying public procurement activity in low-income countries, and precisely one of the reasons why e-procurement reforms around the world usually place a special emphasis on both capacity building programs to collect and maintain centralized datasets on procurement activity and on ensuring that such datasets are made available to market participants. Uganda is no exception, with a key barrier being the decentralized nature of its procurement market, which implies the need to coordinate data collection and transparency efforts across hundreds of PDEs.

In collaboration with PPDA, we made an effort to gather, clean, and standardize a number of confidential datasets on public procurement activity.[13] While far from allowing a perfect measurement of all contracts, firms, and PDEs in Uganda, such a data collection allows us to: (a) identify a large number of firms interested in or already doing business with the government; (b) construct various performance measures for a

[13]Most of the effort involved collecting thousands of paper records from individual PDEs and other government agencies spread across the country as well as digitizing and cleaning such unstructured information.

significant share of PDEs; (c) provide some of the first descriptive evidence on a market for public procurement in Africa.

We now briefly describe some of the data used in our study.[14] First, we aim to identify firms "interested in public procurement," which could form the samples of firms taking part in our RCTs. The reason for this sampling choice is that early pilots and focus groups showed a strong reluctance by many firms with no prior exposure to public procurement to doing any business whatsoever with the government. We identify interested firms through a number of datasets. The main dataset is the *Registry of Providers* (henceforth, *ROP*), which is a formal list maintained by PPDA of all firms that actively expressed interest in participating in public procurement and that went through a simple screening process (e.g., tax verification, and validation of contact information). A second dataset is the list of firms that *pre-qualified* for at least one PDE, which represents a measure of expression of interest in procurement similar to signing up to the ROP.[15]

Second, we are interested in measuring performance of PDEs, which is a crucial component of our second RCT, as we discuss in more detail in Section 4. With this goal, we obtained access, digitized, and standardized all the audit reports that PPDA drafted following its audits of PDEs. The audits aim at capturing all irregularities and cases of corruption pertaining to the public procurement activities of the PDEs, and they are rather similar in nature and reporting to other anti-corruption audits around the world (e.g., see Ferraz and Finan (2008) for the case of Brazil). During an audit, PPDA samples a subset of the contracts awarded by the PDE and evaluates the degree to which the PDE complied with regulations in the selection of the providers and in the execution of the contract. Anti-corruption audits in Uganda are "quasi-random": while a small set of the largest PDEs (e.g., the Uganda National Roads Authority) is audited nearly every year, the remaining and vast majority of PDEs are selected at random every year. We have information for all the 22,321 audits conducted by PPDA between 2007 and 2019, covering a total of 262 PDEs.

A final set of datasets allow us to further characterize the activity in the market. In particular, we have access to the *Government Procurement Portal* (henceforth, *GPP*), the official database managed by PPDA to keep track of PDEs' procurement activity.

[14]Most of the datasets were collected at the beginning of the 2018–2019 f.y.. Some of the datasets were then updated multiple times between then and the end of our RCTs.

[15]Firms can pay a fee and submit certain information and documents to a given PDE to enter their list of pre-qualified firms. The fees and requirements vary by PDE, and typically firms are asked to re-qualify after a certain number of years. The main benefit of pre-qualification is typically that of being more likely to be notified for restricted bidding or request for proposals opportunities.

This is a contract-level database with information on the identity of the firms bidding for and winning the contract, the value and dates of the contract, the type of good or service procured, the selection method used, as well as additional characteristics of the contract. While extremely rich in information, the coverage of this dataset is imperfect. The data is self-reported by each PDE, and PPDA has limited ability to enforce full compliance. Data coverage tends to be particularly lacking among local PDEs located outside the capital city of Kampala. These PDEs typically do not have the human capital and infrastructure capacity to submit reporting to an electronic procurement system like GPP and instead rely on the submission of monthly or quarterly paper reports to PPDA that contain a more limited amount of information on the awarded contracts (for instance, they contain information only on the identity of the firm winning the contract, not on the firms that submitted unsuccessful bids). Together with PPDA, we digitized all these *paper procurement records*.

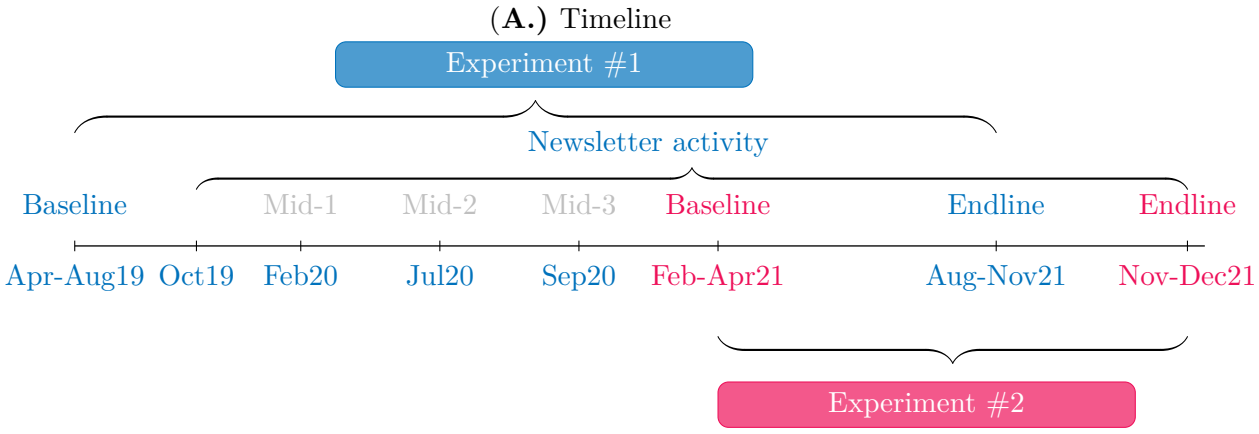
Importantly, using PDE- and firm- level identifiers in the data, we can track PDEs and firms over time, across contracts, and across the different datasets. In total, we have 13,860 firms appearing in at least one of our procurement datasets, and 398 PDEs active in procurement over the period covered by the data.

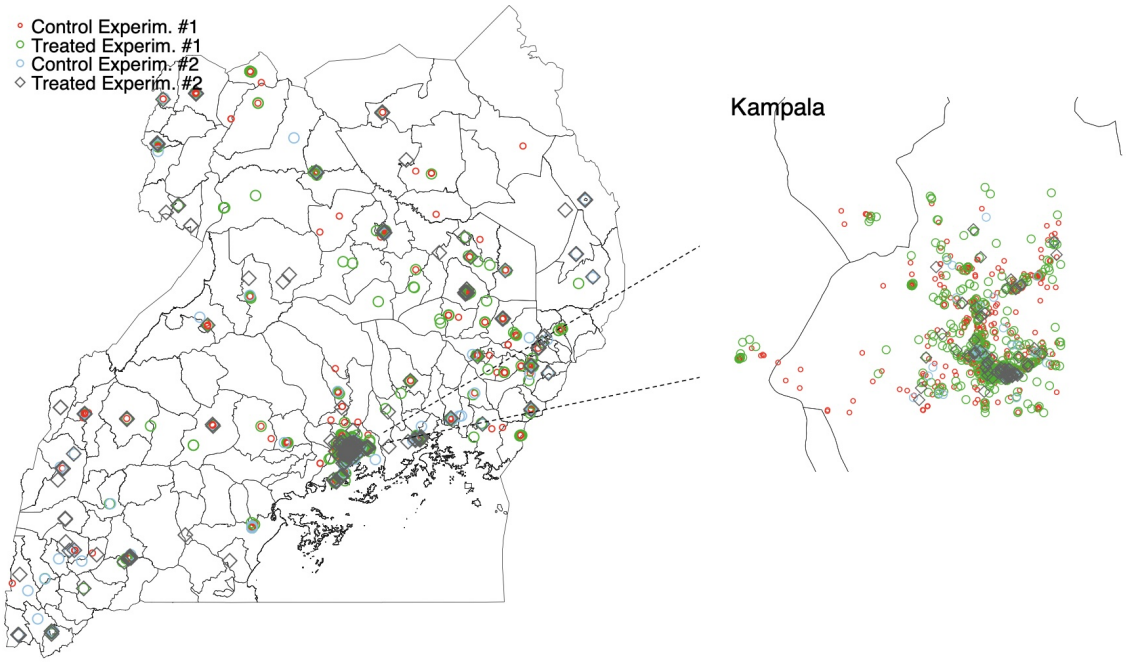
2.3. **Firm-Level Surveys.** Our main data analysis relies on firm-level survey data. We conduct full baseline and endline surveys for each of our two RCTs, namely Experiment #1 (focused on information frictions about procurement opportunities) and Experiment #2 (focused on perceptions about the integrity of public entities), which we discuss in detail in Sections 3 and 4, respectively. In addition, we conducted a total of three short intermediate surveys on the sample of Experiment #1, including one that generates firms' perceptions data that is used to feed our information treatment in Experiment #2. The timeline of our data collection for the two experiments is depicted in Figure 1, Panel A. Figure 1, Panel B, shows the wide geographical distribution of firms in our two experimental samples.

All surveys were conducted in-person at the firms' premises by enumerators from the Independent Evaluation and Research Cell (IERC) of BRAC Uganda who were trained on public procurement by both our team and PPDA officers. However, all surveys were conducted without any explicit reference to PPDA so as to avoid biased responses arising from respondents' fear of government oversight.

2.3.1. *Experiment #1 Surveys.* We sampled firms for Experiment #1 from the lists of firms in the ROP and the list of pre-qualified firms, as discussed in the previous section. We targeted 3,632 firms and ended up with a final sample of 3,045 firms. Our

FIGURE 1. Survey Timeline and Firms' Location





Notes: Pabel A shows the timeline of the project's activities. We started the baseline data collection of Experiment #1 in April 2019 and carried out three more data collections in February 2020 (Midline 1), July 2020 (Midline 2), and September 2020 (Midline 3). Between August and November 2021, we carried out the endline data collection for Experiment #1. The newsletter activity took place between October 2019 and December 2021. The baseline data collection of Experiment #2 began in February 2021 and lasted until April 2021. The endline took place in November and December 2021. Panel B shows the map of the location of the firms that took part in our two experiments. Each dot represents a firm participating either in Experiment #1 (control firms are in red and treated firms are in green) or in Experiment #2 (control firms are in light blue and treated firms are in gray).

response rate from initial reach-out was about 84%. The survey took between 75 and 90 minutes on average.

The baseline survey was conducted between April and August 2019. Enumerators were instructed to interview either one of the firm's owners or managers, or the employee within the firm in charge of public procurement.[16] In the introduction to the survey, respondents were told that the goal of the study was "to understand the barriers that prevent firms like yours from participating more actively in public procurement."

The survey contains several sections. First, we collected basic information about the respondent and the firm, such as firm sector and age as well as education and experience of the firm's owner and of other employees. Second, we collected information about the firm's revenues, costs, profits, assets, liabilities, number of employees, and total wages (with reference to the past f.y.). Importantly, given the incomplete nature of the administrative data on public procurement activity, we placed a strong emphasis on collecting reliable information on bids and contracts won (with reference to the past three fiscal years). Relatedly, we also ask respondents about: (i) their knowledge about the regulations and workings of the public procurement market in Uganda; (ii) the barriers they face when trying to participate more actively in public procurement; and (iii) the sources that firms use to acquire information about the public procurement market.

Table 1 (Panel A) presents some characteristics of the 3,045 firms belonging to the sample at baseline. Firms are representative of the three macro-sectors of construction, supplies, and services. The median firm in our sample is relatively young (7 years of age), and of medium size (12 employees), with yearly revenues of USD 40,540 and USD 8,648 in assets. About 59% of the firms in our sample are located in Kampala.

The endline survey of Experiment #1 was conducted between August and December 2021. The survey was slightly shorter than the baseline, and focused on collecting outcome measures on firm participation in public procurement and firm growth. Of the 3,046 firms in our baseline sample, 2,115 were successfully reached and agreed to conduct the endline interview.

We conducted three intermediate phone surveys of the firms in the Experiment #1 sample. These surveys were conducted in February 2020, June 2020, and September 2020, respectively. The first two of these surveys were purely descriptive in nature. Specifically, the first intermediate survey (N=2,674) had the primary objective of monitoring the correct implementation of the our field experiment. The second intermediate

[16]The respondent was the owner in 68% of cases, a manager in 30% of cases, and another employee in 2% of cases.

TABLE 1. Summary Statistics

Variable	N	Mean	Median	SD	p10	p90
Panel A: Experiment #1						
Owner is a woman	3,045	0.193	0.000	0.395	0	1
Construction	3,045	0.284	0.000	0.451	0	1
Supplies	3,045	0.301	0.000	0.459	0	1
Services	3,045	0.415	0.000	0.493	0	1
HQ in Kampala	3,045	0.591	1.000	0.492	0	1
Total employees, current	3,045	25.885	12.000	103.357	3	47
PP contracts won, last FY	3,045	2.352	1.000	5.740	0	5
PP contracts bidded for, last FY	3,045	4.638	3.000	10.682	0	10
Firm age	3,040	9.293	7.000	7.367	2	19
Profits, '000USD	2,108	204.890	4.865	8,462.463	0	41
Revenues, '000USD	2,176	198.603	40.541	938.378	5	378
Assets value, '000USD	2,282	68.025	8.649	189.256	0	151
Panel B: Experiment #2						
Owner is a woman	524	0.160	0.000	0.367	0	1
Construction	524	0.424	0.000	0.495	0	1
Supplies	524	0.630	1.000	0.483	0	1
Services	524	0.531	1.000	0.500	0	1
HQ in Kampala	524	0.427	0.000	0.495	0	1
Total employees, current	521	20.885	11.000	34.511	3	41
PP contracts bidded for, last FY	523	5.872	3.000	10.401	0	12
PP contracts won, last FY	522	2.308	1.000	4.186	0	5
Active contracts, last 12 months	517	2.791	1.000	4.561	0	7
Share of revenue from public procurement	511	37.241	30.000	31.949	0	82
Num. PDEs mentioned (bidded+not bidded)	524	5.126	4.000	3.082	2	10

Notes: Panel A reports summary statistics on individual characteristics collected from the sample of 3,045 government providers at baseline for Experiment #1. Construction, Supplies, and Services are dummies equal to 1 if the core business of the firm falls under one of these categories. HQ in Kampala is a dummy equal to 1 if the headquarter of the firm is situated in the city of Kampala. Firm age is calculated as the year of the baseline survey (2019) minus the age in years of the firm. Total employees is the sum of permanent and temporary employees currently employed in the firm. Profits, revenues, and assets are in thousands of USD, winsorized at the 99% level. Owner is a woman is a dummy equal to 1 if the owner of the business is a woman. PP contracts won and bid for are the total number of tenders the firm won and bid for, respectively, in the fiscal year preceding the experiment. Panel B reports summary statistics on individual characteristics of a sample of 524 firms interviewed at baseline for Experiment #2. Construction, Supplies, and Services are dummies equal to 1 if the core business of the firm falls under one of these categories. HQ in Kampala is a dummy equal to 1 if the headquarter of the firm is situated in the city of Kampala. Total employees is the sum of permanent and temporary employees currently employed in the firm. PP contracts won and bid for are the total number of tenders the firm won and bid for, respectively, in the year preceding the experiment. Active contracts is the total number of contracts the firm has not completed yet during the past 12 months. Share of revenues from public procur. is the percentage of revenues that comes from public procurement. Num. PDEs mentioned is the total number of public entities the firm mentioned in the survey during the mobilization.

survey (N=2,338) was instead carried out to assess the potential impacts of Covid-19 on the firms in our sample and on the public procurement market more broadly.

The third intermediate survey (N=2,366) was the most directly relevant for our study. First, we measured outcomes after nearly one year from the start of our Experiment #1. Second, we elicited firms' perceptions on the way in which specific PDEs conduct procurement activities. Specifically, we first asked respondents for a list of PDEs that they were familiar with, either because their firm had interacted with them in the past, or because they had information about them through the media or through other personal or business networks. We then asked respondents for their opinion on the public entity's performance, corruption, compliance with the law, level of transparency, and competition. As we discuss in more detail in Section 4, these data on perceptions are used to construct part of the information treatment for Experiment #2.

2.3.2. *Experiment #2 Surveys.* We sampled firms for Experiment #2 in a manner analogous to Experiment #1. In particular, we relied on the ROP and pre-qualified firms after removing those firms that we already contacted for Experiment #1. Since this experiment focuses on measuring and varying perceptions about specific PDEs, we further focused on firms with a sufficient degree of involvement in public procurement. In particular, during our mobilization phase in December 2020, we asked the 1,465 firms to which we initially reached out whether they had submitted any bid for procurement contracts over the previous f.y. and whether they were still planning to be active in public procurement. We then restricted attention to the 783 firms who responded affirmatively to both questions and that had regular access to an email address. The baseline in-person survey took place between February and April 2021 and consisted of a sample of 524 firms.

The survey is broadly organized into three main sections.[17] First, we ask respondents a series of questions about the characteristics of their firm and about their past participation in public procurement, similar to those asked in the baseline survey of Experiment #1.

The second part of the survey elicits respondents' opinions on the performance, corruption, compliance with the law, level of transparency, and competition of a set of PDEs they reported being familiar with. These were the same perceptions that were elicited from the firms in the Experiment #1 sample during the third intermediate survey.

[17]The treatment—i.e., the delivery of the reports—took place at the very end of the survey.

The third part of the survey consists of an incentivized field experiment—an adaptation to our context of the design by Kessler et al. (2019)—where respondents report their interest in a list of hypothetical tenders under the real incentive they will receive information regarding real tenders matching their preferences. We explain the details of this experiment in Section 4.1.

Table 1 (Panel B) presents some characteristics of the 524 firms belonging to the sample at baseline. Similar to the sample for Experiment #1, firms are broadly representative of the three macro-sectors active in procurement, and the median firm is of medium size (11 employees).

The endline survey was conducted between November and December 2021, and therefore measured the impact of our intervention on outcomes over a span of slightly more than 7 months. A total of 445 of the 524 firms in the sample agreed to participate to the endline survey.

2.4. **Descriptive Analysis.** In this section, we use the administrative data and our original surveys to provide a series of descriptive facts about public procurement in Uganda which motivate our interventions.

2.4.1. *Firms' participation in the procurement market is low.* The first relevant fact that we show is that the public procurement market is characterized by a low level of competition. Panel A of Figure 2 shows the distribution of the number of bids per contract in the administrative data, focusing on competitive contracts. The median contract receives only 2 bids, with 45 percent of contracts receiving only one bid, and 83 percent of contracts receiving less than 3 bids.

Panel B of Figure 2 shows the degree of involvement in public procurement of the 13,860 firms that appear in either the ROP or the pre-qualification lists that we collected in the last three fiscal years before the start of our experiment (i.e., from 2016–2017 to 2018–2019). Despite the fact that the firms in this sample are highly self-selected, as their inclusion in these databases signals a strong interest in doing business with the government, the number of bids that they submit is very low. Upon merging this sample to the GPP procurement dataset, we find that 68.5 percent of these firms never submitted a bid in the preceding three fiscal years (spanning the period 2016-2019, for a total of 3,657 unique contracts), with 8.8 percent of them submitting only one bid, and only 7.1 percent submitting 5 or more bids. 77.5 percent of firms never won a single contract in this three-year period. When we focus only on open bidding contracts, which represent the bulk of procurement activity by contract value, we find

that 68 percent of firms never responded to an open bidding tender, and 75 percent of them never won one.

The 3,045 firms in the sample for our Experiment #1 are slighty more active in public procurement, but their overall degree of involvement is also low.[18] Accordingly, when asked about their optimal degree of involvement in public procurement, 96% of firms expressed the desire to increase the share of their business from public procurement contracts.

2.4.2. *Small, young, rural firms engage less in procurement.* In Panel C of Figure 2, we investigate which firms have more difficulties in participating in public procurement. We report coefficients from a regression of the number of bids submitted in the 2017–2018 fiscal year on a series of indicators for firm characteristics and sector fixed effects, using data from the baseline survey of the sample for our Experiment #1.[19]

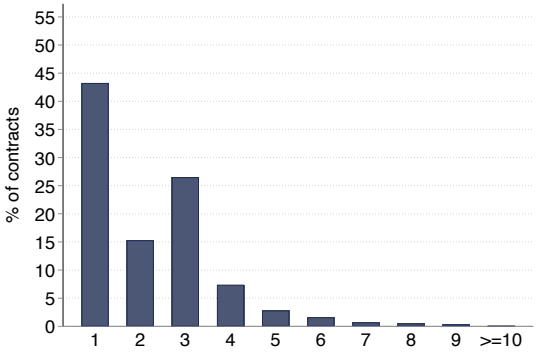
Rural, small, and young firms have lower participation in procurement: firms located outside of the region of Kampala, firms established in the last four years, and firms with less than five employees submitted 11 percent, 25 percent, and 25 percent fewer bids, relative to firms located in Kampala, older than four years, and with five or more employees, respectively. Firms without an internal organization dedicated to public procurement are also less likely to bid: firms without a person within the firm tasked with the preparation of bidding documents, or with the research of good bidding opportunities, submit 8 percent and 23 percent fewer bids, respectively.

2.4.3. *Perceptions of corruption and lack of information on tenders are relevant barriers.* In the baseline survey of the sample for our Experiment #1, we investigate what are firms' main barriers to greater procurement participation. We list a series of potential factors, and we ask respondents how important each factor is, on a scale from one to five, in limiting the bidding activity of the firm. Appendix Figure A.2 shows that the two most important barriers are related to firms' perceptions that the system is corrupt: the share of firms assigning a level of importance of three or higher, on a five-point scale, to their perception that the procurement system is rigged, and to

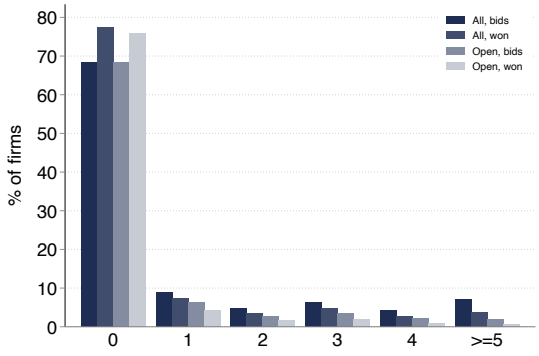
[18]Appendix Figure A.1 shows the degree of involvement in public procurement in the fiscal year before the survey (2017–2018) by the 3,045 firms in the sample for our Experiment #1. Despite our focus on a sample of firms that are particularly interested in public procurement, 22 percent of firms submitted zero bids in the fiscal year before the survey took place, and 62 percent of firms submitted fewer than three bids. The firm at the 75th percentile of the distribution submitted only 5 bids. The distribution of number of procurement contracts obtained in the past fiscal year is even more skewed: 35 percent of firms never won a contract, 20 percent of firms won only one contract, and only 9 percent of firms won five or more contracts.

[19]Each coefficient is normalized by the mean number of bids in the subsample of firms for which the indicator is equal to zero.

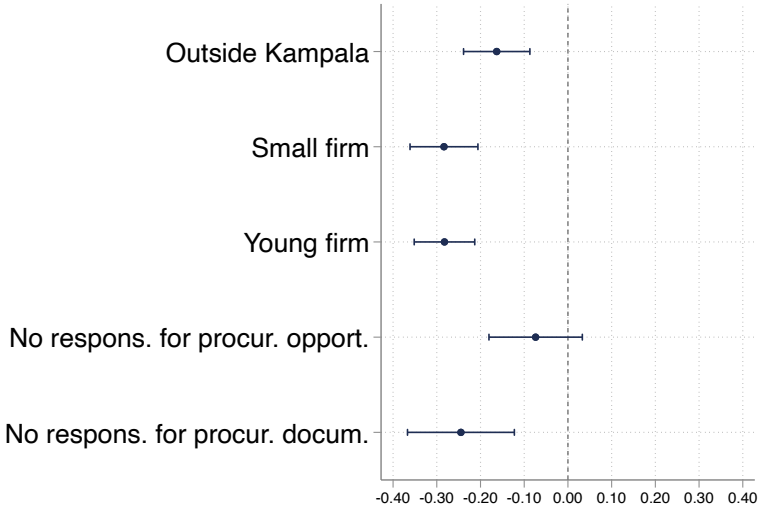
FIGURE 2. Competition in the Public Procurement Market in Uganda



(**A.**) Bids per contract



(**B.**) Bids and contracts won, FYs 16/17–18/19



(**C.**) Who bids less?

Notes: Panel A shows the distribution of the number of bids per contract in the administrative data, focusing on competitive contracts. Panel B shows the distribution of firms by number of bids submitted and contracts won during the 3 fiscal years prior to the experiment, that is from 2016/2017, 2017/2018 and 2018/2019. The sample of firms includes all those that appear in either the ROP or the pre-qualification lists that we collected in the fiscal year before the start of our experiment (i.e., 2018/2019). Panel C reports the coefficients from a firm-level regression, using data from the baseline survey of Experiment #1. The dependent variable is the number of bids at baseline on a series of characteristics of the firm. Coefficients are normalized by the value of the dependent variable when the value of the indicator equals 0.

their lack of personal connections to public officials or politicians, is 75 percent and 69 percent, respectively. Indeed, when asked about their estimate of the percentage of Ugandan firms that make unofficial payments to officials, and of the percentage of officials asking unofficial payments to firms, the median firm answers 60 percent. The intervention in our Experiment #2 will focus on this specific barrier to procurement participation.

An additional important barrier to wider participation is the lack of adequate and timely information about procurement opportunities. Almost one in two firms assign an importance score of three or higher to this barrier. The intervention in our Experiment #1 will focus on this issue, with the goal of giving business owners a complete and timely picture of the tender opportunities that could be of interest to their firm.

Lack of financial capabilities, which are necessary to compete for large contracts, is also cited as an important reason by a large share of firms. On the other hand, firms believe that their lack of information about the documents to be submitted for bidding or of the criteria to assign a contract, or their lack of technical qualification to be successful in the market, are less important barriers.

3. Experiment #1: Increasing Information About Procurement Opportunities

The goal of our first experiment is to investigate whether decreasing information frictions about available procurement opportunities increases firms' participation in the public procurement market.

3.1. **The "Transparency Project".**

A large number of firms in our sample for Experiment #1 believe that lack of adequate and timely information about procurement opportunities is an important barrier to their participation in the procurement market. Uganda lacks a centralized online system to advertise tender notices for competitive procurement contracts, and the main way in which tenders are advertised is through newspapers. Procurement regulations require that a bid notice for open bidding procurement is published "in at least one newspaper of wide national circulation" (PPDA Regulation 42(1) of 2014).[20]

[20]Bid notices should also be displayed on the board notice at the PDE's premises and on PPDA website (PPDA Regulation 42(2) of 2014). However, consultation of the PPDA website by our research team reveals that very few tenders are posted online. Consistent with this, when asked about their main sources of information about tenders, the respondents in our Experiment #1 sample report that newspapers are by far the most important source of information (see Appendix Figure A.3).

This system of tender advertising makes it difficult for firms to obtain timely information about procurement opportunities. In practice, obtaining the full set of available tender opportunities would require a firm to purchase every day all Ugandan newspapers and to search through their pages in order to spot any tender notice. Anecdotes as well as our data collection efforts reveal that tenders are often quite "hidden" in secondary sections of a variety of newspapers, including tabloids. Moreover, tenders are often published in close proximity to the bidding deadline, reducing the time that firms have in order to learn about them. The median firm in the sample says that, on average, they learn about a procurement opportunity 7 days before the deadline. As a result, many firms report that a common strategy they use to gather information is to rely on personal connections with firms and officials, which may not only lead to underestimating the available opportunities, but may also disadvantage firms without personal connections.

The goal of our intervention is to approximate a scenario in which firms have access to a centralized nationwide e-procurement portal, allowing them to obtain continuous information about all available tender opportunities in a timely manner. With this objective, we organized a large field research team as part of the *Transparency Project*, which ran from October 2019 to July 2021. Over this period, the team gathered daily information on all new tender notices that were advertised by PDEs. The sources included *all* the newspapers published in the country, of which both the printed and the online versions were purchased and consulted, the websites of all PDEs, and the PPDA website. Communications containing the tender opportunities were sent to the treatment group of 1,525 out of the 3,045 firms in our sample with bi-weekly "newsletters," via e-mail, WhatsApp, and/or SMS.[21] See Appendix Figure A.4 for an example of our newsletters and Appendix Section B for the text we use to introduce the intervention to treated firms.

As part of our early focus groups and baseline, several firms reported interest in receiving information about tenders relevant to them, given that most firms are quite specialized in a given product or service. Accordingly, our communication of tender notices was personalized to each firm, as we only included the newly published tenders that were a good fit for the firm. The fit between each tender and firm was determined based on an algorithm we designed for the Transparency Project, which conservatively predicted which tenders might be of interest to a given firm based on business activity, location, and firm characteristics.

[21]Firms were allowed to choose their preferred method of communication, and were able to update such method at any time.

Our information intervention included several additional pieces of information, so as to ensure that treated firms would have nearly no transparency gap about the existence of potential tender opportunities. For example, our team also collected all the tenders appearing in the procurement plans, which are published by PDEs at the beginning of the fiscal year to provide interested parties with a tentative timeline of various tenders they plan to advertise (see Section 2.1). These procurement plans are supposed to be made public by PDEs, but this is rarely done. We therefore collected and aggregated this information in collaboration with PPDA. Then, our Transparency Project team sent this information as part of one of the initial newsletters at the beginning of the fiscal year in order to make firms aware of the tenders that each PDE was planning to publish over the coming 12 months. Moreover, in addition to tender notices, PDEs regularly post calls for pre-qualifications, which indicate instructions for firms to become pre-qualified with a given PDE so as to access solicitations for proposals and other communications regarding discretionary tender opportunities. We shared all pre-qualification calls with all treated firms.

All together, our information treatment resembles the transparency part of typical e-procurement reforms around the world, where firms can have continuous access to information on all procurement opportunities relevant to them. Over the 26 months of the experiment, our team identified a total of 4,139 tender notices that were of potential interest to at least one firm in our sample, corresponding to an average of 159 tender notices per month. Of these, only 184 (or 4.45 percent) were not collected primarily through newspapers, confirming their leading role as source of information on tenders. The median firm in our treatment group received information on a total of 621 tenders over the course of the experiment.

3.1.1. *Strengthening the Treatment for a Subset of Firms.* Information frictions are likely to be especially important for firms that are interested in doing business with the government and that are not yet well established in the market. Our sample likely consists of many of these firms. These firms might face other basic frictions, which might interact with lack of information, such as financial frictions or basic knowledge of steps to bid for a government contract (Hjort et al., 2020). To further isolate the role of information about procurement opportunities *per se*, we therefore strengthened the intervention for half of our treatment group.

Specifically, 760 out of the 1,525 treated firms additionally received: (i) a one-time reimbursement for the purchase of the documents necessary to submit a bid for a specific contract (which usually cost around USD 50), and (ii) an explanation of the

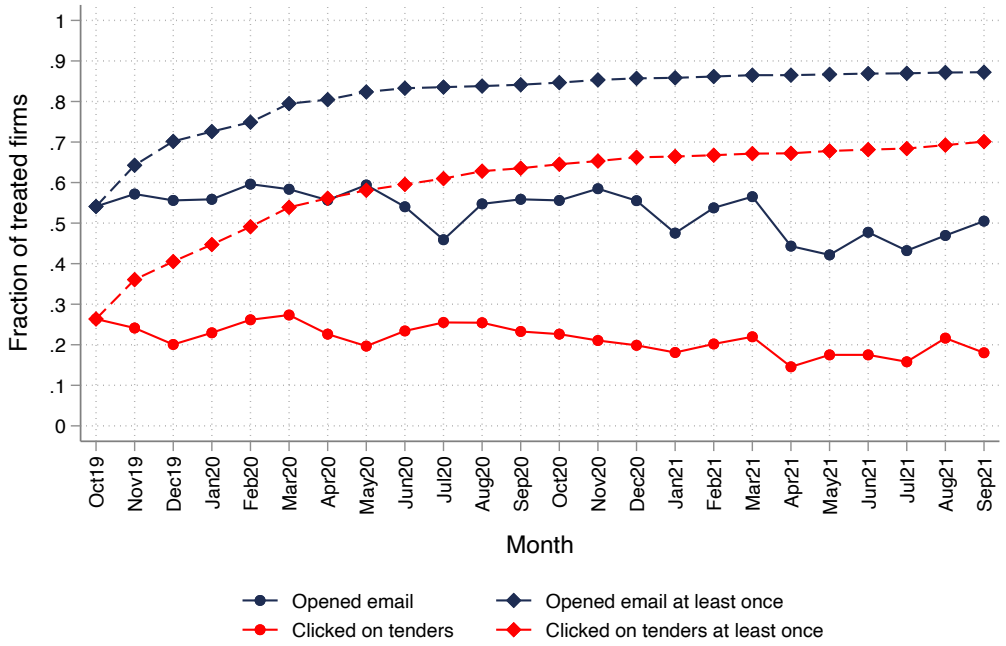
steps to take when interested in participating in a specific tender. We restrict (i) to reimbursements for contracts with entities with whom they have not done business with recently. As for (ii), the explanation is based on the materials shared by PPDA with firms inquiring about how the procurement process works, with an emphasis on how to inspect a potential contract and what to do after buying the bidding documents to submit a proper bid.

3.1.2. *Stratification and Balance.* The random assignment of firms in Experiment #1 is stratified on firm's location ("Kampala" versus "rest of the country"), sector ("construction" versus "supplies" versus "services"), and size (number of employees at baseline "above-median" versus "below-median"). Appendix Table A.1 shows that baseline characteristics are balanced across the three arms of the experiment (control group, information treatment, and strengthened information treatment). Appendix Table A.2 shows that this is true also if we restrict the sample to the 2,114 firms that we were able to reach for our endline survey, assuaging concerns about attrition bias.

3.2. **The Intervention Increases Information about Tenders.** The intended goal of our intervention was effective: firms found the newsletter useful, and this helped reduce the challenges that they faced in obtaining timely information about available tender opportunities. We establish this in three ways.

First, we show that firms were actively engaging with the newsletters throughout the duration of our experiment. Using data from our e-mail provider, we can track the share of firms that were opening each newsletter email. Furthermore, we can track the share of firms that clicked on the links listed in the newsletter, which provided full details about a specific tender opportunity. We show these shares in Figure 3, for each month between October 2019 and September 2021. In any given month, about 50 percent of firms opened at least one email, and about 20 percent of firms clicked on at least one link. During the last months of the newsletter service, the clicking rate is fairly similar to the one in the early months of our intervention. Importantly, as can be seen from the dashed lines in the figure, by the end of the experiment about 90 percent of treated firms have opened a newsletter email at least once, and about 70 percent of them have clicked on at least one link, indicating broad engagement with the newsletter among treated firms. Considering that the tracking technology for the email service provides a lower bound to engagement (as according to the data provider, while there is no possibility for false positive, there is a false negative rate of up to 50%), these patterns indicate that a large number of firms likely find our service useful in order to learn about procurement opportunities.

FIGURE 3. Number of Firms Opening and Clicking on Newsletter Emails



Notes: The figure plots the fraction of firms in the treatment group that opened at least one email and that clicked on at least one tender link. The circles (continuous lines) indicate the fraction of firms doing so in a given month, while the diamonds (dashed lines) indicate the cumulative fraction over time.

Second, our endline survey includes some questions asked only to treated firms with the goal of gauging their degree of satisfaction with the newsletter service. The average rate of satisfaction on a scale from 0 to 10 was 7.2, with 75% of firms rating the service at 6 or above. 75% of firms said that the newsletter was a very important source to learn about tender opportunities (5 on a 1–5 scale), and 63% of firms said that they opened the newsletter email several times per month.

Third, we estimate the treatment effects on firm's information about tenders. While it is impossible to measure the actual information change for each firm over time, we provide suggestive evidence based on general questions regarding firm's self-reported information in our endline surveys. To do so, we estimate the following equation:

$$y_{i1} = \alpha + \beta T_i + \gamma y_{i0} + s_i + X_i^{'}\delta + \varepsilon_i, \tag{3.1}$$

where y_{i1} is the outcome of interest for firm i measured at endline, y_{i0} is its value measured at baseline, T_i is an indicator equal to one if firm i is assigned to receive

our detailed bi-weekly newsletter, s_i are strata fixed effects, and $X_i^{'}$ is a set of controls selected using the post double selection (PDS) lasso procedure (Belloni et al., 2014). This method increases power while mitigating the risk of potential omitted variable bias from imperfect balance on baseline characteristics across treatment arms among the firms surveyed at endline.[22]

Column 1 of Table 2, Panel A, shows that treated firms believe that lack of information about available tender opportunities is a less relevant problem in their attempts to bid for procurement contracts. Consistent with our newsletter service reducing the need to rely on the frequent consultation of newspapers, column 2 of the table shows that treated firms' rating of newspapers as an important source of information about tender opportunities is significantly lower than in the control group.[23]

3.3. **The Intervention Does Not Increase Participation in Procurement.** To assess the impact of increasing firms' information about available tender opportunities on their participation in the procurement market, we estimate equation 3.1 using as dependent variables the number of bids submitted and the number of procurement contracts won.[24] We measured these outcomes at two different points in time after the beginning of the intervention. In a midline survey conducted approximately one year after the beginning of the intervention (September–October 2020), we measured the firm's procurement activity in the preceding six months. In our endline survey, we measure the firm's procurement activity over the last fiscal year.

Despite the significant "first stage," we do not find any significant effect of our intervention on participation in procurement, neither at midline nor at endline. Columns 3 and 4 of Table 2, Panel A, show that the number of bids submitted by treated firms, and the number of procurement contracts won, do not differ significantly among treated and control firms after approximately one year from the beginning of our intervention. Columns 5 and 6 show that this *null result* did not change at endline, approximately two years after the beginning of the intervention.[25]

[22]The set of potential controls include all variables in Appendix Table A.2 that present no missing values for the firms successfully reached at endline. In the Appendix, we present a version of all our results without these controls.

[23]Note that in the specifications in column 1 and 2 we lose 10 and 7 firms, respectively, due to a small number of respondents not answering these survey questions.

[24]To account for outliers, we winsorize both variables at the 99% level.

[25]We obtain similar results at endline from an IV specification in which treatment assignment status is used as an instrument for having clicked on at least one tender in the newsletter. We also re-do the analysis with OLS and results do not change (see Appendix Table A.3).

3.3.1. *Intermediate Actions.* One possible reason behind the lack of increase in procurement activity is that, upon learning of new interesting tender opportunities, treated firms attempted to bid but were discouraged at some intermediate step in the bidding process. We can investigate this hypothesis by looking at a number of additional questions we asked as part of our firm surveys. In our midline survey, we asked firms about the number of tenders for which they decided to inspect the bidding documents in the previous six months. The "inspection" is considered the key first step in the bidding process. For each tender, PDEs provide a time window in which firms can consult the bidding documents at the PDE's premises, so as to analyze the full details about the contract and the requirements to submit a bid.[26] Furthermore, in our endline survey, we asked firms about the number of times they decided to obtain more information about a tender, either by visiting the PDE or by contacting a procurement official. We additionally asked firms for how many contracts the firm bought the bidding documents, which is the final key preliminary step to prepare a bid for a specific tender.

We report the results of the analysis of intermediate steps to participate in public procurement in Table 2, Panel B. Columns 1–3 show that treated firms did not take any of the preliminary actions differentially from firms in the control group. In addition, columns 4 and 5 show that treated firms did not decide to pre-qualify with more PDEs, as measured either at midline or endline. We conclude that treated firms, despite being more informed about tender opportunities, were not more likely to take any action with the goal of obtaining more procurement contracts.

3.3.2. *Additional Financial and Knowledge Nudges Do Not Matter.* Another potential reason behind the lack of treatment effects is that increasing information about tender opportunities is not enough for firms that lack previous experience on the functioning of the process to bid for a tender or for firms who might be constrained financially to buy bidding documents. Our strengthened information treatment is aimed at testing for this, as 760 out of the 1,525 treated firms were additionally offered a reimbursement for the purchase of the documents necessary to submit a bid as well as a detailed explanation of the specific steps necessary to submit a complete bid.

As shown in Appendix Tables A.4 and A.5, we find no significant treatment effect of this intervention along any of our procurement outcomes. Despite increasing their knowledge about tender opportunities, these additional nudges did not lead firms to increase their participation in public procurement.

[26]Given the limited space available, tender notices published on newspapers contain only the main details of the tender, and firms are invited to collect more information about the tender by inspecting the full contract documentation.

TABLE 2. Experiment #1: Does Transparency about Tender Opportunities Matter?

Panel A: Main outcomes

	Endline		Midline		Endline	
	(1)	(2)	(3)	(4)	(5)	(6)
	Lack of info	*Newspapers*	*Bids*	*Won*	*Bids*	*Won*
Information treat	-0.114*	-0.125**	0.111	0.033	-0.359	-0.191
	(0.064)	(0.052)	(0.173)	(0.052)	(0.256)	(0.122)
	[0.074]	[0.017]	[0.521]	[0.524]	[0.160]	[0.117]
Firms	2104	2107	2357	2355	2114	2114
Mean DV	2.357	4.241	2.541	0.561	4.070	1.743

Panel B: Intermediate actions

	Midline	Endline	Endline	Midline	Endline
	(1)	(2)	(3)	(4)	(5)
	Inspections	*Inspections*	*Bought doc.*	*Prequalif.*	*Prequalif.*
Information treat	0.074	0.108	-0.452	-0.020	0.022
	(0.077)	(0.740)	(0.342)	(0.030)	(0.064)
	[0.341]	[0.884]	[0.187]	[0.493]	[0.728]
Firms	2670	2114	2114	2670	2114
Mean DV	0.816	7.755	4.464	0.391	0.757

Notes: The table shows coefficients, standard errors (in parentheses), and p-values (in square brackets) from estimating Equation 3.1. *Information treat* is an indicator equal to 1 if the firm is assigned to the group receiving information about tender opportunities. **Panel A: Main outcomes:** the dependent variables are: continuous variable from one to five reporting firms' answers to the question "How important is lack of information on available procurement opportunities in explaining lack of bidding in your firm, on a scale from one to five?" (column 1); continuous variable from one to five reporting firms' answer to the question "How important are newspapers as a source of information on tenders, on a scale from one to five?" (column 2); number of bids submitted between March and September 2020 (column 3); number of contracts won between March and September 2020 (column 4); number of bids submitted between October 2020 and November 2021 (column 5); number of contracts won between October 2020 and November 2021 (column 6). Number of bids and contracts won are top 1% winsorized. **Panel B: Intermediate actions:** the dependent variables are: total number of contracts inspected between March and September 2020 (column 1) and between October 2020 and November 2021 (column 2); number of contracts for which the firm has bought any bidding document between October 2020 and November 2021 (column 3); total number of pre-qualifications made between March and September 2020 (column 4); total number of pre-qualifications made between October 2020 and November 2021 (column 5). Controls in both panels include 12 strata fixed effects, the value of the dependent variable measured at baseline, and a set of controls measured at baseline and selected using a post-double lasso procedure out of those for which there were no missing among the non-attritors. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

4. Experiment #2: Changing Firms' Perceptions

The lack of effects from our interventions from Experiment #1 suggests that typical tender transparency reforms alone, even when accompanied by additional nudges such as financial incentives and educational interventions, may not be sufficient to increase participation in public procurement—a key objective of policy makers and international organizations around the world.

According to our descriptive evidence in Section 2.4, the most important self-reported barrier to firms' wider participation in procurement is the perception that the system is corrupt and that firms cannot compete on a level playing field without personal connections to public officials. This motivating fact suggests one important potential barrier that our first experiment did not address: firms' lack of information about the integrity of specific PDEs. In a context as opaque as that of government-firm relationships, firms might lack information about the integrity of PDEs engaging in procurement activities. This uncertainty, coupled with the diffuse prior regarding the level of corruption and inefficiency that is pervasive in the procurement market, might lead them to do little or no business at all with the government.

We designed a second intervention to shed more light on these issues. Our Experiment #2 involves two main components. First, we develop an incentivized field experiment to precisely identify whether firms' perceptions about PDEs are indeed an important determinant of firms' participation in procurement (Section 4.1). Second, we assemble a unique database on both aggregated market-wide perceptions as well as government audits, which form the core of our main information intervention aimed at assessing whether providing firms such rich information about government entities' integrity—which allows firms to form more accurate perceptions about specific PDEs—affects their participation in public procurement (Sections 4.2 and 4.3).

4.1. **Identifying Firms' Preferences for Procurement Contracts: An Incentivized Tender Rating Experiment.**

Self-reported measures of barriers to firm participation in public procurement, like the one that we collected as part of our survey for Experiment 1, are interesting, but remain subject to common concerns such as strategic mis-reporting. In order to more convincingly establish that firms' perceptions about the integrity of PDEs matter for their interest in procurement, we conduct an incentivized non-deceptive field experiment, inspired by the incentivized resume rating

(IRR) paradigm used in the labor literature to study discrimination in the hiring process (Kessler et al., 2019).[27] Specifically, in our context, we ask each firm to evaluate 10 hypothetical tender notices for contracts in their sector, under the real incentive that they will receive a bi-weekly newsletter with procurement opportunities tailored to their preferences. This is possible thanks to our infrastructure of the Transparency Project from Experiment #1. In practice, based on firms' evaluation of hypothetical tenders, we feed a simple machine learning algorithm that matches each individual firm to contracts that are predicted to be a best fit for them.

As described in Section 2.3, a total of 524 firms active in public procurement and interested in our incentive agreed to participate to this study.

4.1.1. *Creating Hypothetical Tenders.* We experimentally create tenders that look fully realistic by structuring them exactly as real tenders appearing in local newspapers or government websites. The content of the tenders also appears fully realistic as it is informed qualitatively (e.g., giving us rich information on the text and style of various tender components, the titles of contracts, etc.) and quantitatively (e.g., giving us data on the distribution of tender characteristics) by our large data collection effort of thousands of real tenders as part of the Transparency Project.[28]

A key part of the experimental design is that we are able to randomize a number of tender characteristics, including, for example, the identity of the PDE, days to deadline, the administrative burden required to bid, the procurement schedule, the value of the contract, the location, who is funding the work, and several other features. Appendix Table A.6 shows the eleven components that we randomize across tenders, which we use to build eleven dummies that we include in our regressions. Appendix Table A.7 shows the possible values that each component can take, as well as the probability that each of the eleven dummies takes value one.[29]

4.1.2. *Evaluating Tenders.* At the start of the section, firms are informed with an animated video of how their answers will be used to customize the tender newsletters

[27]The basic idea of Kessler et al. (2019) is that asking respondents to rate hypothetical but real-looking resumes in an incentive compatible setting allows to recover, without deception, true unbiased preferences, in a way similar to resume-audit studies (Bertrand and Mullainathan, 2004). Tukiainen et al. (2023) elicit procurement officers' preferences for procurement outcomes in Finland using conjoint survey experiments.

[28]Specifically, we use as starting database the more than 2,000 tenders collected by our team during the period between July and December 2019. Further, to ensure realism, we use 32 different templates inspired by the aesthetics of real tender adverts appearing in newspapers.

[29]We do introduce a few basic logical restrictions to ensure firms are not shown anything that looks completely unrealistic. Relatedly, our team of research assistants also manually checked and tested the full set of tenders randomly generated by our Python program for any inconsistency.

that our team will send them over the following months. The video was created by our team to ensure the incentive structure was clear, and was shown by the enumerator to each firm in person on a tablet.

One common concern in the implementation of the experimental IRR-like paradigm is how to ensure that the item being presented for evaluation is worth considering for the respondent. In our context, a concern in particular is that despite showing only contracts in their sector, it is still possible that a firm sees a contract title (typically indicating the detailed service or product expected to be delivered) that is not in line with their business. A general approach to address such concerns is to implement a "qualify/disqualify" test, whereby respondents are first shown a preview of certain basic characteristics of the item (in our case, of the tender), allowing for the skipping of items deemed irrelevant.[30] We implement this test in our experiment, ensuring each firm rates only tenders in their sector that they deem worth considering.

Each firm rates a total of 10 tenders. Of these 10 tenders, 6 come from PDEs with which the firm had reported being familiar and for which the firm had reported perceptions about its integrity across different dimensions. We focus on these tenders in our analysis. The additional 4 tenders come from other randomly selected PDEs or from large private buyers, and were introduced to enhance the realism of the rating experiment.

Firms are asked to express their interest in bidding for each tender using a scale between 1 and 10, where 1–2 means "little interest," 3–4 "some interest," 5–6 "high interest," 7–8 "very high interest," and 9–10 "perfect match." The specific question is: "If you see this tender notice from this entity, how interested would you be in bidding for this contract?" This *Interest* measure represents our primary dependent variable. We further ask a second *Likelihood* question (also on a scale of 1–10): "Assume that you have submitted a bid for this contract. How likely do you think it is that you win?"

4.1.3. *Results.* We estimate the following baseline specification on a dataset at the firm-tender level:

$$y_{ip} = \alpha_p + \Gamma_{ip}^{'}\beta + X_{ip}^{'}\delta + \varepsilon_{ip}, \tag{4.1}$$

[30]During the pilot phase of this experiment, respondents shared that when they are looking for opportunities, they usually scroll through newspapers and websites focusing primarily on the contract titles of tender adverts, and they only read further if the title is indeed aligned with their activity.

where y_{ip} represents our *Interest* or *Likelihood* variables, as expressed by firm i when evaluating hypothetical tender p. The matrix Γ_{ip} captures eight firm-specific perceptions regarding the PDE appearing in the (randomly drawn) tender, as well as indicator variables for the firm's reported past experience with that PDE.

To measure perceptions, before conducting the tender rating experiment, we told firms to think about all the contracts advertised by the PDE during a year. We then elicited their belief about the percentage of those contracts satisfying a specific condition. Specifically, we elicit firm's beliefs about the percentage of a PDE's contracts: (i) that are carried out according to the procurement plan submitted at the beginning of each fiscal year (*timely procurement process*); (ii) that are completed in time, once initiated (*timely completion*); (iii) in which the firm is paid in time (*timely payment*); (iv) in which the PDE explained to losing bidders the reasons for not being selected (*feedback*); (v) that are won by providers that have a personal connection with public officials (*personal connections*); (vi) in which the winning firm had to give a "gift" to public officials in exchange for the contract (*corruption*); (vii) that receive a bid from at least three interested providers (*competition*); and finally, (viii) we ask the firm (on a scale from 0 to 100) how much the PDE complies with the rules and regulations that should be followed by law when engaging in public procurement (*compliance score*).[31] The matrix Γ_{ip} also includes a dummy equal to one if the firm has ever bid for a contract advertised by that PDE in the past, a dummy equal to one if the firm has ever won a contract with that PDE in the past, and a dummy equal to one if the owner/manager knows at least one public official working at that PDE. Importantly, all the survey questions that we use to construct these variables were asked before respondents' evaluation of the tenders.

The matrix X_{ip} contains indicator variables for each tender characteristic that we randomize as well as strata fixed effects and fixed effects for the order in which the hypothetical tender was shown to the respondent.[32] Finally, we control for PDE fixed effects (α_p), so that we are comparing differences in perceptions for the same PDE across different firms. We cluster standard errors at the firm level.

Figure 4, Panel A, shows the results of our incentivized tender rating experiment, focusing on the PDE-firm specific perceptions and experiences included in the matrix

[31]See Appendix C for a list of the questions we asked.

[32]Specifically, we control for a dummy equal to one if the firm is active in Kampala, a dummy equal to one if the firm is active in the construction sector, and their interactions, so as to capture the strata fixed effects used in the same sample for the information intervention part of the experiment, as discussed next in Section 4.2. We also include "order" fixed effects to capture any impact on the evaluation of the tender stemming from the order in which the tender is shown to the respondent.

Γ_{ij}. All coefficients are standardized in order to make their magnitude comparable across different variables.

We find that the more positive a firm's perception regarding the integrity of the entity, the higher the firm's interest in the tenders advertised by that entity. This is true for perceptions that the PDE conducts the procurement process in a timely manner, provides feedback to unsuccessful bidders, has higher competition for its contracts, is less corrupt, and is more compliant with the regulations. Results when using the firms' subjective likelihood of winning the contract as dependent variable follow qualitatively similar patterns.[33]

The magnitude of the effects is large when compared to the effects of having a previous positive experience with the PDE. A one standard deviation increase in the perception that the PDE is corrupt leads to a decrease of 0.07 standard deviations in the 0–10 interest scale. Similarly, a one standard deviation increase in the perception that the contracts administered by the PDE are characterized by a sufficient level of competition leads to an increase of 0.15 standard deviations in interest for the tender. As a comparison, having previously won a contract with the PDE is associated with an increase in interest of 0.1 standard deviations. In other words, a firm's perception on the average level of corruption and competition of the contracts administered by a PDE matters for the willingness to do business with that PDE as much as, or more, than having won a contract with the PDE in the past.

The results of the tender rating experiment suggest that a firm's perceptions about the integrity of the PDE conducting the procurement process is an important driver of the firm's willingness to do business with that PDE. At the same time, as we show in the next section, there is wide variation in (mis)perceptions firms hold about the integrity of many PDEs.

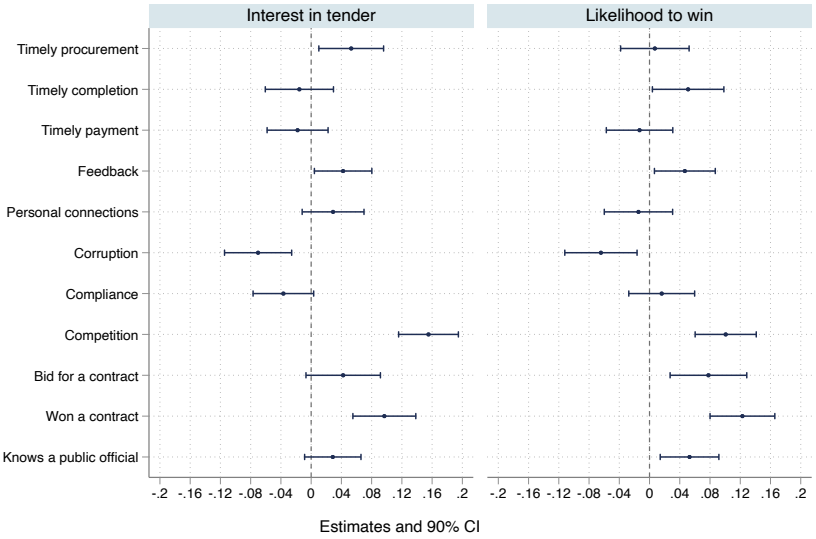
4.2. **Distribution of Firms' Perceptions Relative to the Wisdom of the Crowd and to Government Audits.** While firms believe that the system is characterized by a large amount of corruption, there is variation in the extent of perceived integrity across PDEs. We can capture this variation using data from two sources.

First, as explained above, we elicited firms' perceptions of PDEs in one of our midline surveys for Experiment #1. We use data from the midline survey for Experiment #1 to construct a set of PDE-specific scores capturing the average perception by market

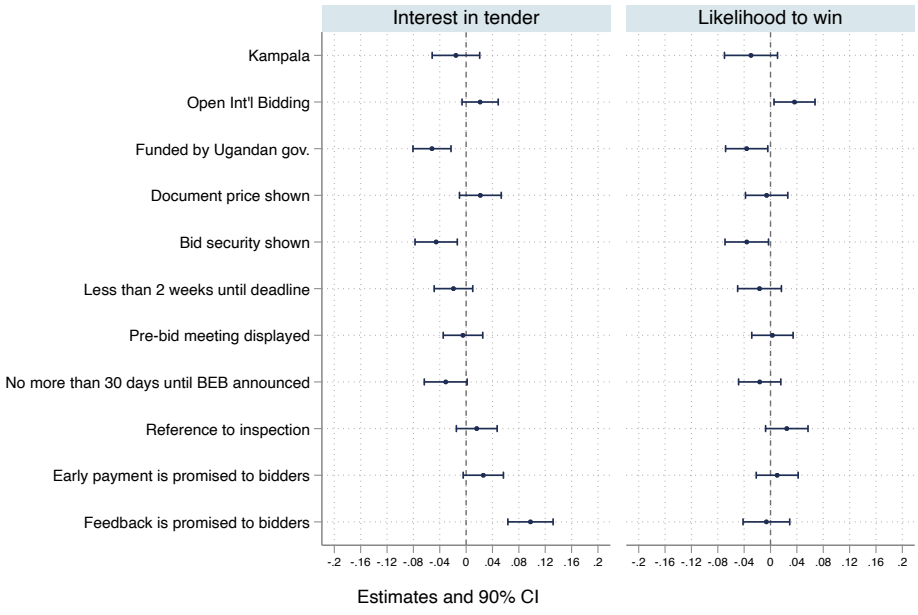
[33]Figure 4, Panel B, reports the impact of other tender characteristics on the firm's evaluations of the tender. Interestingly, firms are less interested in contracts funded by the government (vis-à-vis an international donor), and there is suggestive evidence that the closer the tender's deadline to the publish date, the less interested firms are in bidding for it.

FIGURE 4. Identifying Drivers of Firms' Interest in Public Tenders

(A.) Tender Rating, Firms' Perceptions, and Experience with Entities



(B.) Tender Rating and Tenders Characteristics



Notes: The figure reports standardized effects and 90 percent confidence intervals from the estimation of Equation 4.1. *Dependent variables*: "interest in bidding" for a randomly selected contract, on a scale between 1 and 10 (left panel); perceived "likelihood of winning the tender" on a scale between 1 and 10 (right panel). Panel A plots the effects of perceptions and past experience of the firm with the PDE (contained in $Gamma_{ip}$ in Equation 4.1. Panel B plots the effects of characteristics of the tender shown to the firm contained in X_{ip} in Equation 4.1.

participants on a specific PDE. We refer to these scores as the "market perceptions." Specifically, we elicit perceptions about six of the eight dimensions of integrity that we elicited from the firms in the sample for Experiment #2 (*timely completion*, *timely payment*, *feedback*, *personal connections*, *corruption*, *compliance score*). For each PDE, we average the scores across all the firms that report being familiar with the PDE. As shown in Appendix Figure A.5, Panel A, there is considerable variation across PDEs in each of the indicators. For instance, the PDE at the 25th and the one at the 75th percentile have a corruption score of 0.46 and 0.57, respectively. The interquantile range for the compliance score is instead 0.11.

The second source of information about the integrity of different PDEs are the audits conducted by PPDA between 2014 and 2019, and discussed in Section 2.2. Based on the evidence collected, the auditors and PPDA assign each audited PDE a set of scores, on a scale of 0 to 100, for four indicators of the PDE's performance and general compliance with the procurement regulations, corresponding to four of the variables (*timely completion*, *timely payment*, *compliance score*, *timely procurement process*) on which we elicited perceptions from the firms in our Experiment #2 sample. We refer to these PDE-specific scores as the "audit scores." Using this source of data, we again see considerable variation across PDEs in their degree of compliance with the procurement regulations (Appendix Figure A.5, Panel B).

In order to document to what extent the perceptions of a PDE by the firms in the Experiment #2 sample deviate from these indexes, we construct the average deviation in a firm's perception relative to the market perception or to the audit score, for each dimension, for each entity, and for each firm. Specifically, we calculate this as follows:

$$score_{ip}^{k} = \bar{x}_{p}^{k} - x_{ip}^{k}$$

where $\bar{x}_{p}^{k}$ is the "market perception" or the "audit score" of entity p on dimension k (for instance, on the extent to which the entity is corrupt), and x_{ip}^{k} is firm i's perception of entity p along dimension k.[34] The further away the distribution is from 0, the larger the dispersion of beliefs regarding public entities' integrity.

Figures 5 and 6 plot the distributions of the deviations for each score relative to the market perceptions and the audit scores, respectively. The $score_{ip}^{k}$ are normalized to be

[34]Notice that not all measures are present in both the market perceptions and the audit scores. Specifically, timely completion, timely payment, and compliance score are present in both; timely procurement is present exclusively in the audits; likelihood of getting feedback, number of contracts assigned through personal connections, and number of contracts awarded in presence of corruption are included exclusively in the market perceptions.

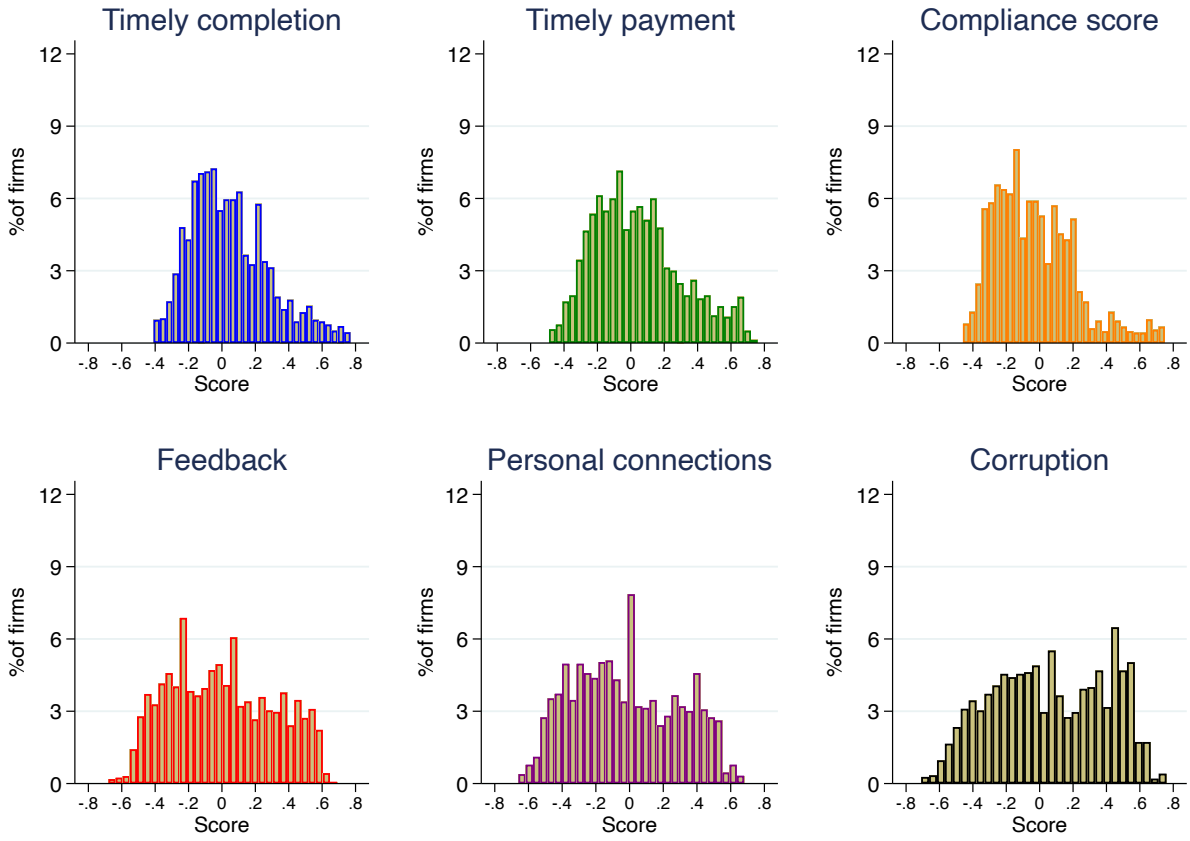
between 0 and 1, so that, for instance, a score of 0.3 for the compliance index for firm i and entity j means that firm i believes that the share of contracts characterized by poor compliance for entity j is 30 percentage points more than what we see in the market perception or in the audit score. The figures show substantial deviations from 0 along all dimensions, and relative to both market perceptions and audit scores. For instance, when focusing on the market perceptions and on the corruption index, the share of $score_{ip}^{k}$ greater than 0.3 or lower than 0.3 (i.e., the share of firm-PDE pairs where the firm's perception is "off" by more than 30 percentage points relative to the "wisdom of the crowd") is 49%. In other words, in 49% of the cases a firm is "overoptimistic" or "overpessimistic" by more than 30 percentage points about the level of corruption of a PDE, relative to the "wisdom of the crowd." As another example, when focusing on the audit scores, in 38% of the cases a firm is "overoptimistic" or "overpessimistic" by more than 30 percentage points about the share of contracts in which firms are paid on time, relative to what was revealed in PPDA's audits. We see similarly large degrees of misperceptions across all dimensions of an entity's integrity.

4.3. **Experimental Design: Changing (Mis)Perceptions.** Motivated by the large degree of variation in firms' perceptions about PDEs, in our Experiment #2 we provide a random subset of firms either information on the market perceptions of different PDEs, or information on the PPDA's audit scores. The goal of this information treatment was to increase the amount of information on which a firm can rely on in order to form beliefs about the integrity of specific PDEs. Importantly, the evidence in the previous section shows that firms are frequently overly *pessimistic* about the integrity of specific PDEs, relative to the average perceptions among market participants and to government audits.

The information is presented in the form of well-organized physical reports spanning several pages, containing easy to consult tables which summarize the scores obtained by PDEs across the various dimensions of integrity.[35] In the case of audits, our report is significantly easier to read than the long unstructured reports typically compiled by the auditors and it neatly aggregates information from multiple audit reports for the same PDE. In Appendix Section D, we show examples from the introductory texts of each report, explaining to the user how to interpret the statistics in each of the reports. We also report examples from the templates explaining how to interpret the list of each report.

[35]The number of PDEs appearing in the market perceptions report (i.e., mentioned by the sample of firms interviewed to generate this report) and in the audit scores report (i.e., audited by PPDA) are 257 and 203, respectively.

FIGURE 5. Deviations between Firms' Perceptions and Market Perceptions



Notes: The histograms plot the distribution of the deviations of firms' perceptions regarding the average score of each public entity from the ones reported in the market perceptions report. The deviations are constructed as referenced in Section 4.2. The further away the distribution is from 0, the larger the dispersion of beliefs regarding public entities' performance.

We randomly assign the 524 firms in the sample to one of three groups. While all three groups are provided with both reports, we vary the timing in which each group receives them: either at baseline or after the endline 7 months later.[36] A first treatment group ($N = 171$) receives the *market perceptions* report immediately after the baseline survey and the audits report after the endline survey. A second treatment group ($N = 169$) receives instead the *audits report* immediately after the baseline survey and

[36]See Section 2.3 for details on the precise timing of the surveys. When reports are delivered at baseline, they are provided to firms at the very end of the survey.

FIGURE 6. Deviations between Firms' Perceptions and Audit Scores

Notes: The histograms plot the distribution of the deviations of firms' perceptions regarding the average score of each public entity from the ones reported in the government audit report. The deviations are constructed as referenced in Section 4.2. The further away the distribution is from 0, the larger the dispersion of beliefs regarding public entities' performance.

the market perceptions report after the endline survey. The control group ($N = 184$) receives both reports after the endline survey. The random assignment to the treatment arms is stratified by sector ("construction" versus "supplies" versus "services") and location of the firms ("Kampala" versus "rest of the country"). Appendix Tables A.8 and A.9 report the balance checks between treated and control firms.

Importantly, all firms in the sample also received the bi-weekly newsletter with information on tender opportunities so as to ensure that information about available tender opportunities was not a meaningful friction for any of the firms in our study.

We are interested in whether providing hard information about the integrity of PDEs—therefore allowing firms to form more accurate perceptions—affected their participation in public procurement over the seven months between the baseline and the endline survey. We measure participation by looking at both the total number of bids for procurement contracts and the number of procurement contracts won. Akin to equation 3.1 from Experiment #1, we estimate the following specification:

$$y_{i1} = \alpha + \beta T_i + \gamma y_{i0} + s_i + X_i^{'}\delta + \varepsilon_i, \tag{4.2}$$

where y_{i1} is the outcome of interest for firm i measured at endline, i.e., the total number of bids and contracts won (top-winsorized at the 99% level). T_i is an indicator equal to one if firm i receives either our *market perceptions* or *audits* report. We also control for y_{i0}, i.e., the measure of bids and contracts won at baseline, for strata fixed effects s_i, and for a set of controls $X_i^{'}$ selected using the post double selection (PDS) lasso procedure.

Additionally, we are interested in understanding what type of information—market perceptions or audits—is more relevant to firms. We therefore also estimate the following equation:

$$y_{i1} = \alpha + \beta_1 T_1 + \beta_2 T_2 + \gamma y_{i0} + s_i + X_i^{'}\delta + \varepsilon_i, \tag{4.3}$$

where β_1 and β_2 capture the effect of the markets perceptions reports and the audits reports, respectively.

We report the results from the estimation of equations 4.2 and 4.3 in Table 3. We find that our information intervention increases the total number of bids by treated firms on average (column 1), even though the estimated coefficient is marginally statistically insignificant. On the other hand, treated firms significantly increase the total number of contracts won (column 3). The magnitudes are large, as bids and contracts won go up by 20% and 37.6%, respectively, after only 7 months. When looking at the relative importance of the two different treatment reports in columns 2 and 4 of the same table, we find that the audits reports, which rely on government data, do not have much of a significant effect on firms' procurement participation. Instead, firms respond strongly to the information contained in the market perception reports, with treated firms reporting 50% more contracts won compared to control firms. While we do not have enough statistical power to distinguish whether the effects of the two treatment reports are different from each other, our evidence points to the likely higher trust firms put in other firms' perceptions than in data provided by the government

itself, perhaps consistent with a general mistrust of government entities (in this case, of the primary anti-corruption body) among firms doing business with the government.

TABLE 3. Experiment #2: Does Addressing Misperceptions Matter?

	Total bids		*Contracts won*	
	(1)	(2)	(3)	(4)
Integrity Information	0.506		0.379**	
	(0.318)		(0.176)	
	[0.111]		[0.031]	
Market Perceptions		0.603		0.503**
		(0.397)		(0.228)
		[0.129]		[0.027]
Audits Scores		0.407		0.252
		(0.390)		(0.208)
		[0.297]		[0.227]
Firms	445	445	445	445
Mean DV	2.579	2.579	1.024	1.024
H_0: Market Perc. = Audits		0.673		0.331

Notes: The table shows coefficients, standard errors (in parentheses) and p-values (in square brackets) from estimating Equation 4.2 (columns 1 and 3), and Equation 4.3 (columns 2 and 4); *Integrity Information* is an indicator for being assigned to either one of the treatment arms; *Market Perceptions* and *Audits Scores* are indicators for being assigned to receiving either the other firms' perceptions report or the audits reports. *Dependent variables*: Total number of bid, constructed summing all the bids reported at endline, that is between May 2021 and November 2021 (columns 1 and 2). Total contracts won, constructed summing the total number of bids won at endline (columns 3 and 4). Controls include 4 strata (a dummy equal to 1 for the firm being located in Kampala, a dummy equal to 1 if the firm is active in the construction sector and their interactions). We run a post-double lasso for optimal variable selection. The algorithm includes all the baseline covariates for which we have no missing among the non-attritors. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

We next provide evidence that these positive effects on procurement activity are driven by treated firms positively updating their perception of specific PDEs. To do so, we construct a matrix of size $N \times J$, where each entry is a firm-PDE link, with each of the N firms matched to each of the J PDEs appearing in the report. Then, focusing primarily on the market perception report, we estimate the following equation at the firm-PDE level:

$$\begin{aligned} y_{ij1} = \alpha_i + \gamma_j + \beta_1 T_i \times Men_{ij} \times TOP_j + \beta_2 T_i \times Men_{ij} + \beta_3 T_i \times TOP_j + \\ + \beta_4 Men_{ij} \times TOP_j + \beta_5 Men_{ij} + \gamma y_{ij0} + s_i + \varepsilon_i, \end{aligned} \tag{4.4}$$

where y_{ij1} is the outcome (bids or contracts won) for firm i and PDE j. T_i is an indicator equal to one if firm i received the report, Men_{ij} is an indicator equal to one if firm i mentioned being familiar with PDE j at baseline, and TOP_j is an indicator equal to one if PDE j is reported to have high integrity, namely it is ranked among the top decile in the ranking distribution shown in the report. This information captures the top PDEs in the "front page" of the report, which should be most salient to the firm and likely driving the effects on procurement participation. In this analysis, we include firm fixed effects (α_i) and PDE fixed effects (γ_j). Given the structure of the data, we estimate this specification using OLS. If the report is providing new information about the integrity of the PDEs which leads firms to update their priors, we expect the treatment effect to be driven by PDEs that are reported to have high integrity among the ones firms reporting having some opinions about.

Table 4, columns 1 and 3, shows the results, comparing firms receiving the market perception report to firms that did not receive the report. We find that treated firms receiving the market perception report bid more (p-value=0.05) and won more contracts (p-value=0.08) with PDEs they were familiar with and that are ranked as top performing in the market perceptions report. The magnitude of the effects are large: relative to firms that did not receive the report, treated firms more than double the number of bids with these PDEs, and the number of contracts won increases by almost three times. In comparison, we find precisely estimated zero effects for other types of PDEs: treated firms do not increase their participation with PDEs on which they were familiar but that are outside the top decile of integrity. Similarly, they do not participate more with high integrity PDEs with which they did not have any familiarity at baseline. This suggests that the treatment was particularly effective through its ability to provide information on the high integrity of a set of PDEs on which the firms had some priors.[37]

Theoretically, this effect could be driven by either a confirmation of priors, or by a correction of priors. In the first case, firms that have a positive prior about a PDE are pushed to increase their engagement with it when the report confirms that the PDE has indeed high integrity. In the second case, firms that have a negative prior about a PDE are pushed to increase their engagement with it when the report overturns that prior, showing that the PDE has instead high integrity. To tease out these mechanisms, we estimate a second specification similar to 4.4. In this specification, we replace the

[37]Notice that the results focus solely on the market perceptions report. Consistent with the audits report having less of an effect on firm activity, we do not detect any relevant heterogeneity from this analysis.

TABLE 4. Experiment #2: Does Addressing Misperceptions Matter? Heterogeneity

	Total bids		*Contracts won*	
	(1)	(2)	(3)	(4)
Treated × Mentioned × Top	0.823**		0.314	
	(0.416)		(0.195)	
	[0.048]		[0.107]	
Treated × Mentioned	-0.015		0.024	
	(0.063)		(0.038)	
	[0.809]		[0.528]	
Treated × Top	-0.002	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
	[0.216]	[0.507]	[0.128]	[0.314]
Treated × Score Optimist × Top		0.888		-0.263
		(1.059)		(0.410)
		[0.401]		[0.521]
Treated × Score Pessimist × Top		0.822*		0.674**
		(0.484)		(0.285)
		[0.090]		[0.018]
Treated × About Right × Top		0.127		-0.239
		(0.309)		(0.214)
		[0.680]		[0.264]
Observations	64872	64872	64872	64872
N. firms	306	306	306	306
N. PDEs	212	212	212	212
Mean DV top mentioned	0.327		0.143	
Mean DV top among pessimists		0.241		0.000

Notes: The table shows coefficients, robust standard errors (in parentheses), and p-values (in square brackets) from estimating Equation 4.4. The unit of observation is a firm-PDE pair. *Treated* is an indicator equal to 1 if the firm received the market perceptions report, *Mentioned* is an indicator equal to 1 if the firm had mentioned the name of the PDE at baseline, and *Top* is an indicator equal to 1 if the PDE is in the top decile of the integrity distribution of the PDEs. *Score Optimist* is an indicator equal to 1 if the firm belongs to the top 40th percentile of the distribution of the deviations between the firm's beliefs and the market beliefs; *Score Pessimist* an indicator for the firm belonging to the bottom 40th percentile; *About Right* a dummy equal to 1 if the firm's deviation belongs to the middle of the distribution (40th to 60th percentile). *Dependent variables*: a firm's total bids with the PDE (columns 1 and 3) and contracts won by the firm from the PDE (columns 2 and 4). Controls include dummies for strata FE (a dummy equal to 1 if the firm is active in Kampala and another if the firm is active in the construction sector, as well as their interactions). All specifications include firm fixed effects and PDE fixed effects. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

indicator for *Mentioned* with indicator variables that divide PDEs in those on which the firm held a pessimistic prior, those on which the firm held an optimistic prior, and those for which the firm had a prior that was in line with what is shown in the

report. Specifically, we define these indicators based on the deviation between the firm's belief and the market beliefs about a specific PDE, taking the average of scores firms assign to a given PDE along all dimensions we ask about (which are discussed earlier in this section). Normalizing negative and positive deviations (relative to market perceptions) into a continuous scale, we then define an "optimist" ("pessimist") a firm with a deviation in the top (bottom) 40th percentile. A firm which is "about right" is a firm whose deviation is in the middle (40th to 60th percentile).

We report the results from this analysis in columns 2 and 4 of Table 4.[38] We find that the treatment effect is entirely driven by those PDEs on which the firm held a pessimistic prior. The treatment effect increases the total number of bids for these firm-PDE pairs by about 400 percent, and the total number of contracts won from essentially 0 to 0.674 contract won by the firm with a given PDE in the 7 months of our intervention. This suggests that the treatment effect of the market perceptions report operates through a meaningful correction of prior beliefs.

5. Conclusion

This paper investigates whether information frictions about tender opportunities and corruption perceptions affect firm participation in public procurement. Isolating the role of these factors as drivers of low participation in the procurement market is empirically challenging. On the one hand, information levels, perceptions, and economic outcomes tend to be jointly determined. For instance, firms that are less likely to engage in procurement might also be less likely to acquire information about procurement opportunities or public entities. Moreover, e-procurement and related policies are typically implemented as a bundle, where transparency reforms are often accompanied by many other policy changes. Finally, rich micro-data is crucial, as we need to observe information levels and corruption perceptions as well as firms' participation in public procurement. These data are difficult to obtain, particularly in a low-income setting.

In order to tackle these challenges, we conducted two nation-wide information interventions in Uganda. The first intervention decreased information frictions about available procurement opportunities, approximating the existence of a centralized portal for tender notices. The second intervention allowed firms to form more accurate perceptions about the integrity of the public entities in charge of procurement contracts.

[38]Appendix Table A.10 reports a longer version of this table with other interacted coefficients previously not shown.

Our results show that increasing transparency about tender opportunities does not lead to an increase in firms' willingness to do business with the government, despite making them more informed about the availability of tenders in their sector. However, providing hard information about the integrity of specific public entities leads to an increase in firms' total number of bids and total government contracts won, especially for public entities revealed to have the highest integrity. The results seem driven by a mechanism according to which firms positively update their priors on public entities they were too pessimistic about. This suggests that in contexts characterized by low levels of transparency as well as widespread government corruption and inefficiency, firms might hold inaccurate, overly pessimistic perceptions about the integrity of public entities, which might influence important economic decisions such as doing business with the government (Olken, 2009; Bursztyn and Yang, 2022).

Our results, which were used by our partner and policy-makers in Uganda, can inform current efforts to reform public procurement markets in developing countries. These reforms typically place a special emphasis on increasing transparency about the functioning of the market by introducing e-procurement platforms. Our findings suggest that this might have limited success in increasing competition, unless coupled with broader transparency interventions and efforts aimed at improving firms' perceptions about government entities' integrity.

These results are naturally based on evidence from one context, that of Uganda, where negative perceptions about government entities may be particularly pervasive and information levels very low. While we believe our results may be informative for a number of similar contexts, especially across Africa, future work studying the role of transparency in different procurement markets is of first-order importance. Our finding that firms shy away from doing (more) business with government entities because of limited information about their integrity also points to likely negative consequences on the quality of public service delivery. While this is beyond the scope of our paper, we think understanding the consequences of potentially negative selection into firm-government relationships is an exciting area of future research.

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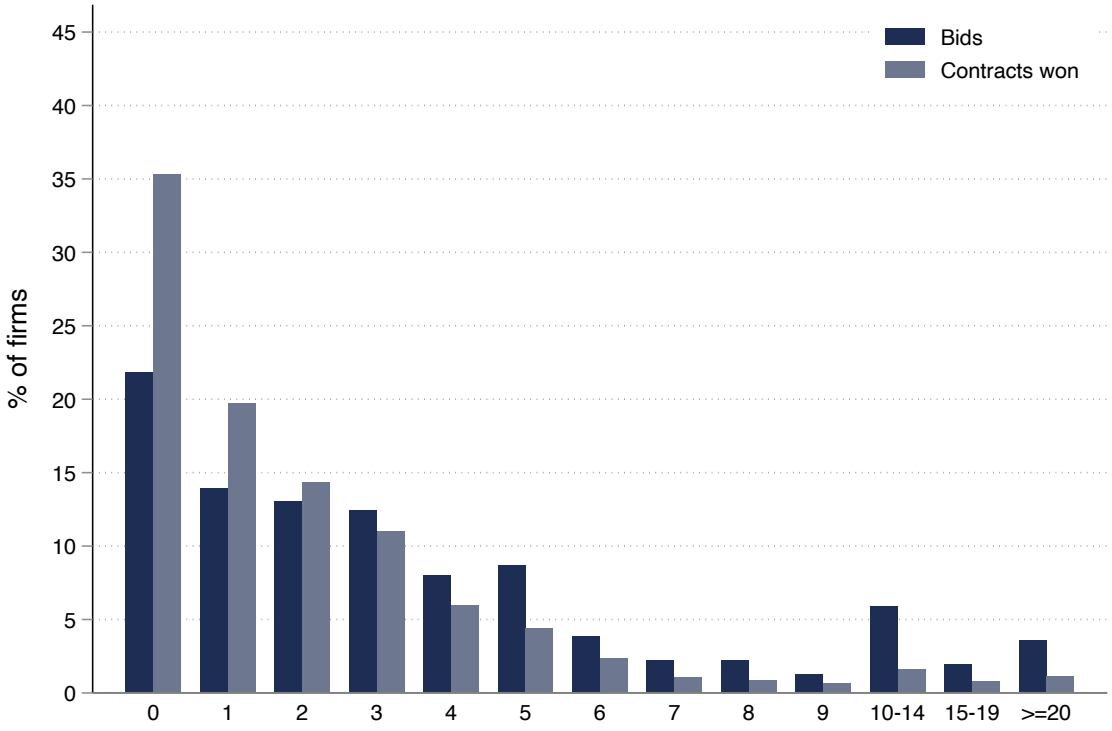
ONLINE APPENDIX

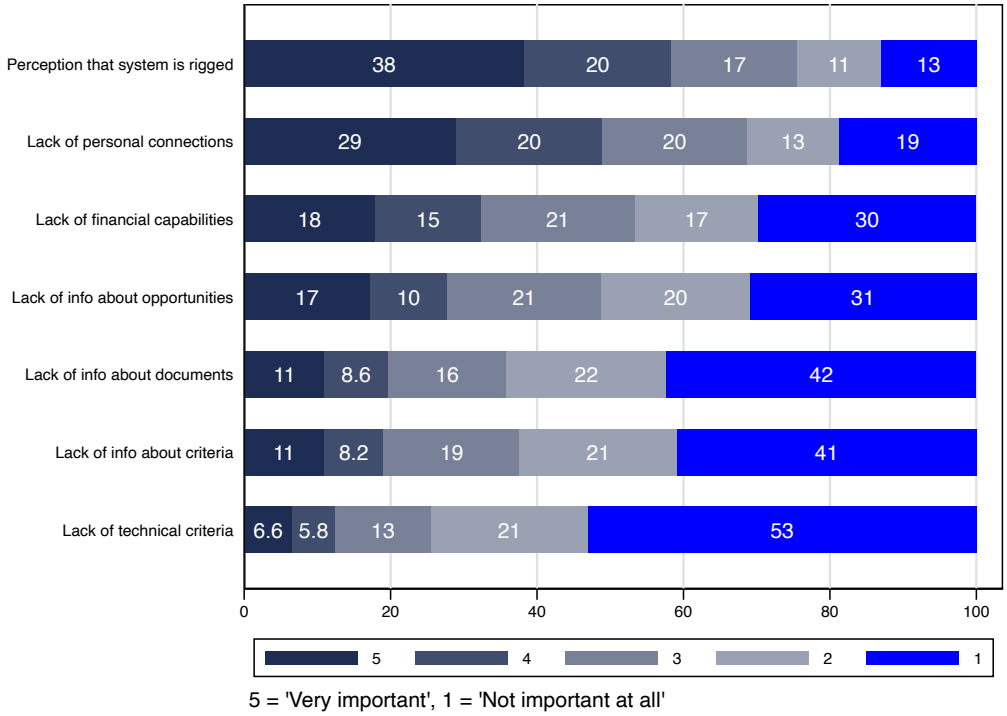
Appendix A. Figures and Tables

Figure A.1. Bids and Contracts Won, FY 17/18



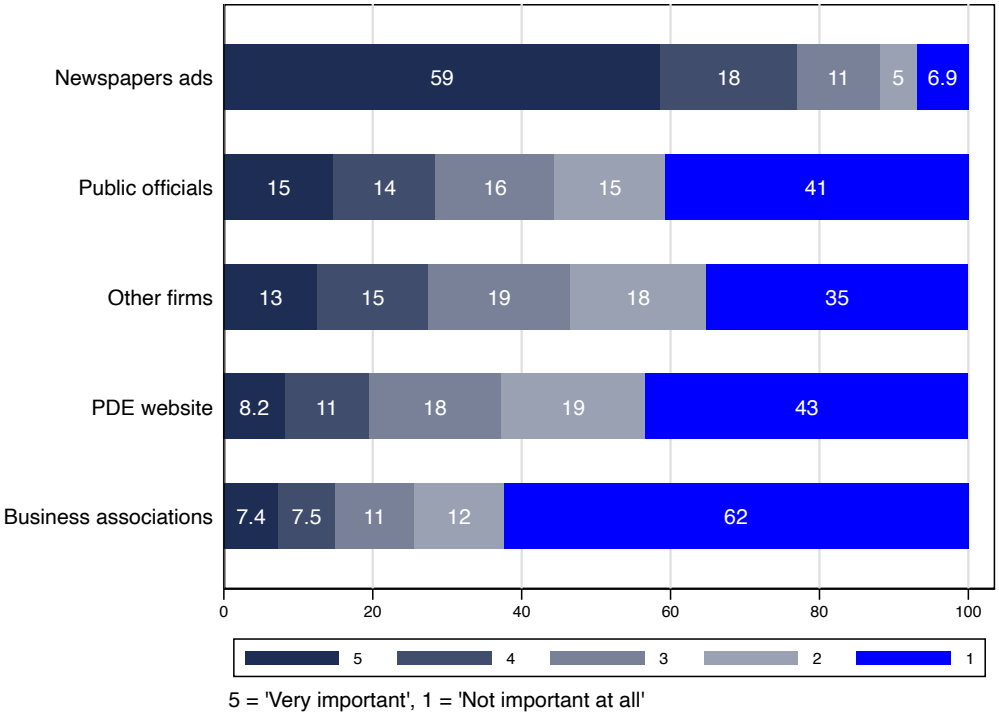
Notes: Distribution of firms by number of bids submitted and contracts won during the fiscal year prior to the experiment, that is 2017/2018. The source for this graph is the baseline survey in Experiment #1.

FIGURE A.2. Limits to Firms' Participation in Public Procurement



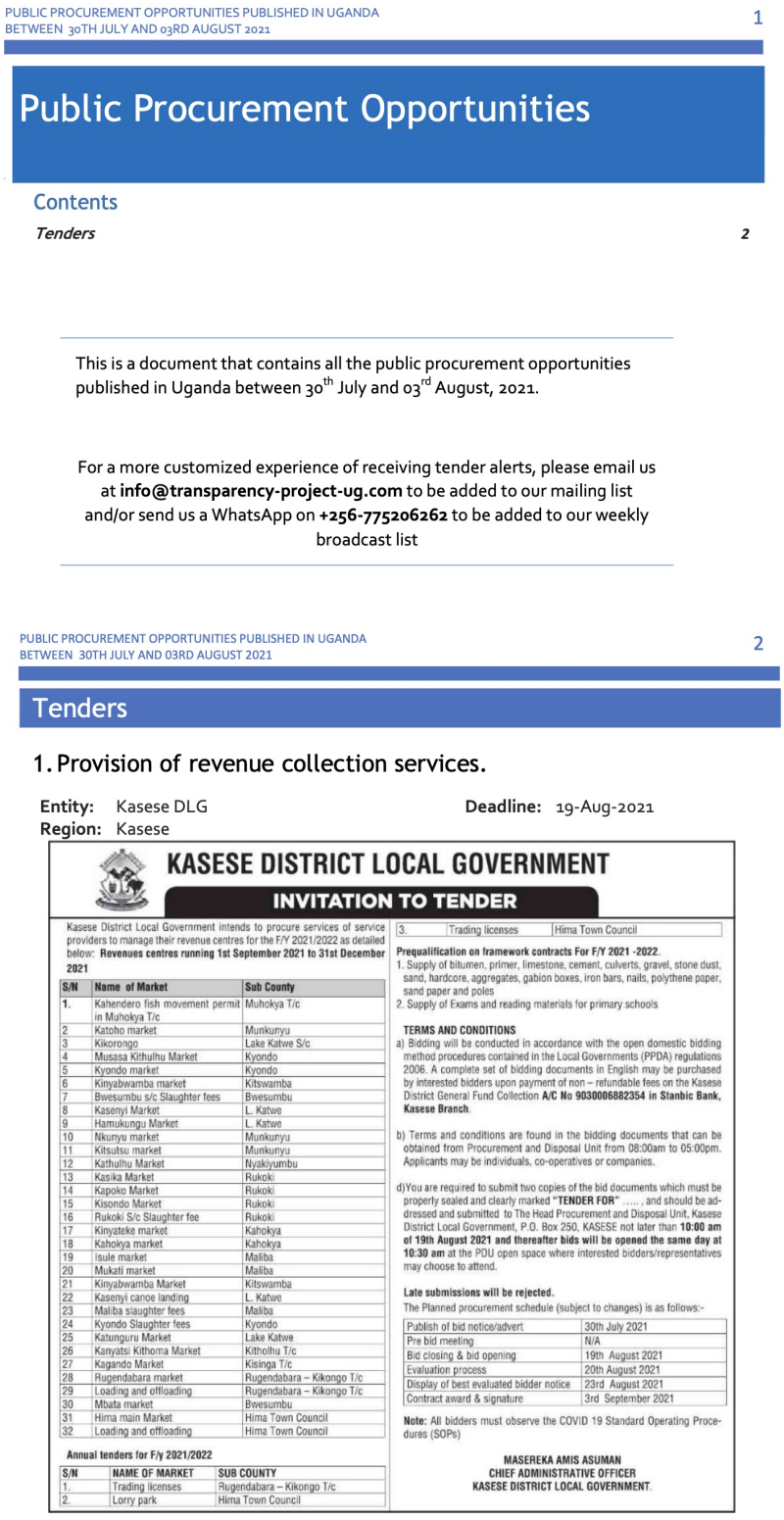
Notes: The figure reports percent of respondents by type of answers to the following question: *How important are the following factors in limiting your bidding activity?* in the baseline survey of Experiment #1. Respondents were asked to score each of the listed factors on the y-axis according to different levels of importance as a barrier to bidding. Respondents were asked to give an answer between 1 and 5, where 1 means "Not important at all" (light blue) and 5 means "Very important" (dark blue).

FIGURE A.3. Sources of Information about Procurement Opportunities



Notes: The figure reports percent of respondents by type of answers to the following question: *How important is this source to obtain information about available public procurement opportunities?*, collected during the baseline survey of Experiment #1. Respondents were asked to score each source of information on the y-axis according to different levels of importance as a source of information about procurement opportunities. Respondents were asked to give an answer between 1 and 5, where 1 means "Not important at all" (light blue) and 5 means "Very important" (dark blue).

FIGURE A.4. Newsletter



PUBLIC PROCUREMENT OPPORTUNITIES PUBLISHED IN UGANDA
BETWEEN 30TH JULY AND 03RD AUGUST 2021 1

Public Procurement Opportunities

Contents

Tenders 2

This is a document that contains all the public procurement opportunities published in Uganda between 30th July and 03rd August, 2021.

For a more customized experience of receiving tender alerts, please email us at **info@transparency-project-ug.com** to be added to our mailing list and/or send us a WhatsApp on **+256-775206262** to be added to our weekly broadcast list

PUBLIC PROCUREMENT OPPORTUNITIES PUBLISHED IN UGANDA
BETWEEN 30TH JULY AND 03RD AUGUST 2021 2

Tenders

1. Provision of revenue collection services.

Entity: Kasese DLG **Deadline:** 19-Aug-2021
Region: Kasese

KASESE DISTRICT LOCAL GOVERNMENT

INVITATION TO TENDER

Kasese District Local Government intends to procure services of service providers to manage their revenue centres for the F/Y 2021/2022 as detailed below: **Revenues centres running 1st September 2021 to 31st December 2021**

S/N	Name of Market	Sub County
1.	Kahendero fish movement permit in Muhokya T/c	Muhokya T/c
2	Katoho market	Munkunyu
3	Kikorongo	Lake Katwe S/c
4	Musasa Kithulhu Market	Kyondo
5	Kyondo market	Kyondo
6	Kinyabwamba market	Kitswamba
7	Bwesumbu s/c Slaughter fees	Bwesumbu
8	Kasenyi Market	L. Katwe
9	Hamukungu Market	L. Katwe
10	Nkunyu market	Munkunyu
11	Kitsutsu market	Munkunyu
12	Kathulhu Market	Nyakiyumbu
13	Kasika Market	Rukoki
14	Kapoko Market	Rukoki
15	Kisondo Market	Rukoki
16	Rukoki S/c Slaughter fee	Rukoki
17	Kinyateke market	Kahokya
18	Kahokya market	Kahokya
19	Isule market	Maliba
20	Mukati market	Maliba
21	Kinyabwamba Market	Kitswamba
22	Kasenyi canoe landing	L. Katwe
23	Maliba slaughter fees	Maliba
24	Kyondo Slaughter fees	Kyondo
25	Katunguru Market	Lake Katwe
26	Kanyatsi Kithoma Market	Kitholhu T/c
27	Kagando Market	Kisinga T/c
28	Rugendabara market	Rugendabara – Kikongo T/c
29	Loading and offloading	Rugendabara – Kikongo T/c
30	Mbata market	Bwesumbu
31	Hima main Market	Hima Town Council
32	Loading and offloading	Hima Town Council

Annual tenders for F/y 2021/2022

S/N	NAME OF MARKET	SUB COUNTY
1.	Trading licenses	Rugendabara – Kikongo T/c
2.	Lorry park	Hima Town Council
3.	Trading licenses	Hima Town Council

Prequalification on framework contracts For F/Y 2021 -2022.

1. Supply of bitumen, primer, limestone, cement, culverts, gravel, stone dust, sand, hardcore, aggregates, gabion boxes, iron bars, nails, polythene paper, sand paper and poles
2. Supply of Exams and reading materials for primary schools

TERMS AND CONDITIONS

a) Bidding will be conducted in accordance with the open domestic bidding method procedures contained in the Local Governments (PPDA) regulations 2006. A complete set of bidding documents in English may be purchased by interested bidders upon payment of non – refundable fees on the Kasese District General Fund Collection **A/C No 9030006882354 in Stanbic Bank, Kasese Branch.**

b) Terms and conditions are found in the bidding documents that can be obtained from Procurement and Disposal Unit from 08:00am to 05:00pm. Applicants may be individuals, co-operatives or companies.

d) You are required to submit two copies of the bid documents which must be properly sealed and clearly marked **"TENDER FOR"** ….. , and should be addressed and submitted to The Head Procurement and Disposal Unit, Kasese District Local Government, P.O. Box 250, KASESE not later than **10:00 am of 19th August 2021 and thereafter bids will be opened the same day at 10:30 am** at the PDU open space where interested bidders/representatives may choose to attend.

Late submissions will be rejected.

The Planned procurement schedule (subject to changes) is as follows:-

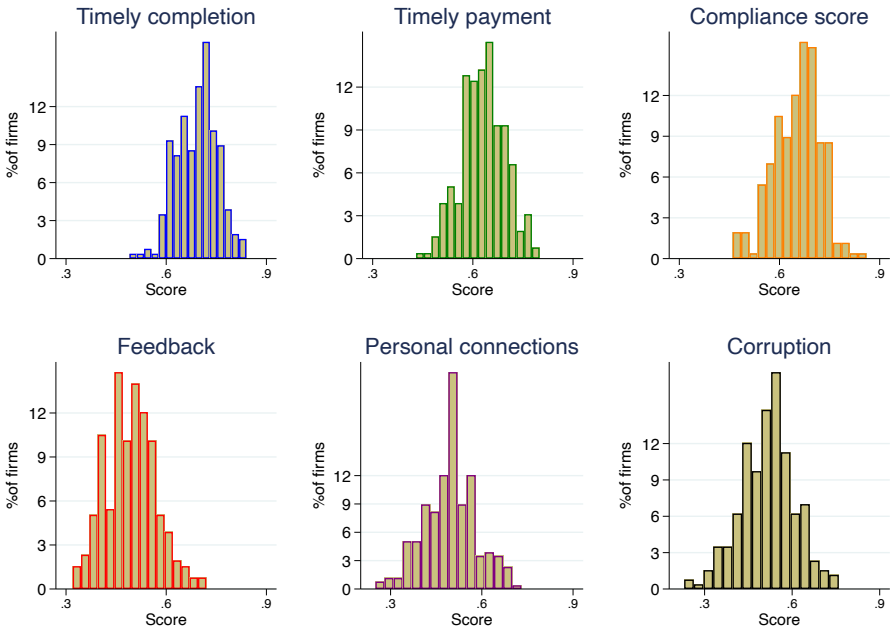
Publish of bid notice/advert	30th July 2021
Pre bid meeting	N/A
Bid closing & bid opening	19th August 2021
Evaluation process	20th August 2021
Display of best evaluated bidder notice	23rd August 2021
Contract award & signature	3rd September 2021

Note: All bidders must observe the COVID 19 Standard Operating Procedures (SOPs)

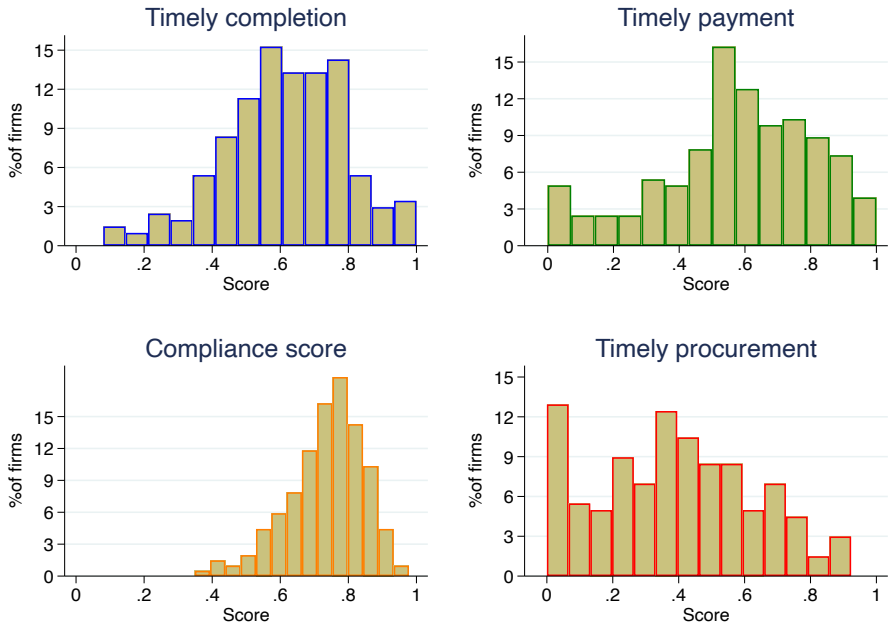
MASEREKA AMIS ASUMAN
CHIEF ADMINISTRATIVE OFFICER
KASESE DISTRICT LOCAL GOVERNMENT.

Notes: This figure reports an example of the biweekly newsletter treated firms in Experiment #1 received as part of their treatment. The first panel reports an example of introduction to the content, the second panel reports an example of tender.

FIGURE A.5. Comparison of Distribution of Scores from Market Perceptions and Audits Reports



(**A.**) Distribution of Scores from Market Perceptions Reports



(**B.**) Distribution of Scores from Audits Reports

Notes: Panel A plots the distribution of scores that PDEs obtained from the perceptions reports. Panel B plots the distribution of scores that PDEs obtained from the audits conducted by the government.

TABLE A.1. Experiment #1: Balance, Separate Treatments vs Control

Variable	Mean in T1	Mean in T2	Mean in C	T1	T2	p(T1=T2)	N
Panel A: Individual and firm characteristics							
Owner is a woman	0.183	0.199	0.195	-0.012	0.003	0.423	3,045
				(0.017)	(0.017)		
Age	39.748	40.378	39.758	-0.006	0.616	0.195	3,044
				(0.414)	(0.418)		
Graduated from University	0.604	0.609	0.624	-0.021	-0.015	0.803	3,045
				(0.021)	(0.021)		
Owner	0.699	0.676	0.676	0.023	-0.000	0.310	3,045
				(0.020)	(0.020)		
Manager	0.276	0.301	0.301	-0.026	0.000	0.253	3,045
				(0.019)	(0.020)		
Years spent in this firm	7.465	8.003	7.451	0.016	0.553	0.066	3,045
				(0.245)	(0.264)		
Owner owns other firms	0.346	0.349	0.370	-0.024	-0.022	0.934	3,045
				(0.021)	(0.021)		
Firm age	9.142	9.635	9.199	-0.061	0.443	0.166	3,040
				(0.305)	(0.331)		
HQ in Kampala	0.592	0.589	0.591	0.000	0.000		3,045
				(0.000)	(0.000)		
Permanent employees	12.060	9.839	14.090	-2.060	-4.259	0.334	3,045
				(3.584)	(3.417)		
Temporary employees	14.096	12.150	13.649	0.432	-1.507	0.227	3,035
				(1.737)	(1.397)		
Profits, '000USD	0.767	0.020	0.022	0.755	-0.009	0.318	2,108
				(0.757)	(0.030)		
Revenues, '000USD	0.174	0.158	0.231	-0.057	-0.072	0.625	2,176
				(0.044)	(0.041)		
Assets value, '000USD	62.713	1,043.168	94.849	-36.312	919.065	0.306	2,282
				(60.738)	(929.012)		
Share revenues from public procur.	32.999	31.861	33.593	-0.593	-1.744	0.469	3,045
				(1.376)	(1.376)		
Has person charge of searching PP opp.	0.762	0.757	0.778	-0.016	-0.021	0.806	3,045
				(0.019)	(0.019)		
Has person charge of preparing bid docum.	0.843	0.843	0.855	-0.012	-0.012	0.981	3,045
				(0.016)	(0.016)		
Got a loan during the last FY	0.179	0.163	0.191	-0.012	-0.029	0.392	2,948
				(0.017)	(0.017)		
Num. production sites	2.445	1.329	1.571	0.870	-0.238	0.158	3,042
				(0.797)	(0.134)		
Share of output outsourced	7.987	8.446	8.565	-0.584	-0.112	0.582	3,040
				(0.736)	(0.755)		
Has access to internet	0.842	0.822	0.837	0.005	-0.014	0.309	3,045
				(0.016)	(0.016)		
Has system to track inventory	0.821	0.832	0.822	-0.001	0.010	0.569	3,045
				(0.017)	(0.017)		
Has system to track contracts	0.837	0.868	0.836	0.001	0.033	0.072	3,045
				(0.016)	(0.015)		
Has system to track suppliers	0.792	0.796	0.772	0.020	0.025	0.843	3,045
				(0.018)	(0.018)		
Keep business records	0.974	0.966	0.970	0.004	-0.004	0.359	3,045
				(0.007)	(0.008)		
Has a reward system	0.690	0.654	0.680	0.011	-0.025	0.132	3,045
				(0.020)	(0.021)		
Has a training system	0.745	0.717	0.733	0.012	-0.016	0.214	3,045
				(0.019)	(0.019)		
Expected ease to access loans in 3 yrs time	1.962	1.986	2.005	-0.043	-0.020	0.601	3,045
				(0.039)	(0.038)		

TABLE A.1, CONT'D. Experiment #1: Balance, Separate Treatments vs Control

Variable	Mean in T1	Mean in T2	Mean in C	T1	T2	p(T1=T2)	N
Panel B: Procurement activity							
Want to increase participation in PP	0.969	0.957	0.959	0.009	-0.003	0.217	3,045
				(0.008)	(0.009)		
Is prequalified for at least 1 PDE	0.767	0.777	0.763	0.003	0.014	0.625	2,986
				(0.019)	(0.019)		
Total PDEs won at least a contract from, last 3 FYs	1.922	1.905	1.944	-0.023	-0.038	0.883	3,045
				(0.092)	(0.088)		
Total contracts won, last 3 FYs	5.178	5.111	4.830	0.348	0.283	0.908	3,045
				(0.473)	(0.478)		
Num. PDEs firm bidded or invited to bid, last 3 FY	2.458	2.534	2.617	-0.160	-0.082	0.550	3,045
				(0.116)	(0.115)		
Ever visited PDE to inspect bid documents	0.759	0.755	0.778	-0.019	-0.023	0.840	3,045
				(0.019)	(0.019)		
I never won a contract	0.204	0.237	0.209	-0.005	0.028	0.118	3,045
				(0.018)	(0.018)		
A delay never happened	0.110	0.095	0.114	-0.004	-0.019	0.335	3,045
				(0.014)	(0.013)		
A delay in less than 50% times	0.322	0.301	0.320	0.001	-0.019	0.387	3,045
				(0.021)	(0.020)		
A delay in more than 50% times	0.365	0.367	0.357	0.008	0.011	0.921	3,045
				(0.021)	(0.021)		
Knows how pre-qualif. w/ entity works	0.905	0.914	0.914	-0.010	0.000	0.495	3,045
				(0.013)	(0.012)		
Interest in PDEs, but not pre-qualif.	0.795	0.829	0.824	-0.029	0.005	0.087	3,045
				(0.017)	(0.017)		
Knows entity procurement plan	0.668	0.708	0.690	-0.022	0.018	0.090	3,045
				(0.021)	(0.020)		
Importance of newspaper ads	4.503	4.517	4.507	-0.004	0.011	0.747	3,045
				(0.039)	(0.039)		
Newspaper ads are (very) important	0.873	0.879	0.891	-0.018	-0.012	0.724	3,045
				(0.014)	(0.014)		
Freq. checking newspaper ads	6.233	6.217	6.147	0.085	0.070	0.820	3,045
				(0.053)	(0.057)		
Importance of PDEs websites	2.508	2.559	2.554	-0.045	0.005	0.464	3,045
				(0.059)	(0.060)		
PDEs websites are (very) important	0.214	0.246	0.249	-0.034	-0.003	0.141	3,045
				(0.018)	(0.019)		
Freq. checking PDEs websites	3.103	3.207	3.076	0.027	0.130	0.314	3,045
				(0.086)	(0.088)		
Importance of other gov. websites	2.408	2.446	2.426	-0.018	0.020	0.580	3,045
				(0.059)	(0.060)		
Other gov. websites are (very) important	2.767	2.879	2.799	-0.031	0.080	0.243	3,045
				(0.081)	(0.084)		
Importance of public officials as source of info	2.452	2.425	2.451	0.002	-0.027	0.683	3,045
				(0.062)	(0.060)		
Public officials are (very) important as source of info	2.648	2.672	2.589	0.060	0.082	0.811	3,045
				(0.081)	(0.081)		
Importance of business assoc. websites	2.227	2.205	2.266	-0.038	-0.061	0.740	3,045
				(0.060)	(0.059)		
Business assoc. are (very) important	2.506	2.511	2.494	0.012	0.016	0.963	3,045
				(0.077)	(0.077)		
Importance of other firms	2.607	2.591	2.596	0.011	-0.006	0.807	3,045
				(0.061)	(0.058)		
Other firms are (very) important	2.969	3.016	2.968	0.001	0.047	0.631	3,045
				(0.082)	(0.082)		
Get info from gov. regulations	0.667	0.667	0.674	-0.008	-0.007	0.982	3,045
				(0.021)	(0.021)		
Get info from business assoc.	0.350	0.362	0.384	-0.034	-0.022	0.643	3,045
				(0.021)	(0.021)		
Get info from other firms	0.467	0.449	0.470	-0.003	-0.022	0.463	3,045
				(0.022)	(0.022)		
Get info from online	0.016	0.017	0.017	-0.001	-0.000	0.828	3,045
				(0.006)	(0.006)		
Get info from media	0.033	0.039	0.040	-0.007	-0.001	0.480	3,045
				(0.008)	(0.009)		
Get info from newspapers	0.078	0.087	0.071	0.007	0.016	0.546	3,045
				(0.012)	(0.012)		
Get info from personal contacts	0.021	0.036	0.035	-0.014	0.001	0.086	3,045
				(0.007)	(0.008)		
Get info from PPDA	0.013	0.009	0.007	0.006	0.002	0.472	3,045
				(0.005)	(0.004)		
Get info from PDEs	0.031	0.030	0.020	0.012	0.011	0.899	3,045
				(0.007)	(0.007)		

TABLE A.1, CONT'D. Experiment #1: Balance, Separate Treatments vs Control

Variable	Mean in T1	Mean in T2	Mean in C	T1	T2	p(T1=T2)	N
Panel C: Challenges related to procurement							
Importance of lack of info re: opportunities	2.593	2.638	2.640	-0.046	-0.002	0.552	3,045
				(0.064)	(0.064)		
(Very) important factor: lack of info re: opportunities	0.263	0.264	0.290	-0.027	-0.026	0.947	3,045
				(0.020)	(0.020)		
Importance of lack of info re: documents	2.251	2.245	2.235	0.017	0.010	0.918	3,045
				(0.060)	(0.060)		
Importance of lack of info re: criteria	2.315	2.239	2.258	0.058	-0.019	0.268	3,045
				(0.060)	(0.059)		
Importance of lack of technical qualif.	1.976	1.903	1.891	0.086	0.011	0.235	3,045
				(0.055)	(0.052)		
Importance of financial constraints	2.762	2.700	2.745	0.017	-0.046	0.384	3,045
				(0.064)	(0.063)		
Importance of lack of personal connections	3.237	3.320	3.278	-0.041	0.041	0.271	3,045
				(0.065)	(0.065)		
System is rigged [scale 1-5]	3.566	3.618	3.591	-0.025	0.027	0.469	3,045
				(0.063)	(0.062)		
Corruption in selection of winners in PP	3.852	3.987	3.928	-0.075	0.059	0.033	3,045
				(0.056)	(0.053)		
Personal connections necessary to win in PP	3.656	3.657	3.701	-0.044	-0.044	0.999	3,045
				(0.060)	(0.061)		

Notes: This table reports balance checks among treated and control firms in Experiment #1. The first column reports mean in T1 (that is, Information only). The second column reports mean in T2 (that is, Information + nudge). The third column reports mean in the Control group. The fourth and fifth column report coefficients β_1 and β_2 from the following specification $y_{i0} = \alpha + \beta_1 T1_i + \beta_2 T2_i + \varepsilon_i$. The sixth column reports the p-value of a Wald test of equality between the two coefficients for T1 and T2. Last column reports the total number of observations.

TABLE A.2. Experiment #1: Balance on Baseline Covariates by Attrition Status

	Non-attrited				Attrited			
Variable	T	C	pval	Miss. obs.	T	C	pval	Miss. obs.
Panel A: Individual and firm characteristics								
Owner is a woman	0.184	0.181	0.971	0	0.209	0.223	0.819	0
Age	39.939	39.749	0.567	1	40.389	39.775	0.396	0
Graduated from University	0.610	0.619	0.408	0	0.596	0.635	0.506	0
Owner	0.685	0.664	0.341	0	0.695	0.701	0.802	0
Manager	0.289	0.313	0.274	0	0.286	0.278	0.719	0
Years spent in this firm	7.799	7.735	0.754	0	7.558	6.895	0.101	0
Owner owns other firms	0.338	0.372	0.144	0	0.373	0.367	0.963	0
Firm age	9.590	9.718	0.753	4	8.848	8.188	0.131	1
HQ in Kampala	0.597	0.564	0.873	0	0.575	0.643	0.533	0
Permanent employees	10.702	16.758	0.213	0	11.625	8.883	0.420	0
Temporary employees	13.425	14.199	0.674	7	12.336	12.574	0.931	3
Profits, M-UGX	82.312	86.858	0.828	644	5,018.722	67.094	0.322	293
Revenues, M-UGX	598.401	1,000.073	0.049	604	648.930	560.245	0.475	265
Assets value, M-UGX	265.788	347.307	0.335	520	6,895.070	358.258	0.312	243
Profits, '000USD	0.022	0.023	0.828	644	1.356	0.018	0.322	293
Revenues, '000USD	0.162	0.270	0.049	604	0.175	0.151	0.475	265
Assets value, '000USD	71.835	93.867	0.335	520	1,863.532	96.826	0.312	243
Share revenues from public procur.	33.652	35.730	0.208	0	29.178	29.423	0.756	0
Has person charge of searching PP opp.	0.761	0.806	0.015	0	0.755	0.722	0.291	0
Has person charge of preparing bid docum.	0.842	0.871	0.077	0	0.846	0.825	0.410	0
Got a loan during the last FY	0.175	0.207	0.074	64	0.159	0.161	0.921	33
Num. production sites	1.526	1.604	0.712	1	2.853	1.507	0.355	2
Share of output outsourced	8.271	8.699	0.477	4	8.070	8.304	0.975	1
Has access to internet	0.846	0.844	0.918	0	0.796	0.823	0.463	0
Has system to track inventory	0.820	0.843	0.211	0	0.844	0.781	0.015	0
Has system to track contracts	0.854	0.856	0.934	0	0.849	0.796	0.061	0
Has system to track suppliers	0.795	0.793	0.735	0	0.791	0.730	0.044	0
Keep business records	0.975	0.975	0.941	0	0.957	0.959	0.749	0
Has a reward system	0.683	0.696	0.712	0	0.642	0.649	0.851	0
Has a training system	0.742	0.765	0.284	0	0.702	0.670	0.215	0
Expected ease to access loans in 3 yrs time	1.964	1.991	0.475	0	2.000	2.033	0.607	0

TABLE A.2, CONT'D. Experiment #1: Balance on Baseline Covariates by Attrition Status

	Non-attrited				Attrited			
Variable	T	C	pval	Miss. obs.	T	C	pval	Miss. obs.
Panel B: Procurement activity								
Want to increase participation in PP	0.962	0.962	0.940	0	0.964	0.953	0.472	0
Is prequalified for at least 1 PDE	0.795	0.797	0.985	31	0.708	0.697	0.743	28
Total PDEs won at least a contract from, last 3 FYs	2.032	2.088	0.683	0	1.596	1.664	0.541	0
Total contracts won, last 3 FYs	5.655	5.420	0.568	0	3.784	3.678	0.923	0
Num. PDEs firm bidded or invited to bid, last 3 FY	2.597	2.722	0.347	0	2.226	2.412	0.204	0
Ever visited PDE to inspect bid documents	0.769	0.786	0.510	0	0.726	0.763	0.094	0
I never won a contract	0.200	0.173	0.164	0	0.274	0.280	0.981	0
A delay never happened	0.099	0.118	0.148	0	0.111	0.105	0.688	0
A delay in less than 50% times	0.317	0.332	0.555	0	0.296	0.297	0.831	0
A delay in more than 50% times	0.383	0.376	0.697	0	0.320	0.318	0.973	0
Knows how pre-qualif. w/ entity works	0.922	0.920	0.767	0	0.875	0.903	0.149	0
Interest in PDEs, but not pre-qualif.	0.806	0.837	0.063	0	0.827	0.798	0.424	0
Knows entity procurement plan	0.688	0.700	0.622	0	0.688	0.672	0.786	0
Importance of newspaper ads	4.536	4.560	0.499	0	4.442	4.402	0.549	0
Newspaper ads are (very) important	0.883	0.909	0.045	0	0.858	0.854	0.838	0
Freq. checking newspaper ads	6.275	6.226	0.452	0	6.091	5.994	0.242	0
Importance of PDEs websites	2.511	2.615	0.134	0	2.594	2.435	0.109	0
PDEs websites are (very) important	0.226	0.262	0.095	0	0.240	0.223	0.686	0
Freq. checking PDEs websites	3.114	3.168	0.695	0	3.264	2.897	0.006	0
Importance of other gov. websites	2.410	2.485	0.264	0	2.471	2.311	0.094	0
Other gov. websites are (very) important	2.808	2.880	0.464	0	2.863	2.641	0.066	0
Importance of public officials as source of info	2.399	2.522	0.113	0	2.543	2.313	0.062	0
Public officials are (very) important as source of info	2.615	2.666	0.797	0	2.781	2.441	0.021	0
Importance of business assoc. websites	2.162	2.336	0.007	0	2.361	2.128	0.011	0
Business assoc. are (very) important	2.454	2.581	0.154	0	2.654	2.324	0.004	0
Importance of other firms	2.546	2.675	0.056	0	2.740	2.443	0.003	0
Other firms are (very) important	2.949	3.066	0.245	0	3.108	2.779	0.016	0
Get info from gov. regulations	0.665	0.678	0.622	0	0.671	0.668	0.997	0
Get info from business assoc.	0.340	0.388	0.037	0	0.399	0.377	0.520	0
Get info from other firms	0.444	0.485	0.106	0	0.495	0.443	0.192	0
Get info from online	0.016	0.016	0.992	0	0.017	0.019	0.831	0
Get info from media	0.039	0.045	0.567	0	0.029	0.031	0.712	0
Get info from newspapers	0.083	0.076	0.594	0	0.082	0.062	0.242	0
Get info from personal contacts	0.027	0.031	0.526	0	0.031	0.043	0.243	0
Get info from PPDA	0.010	0.005	0.205	0	0.014	0.012	0.711	0
Get info from PDEs	0.029	0.020	0.189	0	0.036	0.019	0.143	0

TABLE A.2, CONT'D. Experiment #1: Balance on Baseline Covariates by Attrition Status

	Non-attrited					Attrited				
Variable	T	C	pval	Miss. obs.		T	C	pval	Miss. obs.	
Panel C: Challenges related to procurement										
Importance of lack of info re: opportunities	2.597	2.615	0.837	0		2.666	2.689	0.595	0	
(Very) important factor: lack of info re: opportunities	0.263	0.276	0.494	0		0.264	0.318	0.067	0	
Importance of lack of info re: documents	2.239	2.228	0.750	0		2.272	2.249	0.885	0	
Importance of lack of info re: criteria	2.257	2.237	0.615	0		2.332	2.299	0.939	0	
Importance of lack of technical qualif.	1.914	1.851	0.171	0		2.007	1.969	0.738	0	
Importance of financial constraints	2.696	2.730	0.667	0		2.825	2.775	0.741	0	
Importance of lack of personal connections	3.256	3.229	0.738	0		3.337	3.375	0.599	0	
System is rigged [scale 1-5]	3.563	3.587	0.679	0		3.671	3.600	0.666	0	
Corruption in selection of winners in PP	3.914	3.936	0.683	0		3.933	3.911	0.967	0	
Personal connections necessary to win in PP	3.629	3.678	0.444	0		3.728	3.746	0.782	0	
Sample sizes	1,109	1,005				416	515			

Notes: This table reports balance checks among treated and control firms in Experiment #1 separately for non-attrited firms at endline and attrited firms at endline. Columns "T" and "C" indicate the mean for each characteristic among treated and control respectively. "pval" is a t-test of equality between the means of the two groups. "Miss. obs." counts how many missing observations at baseline we have for each characteristic. In the PDS-lasso analysis, we include only the characteristics with non-missing observations. We define attrited a firm who is not willing to respond to our endline survey two years after the experiment.

TABLE A.3. Experiment #1: OLS

Panel A: Main outcomes

	Endline		Midline		Endline	
	(1)	(2)	(3)	(4)	(5)	(6)
	Lack of info	*Newspapers*	*Bids*	*Won*	*Bids*	*Won*
Information treat	-0.114*	-0.124**	0.096	0.031	-0.468*	-0.212*
	(0.064)	(0.052)	(0.173)	(0.052)	(0.259)	(0.123)
	[0.072]	[0.018]	[0.580]	[0.551]	[0.071]	[0.084]
Firms	2104	2107	2357	2355	2114	2114
Mean DV	2.357	4.241	2.541	0.561	4.070	1.743

Panel B: Intermediate actions

	Midline	Endline	Endline	Midline	Endline
	(1)	(2)	(3)	(4)	(5)
	Inspections	*Inspections*	*Bought doc.*	*Prequalif.*	*Prequalif.*
Information treat	0.068	-0.021	-0.560	-0.022	0.015
	(0.078)	(0.742)	(0.353)	(0.030)	(0.065)
	[0.384]	[0.978]	[0.112]	[0.462]	[0.815]
Firms	2670	2114	2114	2670	2114
Mean DV	0.816	7.755	4.464	0.391	0.757

Notes: This table shows coefficients, standard errors (in parentheses), and p-values (in square brackets) from estimating Equation 3.1. *Information treat* is an indicator equal to 1 if the firm is assigned to the group receiving information about tender opportunities. **Panel A: Main outcomes:** the dependent variables are: continuous variable from one to five reporting firms' answers to the question "How important is lack of information on available procurement opportunities in explaining lack of bidding in your firm, on a scale from one to five?" (column 1); continuous variable from one to five reporting firms' answer to the question "How important are newspapers as a source of information on tenders, on a scale from one to five?" (column 2); number of bids submitted between March and September 2020 (column 3); number of contracts won between March and September 2020 (column 4); number of bids submitted between October 2020 and November 2021 (column 5); number of contracts won between October 2020 and November 2021 (column 6). Number of bids and contracts won are top 1% winsorized. **Panel B: Intermediate actions:** the dependent variables are: total number of contracts inspected between March and September 2020 (column 1) and between October 2020 and November 2021 (column 2); number of contracts for which the firm has bought any bidding document between October 2020 and November 2021 (column 3); total number of pre-qualifications made between March and September 2020 (column 4); total number of pre-qualifications made between October 2020 and November 2021 (column 5). Controls include 12 strata fixed effects, the value of the dependent variable measured at baseline. This specification uses an OLS regression. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

TABLE A.4. Experiment #1: Separate Treatments, PDS-lasso

Panel A: Main outcomes

	Endline		Midline		Endline	
	(1)	(2)	(3)	(4)	(5)	(6)
	Lack of info	*Newspapers*	*Bids*	*Won*	*Bids*	*Won*
Information treat	-0.145*	-0.157**	0.452**	0.110	-0.232	-0.087
	(0.077)	(0.064)	(0.222)	(0.067)	(0.318)	(0.152)
	[0.059]	[0.015]	[0.042]	[0.102]	[0.466]	[0.566]
Info. treat + Nudge	-0.083	-0.093	-0.223	-0.041	-0.491*	-0.293**
	(0.077)	(0.064)	(0.193)	(0.060)	(0.290)	(0.137)
	[0.285]	[0.146]	[0.248]	[0.491]	[0.091]	[0.033]
Firms	2104	2107	2357	2355	2114	2114
Mean DV	2.357	4.241	2.541	0.561	4.070	1.743

Panel B: Intermediate actions

	Midline	Endline	Endline	Midline	Endline
	(1)	(2)	(3)	(4)	(5)
	Inspections	*Inspections*	*Bought doc.*	*Prequalif.*	*Prequalif.*
Information treat	-0.054	0.491	-0.374	-0.050	0.013
	(0.085)	(0.986)	(0.403)	(0.035)	(0.079)
	[0.520]	[0.618]	[0.353]	[0.157]	[0.869]
Info. treat + Nudge	0.204*	-0.269	-0.528	0.010	0.032
	(0.107)	(0.881)	(0.379)	(0.037)	(0.077)
	[0.057]	[0.760]	[0.163]	[0.788]	[0.683]
Firms	2670	2114	2114	2670	2114
Mean DV	0.816	7.755	4.464	0.391	0.757

Notes: This table shows coefficients, standard errors (in parentheses), and p-values (in square brackets) from estimating a variant of Equation 3.1, where *Information treat* is an indicator equal to 1 if the firm is assigned to receive the newsletter. *Info. treat + Nudge* is an indicator for being assigned to receive the newsletter and the nudge to inspect bidding documents. **Panel A: Main outcomes:** the dependent variables are: continuous variable from one to five reporting firms' answers to the question "How important is lack of information on available procurement opportunities in explaining lack of bidding in your firm, on a scale from one to five?" (column 1); continuous variable from one to five reporting firms' answer to the question "How important are newspapers as a source of information on tenders, on a scale from one to five?" (column 2); number of bids submitted between March and September 2020 (column 3); number of contracts won between March and September 2020 (column 4); number of bids submitted between October 2020 and November 2021 (column 5); number of contracts won between October 2020 and November 2021 (column 6). Number of bids and contracts won are top 1% winsorized. **Panel B: Intermediate actions:** the dependent variables are: total number of contracts inspected between March and September 2020 (column 1) and between October 2020 and November 2021 (column 2); number of contracts for which the firm has bought any bidding document between October 2020 and November 2021 (column 3); total number of pre-qualifications made between March and September 2020 (column 4); total number of pre-qualifications made between October 2020 and November 2021 (column 5). Number of bids and contracts won are top 1% winsorized. Controls include 12 strata fixed effects, the value of the dependent variable measured at baseline. This specification uses an OLS regression. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

TABLE A.5. Experiment #1: Separate Treatments, OLS

Panel A: Main outcomes

	Endline		Midline		Endline	
	(1)	(2)	(3)	(4)	(5)	(6)
	Lack of info	*Newspapers*	*Bids*	*Won*	*Bids*	*Won*
Information treat	-0.146*	-0.157**	0.451**	0.110	-0.321	-0.105
	(0.077)	(0.064)	(0.223)	(0.067)	(0.319)	(0.153)
	[0.057]	[0.015]	[0.043]	[0.101]	[0.315]	[0.491]
Info. treat + Nudge	-0.083	-0.092	-0.249	-0.046	-0.611**	-0.317**
	(0.077)	(0.064)	(0.193)	(0.060)	(0.295)	(0.138)
	[0.282]	[0.152]	[0.197]	[0.444]	[0.038]	[0.022]
Firms	2104	2107	2357	2355	2114	2114
Mean DV	2.357	4.241	2.541	0.561	4.070	1.743

Panel B: Intermediate actions

	Midline	Endline	Endline	Midline	Endline
	(1)	(2)	(3)	(4)	(5)
	Inspections	*Inspections*	*Bought doc.*	*Prequalif.*	*Prequalif.*
Information treat	-0.055	0.321	-0.489	-0.050	0.010
	(0.086)	(0.979)	(0.411)	(0.036)	(0.080)
	[0.520]	[0.743]	[0.234]	[0.161]	[0.897]
Info. treat + Nudge	0.193*	-0.357	-0.631	0.006	0.020
	(0.108)	(0.898)	(0.392)	(0.037)	(0.078)
	[0.074]	[0.691]	[0.108]	[0.866]	[0.797]
Firms	2670	2114	2114	2670	2114
Mean DV	0.816	7.755	4.464	0.391	0.757

Notes: This table shows coefficients, standard errors (in parentheses), and p-values (in square brackets) from estimating a variant of Equation 3.1, where *Information treat* is an indicator equal to 1 if the firm is assigned to receive the newsletter. *Info. treat + Nudge* is an indicator for being assigned to receive the newsletter and the nudge to inspect bidding documents. **Panel A: Main outcomes:** the dependent variables are: continuous variable from one to five reporting firms' answers to the question "How important is lack of information on available procurement opportunities in explaining lack of bidding in your firm, on a scale from one to five?" (column 1); continuous variable from one to five reporting firms' answer to the question "How important are newspapers as a source of information on tenders, on a scale from one to five?" (column 2); number of bids submitted between March and September 2020 (column 3); number of contracts won between March and September 2020 (column 4); number of bids submitted between October 2020 and November 2021 (column 5); number of contracts won between October 2020 and November 2021 (column 6). Number of bids and contracts won are top 1% winsorized. **Panel B: Intermediate actions:** the dependent variables are: total number of contracts inspected between March and September 2020 (column 1) and between October 2020 and November 2021 (column 2); number of contracts for which the firm has bought any bidding document between October 2020 and November 2021 (column 3); total number of pre-qualifications made between March and September 2020 (column 4); total number of pre-qualifications made between October 2020 and November 2021 (column 5). Number of bids and contracts won are top 1% winsorized. Controls include 12 strata fixed effects, the value of the dependent variable measured at baseline. This specification uses an OLS regression. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

TABLE A.6. Variables in Hypothetical Tenders

Variable	**Description**
Kampala	A dummy equal to 1 if the PDE is located in the capital Kampala
Open International Bidding	A dummy equal to 1 if the bidding method is an open international
Funded by Ugandan gov'nt	A dummy equal to 1 if the contract is funded by the government
Document price shown	A dummy equal to 1 if the tender shows the bid document price
Bid security shown	A dummy equal to 1 if the tender shows the bid security amount
Less than 2 weeks until deadline	A dummy equal to 1 if the tender's deadline is less than two weeks from publication
Pre-bid meeting displayed	A dummy equal to 1 if the tender shows the pre-bid meeting date
Up to 30 days until BEB announced	A dummy equal to 1 if the tender shows a date for announcing the BEB which is less than 30 days from the deadline
Reference to inspection	A dummy equal to 1 if the tender references the possibility to inspect the documentation
Early payment is promised to bidders	A dummy equal to 1 if the tender promises early payments
Feedback is promised to bidders	A dummy equal to 1 if the tender promises feedback

Notes: This table illustrates the coding of regressors based on original profile components. The first column shows the main regressors. The second column gives a brief description of the variables.

TABLE A.7. Description of Hypothetical Tenders Components

Variable	Categorical Value	Options
Kampala (15%)	= 1 if the contract takes place in Kampala	There are 158 different locations for the contracts advertised.
Open International Bidding (1%)	= 1 if the bidding method is open internat'l (option 3)	1. Open bidding 2. Open domestic bidding 3. Open international bidding
Funded by Ugandan gov'nt (88%)	= 1 if contract funded by government (option 2)	1. Government of Uganda 2. Government of the Republic of Uganda 3. Central Government of Uganda 4. African Development Bank (AfDB) 5. European Union 6. Federal Republic of Germany 7. World Bank 8. International Monetary Fund 9. International Development Association (IDA) 10. Primary Health Care (PHC) 11. USAID
Document price shown (85%)	= 1 if the tender shows bid document price	Bid document price ranges from 3,000UGX to 500,000UGX
Bid security shown (30%)	= 1 if the tender shows bid security amount	Bid security cost ranges from 90,000UGX to 7,000,000,000UGX
Less than 2 weeks until deadline (3%)	= 1 if the tender's deadline is less than two weeks from publication	Tender deadline between 4 and 89 days from publication
Pre-bid meeting displayed (33%)	= 1 if the tender shows pre-bid meeting date	Distance to pre-bid meeting ranges from 1 to 36 days from publication
Up to 30 days until BEB announced (15%)	= 1 if the date for announcing the BEB is less than 30 days from the deadline	Distance to best evaluated bidder (BEB) notice ranges from 10 to 207 days
Reference to inspection (50%)	= 1 if the tender references to possibility to inspect the documentation	Message inviting bidders to inspect the bidding documents: "Bidding documents shall be issued at [PDE name]"; "Bidding documents shall be issued and inspected at [PDE name]"
Early payment is promised to bidders 30%)	= 1 if the tender promises early payments	Message assuring providers that they will receive their payment immediately after the delivery of the goods or services procured: "Payments to the company will be made immediately upon delivery of the goods"
Feedback is promised to bidders (30%)	= 1 if the tender promises feedback	Message assuring providers that unsuccesful bidders will receive an explanation for not being selected: "The entity will provide comprehensive feedback to both successful and unsuccessful bidders about the evaluation process"; "Comprehensive feedback will be provided to all bidders"

Notes: This table illustrates values and options for each characteristics in the hypothetical tender rating exercise.

TABLE A.8. Experiment #2: Balance, Separate Treatments vs Control

Variable	Mean in T1	Mean in T2	Mean in C	T1	T2	p(T1=T2)	N
Owner is woman	0.146	0.154	0.179	-0.033	-0.028	0.893	524
				(0.039)	(0.040)		
Construction	0.409	0.438	0.424	-0.000	0.049	0.100	524
				(0.028)	(0.024)		
Services	0.544	0.562	0.489	0.047	0.055	0.876	524
				(0.048)	(0.047)		
Supplies	0.649	0.586	0.652	0.001	-0.061	0.235	524
				(0.051)	(0.052)		
HQ in Kampala	0.398	0.467	0.418	-0.067	-0.003	0.032	524
				(0.024)	(0.025)		
Total employees	19.976	18.917	23.536	-3.624	-4.500	0.776	521
				(4.048)	(3.800)		
Bids submitted, last FY	5.942	6.426	5.295	0.485	0.943	0.714	523
				(0.970)	(1.079)		
Contract won, last FY	2.357	2.292	2.279	0.065	-0.007	0.883	522
				(0.428)	(0.434)		
Active contracts, last FY	2.815	2.880	2.687	0.132	0.191	0.911	517
				(0.441)	(0.509)		
Share of revenues from PP	38.899	37.305	35.626	3.147	1.611	0.657	511
				(3.506)	(3.396)		
N. PDEs mentioned at baseline	5.047	5.036	5.283	-0.282	-0.283	0.998	524
				(0.335)	(0.318)		
Percept. public ent.[0-100]: timely payment	54.444	52.849	54.380	0.364	-1.207	0.491	521
				(2.207)	(2.131)		
Percept. public ent.[0-100]: feedback	52.982	50.060	51.727	1.223	-1.633	0.327	521
				(2.829)	(2.806)		
Percept. public ent.[0-100]: personal connections	61.411	59.516	57.758	3.732	1.945	0.558	496
				(2.791)	(2.972)		
Percept. public ent.[0-100]: corruption	58.000	56.497	55.872	2.407	1.092	0.685	488
				(3.059)	(3.196)		

Notes: This table reports balance checks among treated and control firms in Experiment #2. The first column reports mean in T1 (that is, firms receiving first the market perception reports). The second column reports mean in T2 (that is, firms receiving first the audits reports). The third column reports mean in the Control group. The fourth and fifth column report coefficients β_1 and β_2 from the following specification $y_{i0} = \alpha + \beta_1 T1_i + \beta_2 T2_i + \varepsilon_i$. The sixth column reports the p-value of a Wald test of equality between the two coefficients for T1 and T2. Last column reports the total number of observations.

TABLE A.9. Experiment #2: Balance on Baseline Covariates by Attrition Status

	Non-attrited				Attrited			
Variable	T	C	pval	Miss. obs.	T	C	pval	Miss. obs.
Resp. is female	0.160	0.177	0.615	0	0.102	0.200	0.402	0
Respondent is the owner	0.488	0.390	0.032	0	0.407	0.700	0.122	0
Years in this firm	9.029	8.947	0.921	0	9.954	11.400	0.302	0
University degree	0.594	0.573	0.703	0	0.593	0.600	0.634	0
Region: Kampala	0.391	0.427	0.040	0	0.627	0.350	0.906	0
Bids made, last 12 months	6.125	5.319	0.388	1	6.458	5.100	0.680	0
Bids won, last 12 months	2.231	2.221	0.971	1	2.776	2.750	0.855	1
Active contracts, last 12 months	2.902	2.420	0.242	7	2.593	4.850	0.155	0
Share of revenue from public procurement	37.945	35.509	0.423	11	38.912	36.550	0.838	2
Total employees	19.832	23.816	0.329	2	17.603	21.250	0.402	1
Timely payment - Public entities	53.399	53.604	0.934	3	54.881	60.750	0.390	0
Feedback - Public entities	51.100	50.491	0.797	3	53.559	61.800	0.215	0
Personal connection - Public entities	59.425	57.390	0.415	20	65.923	60.842	0.216	8
Corruption - Public entities	56.095	55.183	0.689	28	63.250	61.421	0.541	8
Timely payment - Private entities	78.815	77.854	0.534	11	79.345	77.350	0.572	1
Feedback - Private entities	63.251	60.019	0.208	12	62.310	62.650	0.981	1
Personal connection - Private entities	45.936	47.779	0.521	26	52.442	49.650	0.993	7
Corruption - Private entities	35.720	36.315	0.832	35	41.706	35.158	0.460	9
Info on bus. from other firms	3.114	2.939	0.190	0	2.763	3.200	0.497	0
Info on bus. from gov. agencies	2.719	2.755	0.870	1	2.593	2.750	0.940	0
Info on bus. from tradit. media	3.480	3.348	0.325	0	3.508	3.450	0.854	0
Info on bus. from internet	3.146	3.073	0.665	0	3.119	3.750	0.127	0
Info on bus. from consultancy	2.374	2.268	0.420	0	2.627	2.800	0.779	0
Info on bus. from bus. assoc.	2.488	2.617	0.396	2	2.373	2.950	0.241	0
Info on bus. from special. web.	2.335	2.317	0.885	0	2.136	3.400	0.010	0
PDEs mentioned (bidded+not bidded)	4.957	5.262	0.303	0	5.441	5.450	0.826	0
Bid for both reports is the same	0.459	0.445	0.827	0	0.441	0.350	0.648	0
Bid for firm perception is higher	0.235	0.280	0.308	0	0.254	0.250	0.673	0
Bid for audits is higher	0.306	0.274	0.449	0	0.305	0.400	0.400	0
Sample sizes	281	164			59	20		

Notes: The table reports balance checks among treated and control firms in Experiment #1, separately for non-attrited firms at endline and attrited firms at endline. Columns "T" and "C" indicate the mean for each characteristic among treated and control respectively. "pval" is a t-test of equality between the means of the two groups. "Miss. obs." counts how many missing observations at baseline we have for each characteristic. In the PDS-lasso analysis, we include only the characteristics with non-missing observations. We define attrited a firm who is not willing to respond to our endline survey.

TABLE A.10. Experiment #2: Does Addressing Misperceptions Matter?: Heterogeneity, Complete Version

	Total bids		*Contracts won*	
	(1)	(2)	(3)	(4)
Treated × Mentioned × Top	0.823**		0.314	
	(0.416)		(0.195)	
	[0.048]		[0.107]	
Treated × Mentioned	-0.015		0.024	
	(0.063)		(0.038)	
	[0.809]		[0.528]	
Treated × Top	-0.002	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
	[0.216]	[0.507]	[0.128]	[0.314]
Treated × Score Optimist × Top		0.888		-0.263
		(1.059)		(0.410)
		[0.401]		[0.521]
Treated × Score Pessimist × Top		0.822*		0.674**
		(0.484)		(0.285)
		[0.090]		[0.018]
Treated × About Right × Top		0.127		-0.239
		(0.309)		(0.214)
		[0.680]		[0.264]
Treated × Optimist		0.122		-0.003
		(0.133)		(0.083)
		[0.358]		[0.969]
Treated × Pessimist		-0.014		0.021
		(0.083)		(0.038)
		[0.864]		[0.582]
Treated × About Right		-0.241		0.042
		(0.150)		(0.101)
		[0.109]		[0.679]
Observations	64872	64872	64872	64872
N. firms	306	306	306	306
N. PDEs	212	212	212	212
Mean DV top mentioned	0.327		0.143	
Mean DV top among pessimists		0.241		0.000

Notes: The table shows coefficients, robust standard errors (in parentheses), and p-values (in square brackets) from estimating Equation 4.4. The unit of observation is a firm-PDE pair. *Treated* is an indicator equal to 1 if the firm received the market perceptions report, *Mentioned* is an indicator equal to 1 if the firm had mentioned the name of the PDE at baseline, and *Top* is an indicator equal to 1 if the PDE is in the top decile of the integrity distribution of the PDEs. *Score Optimist* is an indicator equal to 1 if the firm belongs to the top 40th percentile of the distribution of the deviations between the firm's beliefs and the market beliefs; *Score Pessimist* an indicator for the firm belonging to the bottom 40th percentile; *About Right* a dummy equal to 1 if the firm's deviation belongs to the middle of the distribution (40th to 60th percentile). *Dependent variables*: a firm's total bids with the PDE (columns 1 and 3) and contracts won by the firm from the PDE (columns 2 and 4). Controls include dummies for strata FE (a dummy equal to 1 if the firm is active in Kampala and another if the firm is active in the construction sector, as well as their interactions). All specifications include firm fixed effects and PDE fixed effects. ***, **, *, indicate significance at the 1%, 5%, and 10% levels respectively.

Appendix B. Experiment #1: Introductory text

Dear Respondent, We would like to thank you for your participation in our survey on public procurement, that was carried out between April and August of 2019. As you may recall, our study aims to understand the barriers that prevent firms like yours from participating more actively in public procurement and how to increase transparency in the public procurement sector. We are happy to share with you the preliminary findings of our study. You can access the report via this link. We will follow up in the following months with an updated report with additional findings. We also want to share with you two pieces of information about public procurement opportunities.

1. Alerts on the latest public procurement opportunities available. Every Tuesday and Thursday you will receive via e-mail, WhatsApp or SMS a list of the latest opportunities (tender notices, calls for pre-qualification and framework contracts) that are published by ministries, hospitals, local authorities and any other entities that conduct public procurement in Uganda.

   If you would like to receive these tenders through WhatsApp, please add the phone number XXXXXXXXXX to your contact list and send us a message. If you use WhatsApp Web or you are reading this document from your phone, you can also click on this link to send us a message. If you want to receive the tenders through e-mail please send us your address to info@transparency-project-ug.com.
2. The procurement plans of the different Procurement and Disposing Entities (PDEs) in Uganda. As you may be aware, these plans describe the list of contracts that an entity expects to engage in for the coming fiscal year, and therefore we think that these present useful information for firms like yours to plan ahead what contracts you would like to bid for in the coming fiscal year. We will share the procurement plans when the entities make them available. Moreover, we are in contact with these entities, and we will share with you updates that are made to these plans throughout the year.

We would like to thank you again for your participation in our survey and in our research project. Sincerely, The Transparency Project research team [1]

[1]If you would like to change your phone contact to one that is more suitable for us or share with us your e-mail address you can contact us at info@transparency-project-ug.com, or at XXXXXXXXXX We obtained your contact as part of the survey "Information Frictions in Government-Firm Relationships", a nation-wide survey conducted in Uganda between April and August of 2019. If you do not recall participating in this survey or you would like to stop receiving these messages, contact us either through phone or mail. This study is conducted by researchers at The University of Chicago Booth School of Business, at Northwestern University Kellogg School of Management, and at the Institute

Appendix C. Experiment #2: Elicitation of perceptions of PDEs

[1] At the start of a fiscal year, public entities publish their procurement plan, where they estimate the time they will spend in the procurement process for each contract (that is, the process of publishing the contract, evaluating the bids and selecting a provider). In a typical year, what do you think is the percentage of contracts where **this procurement process is carried out on time**, according to the plan?

[2] Think about all the procurement contracts planned by a public entity in a typical year. What do you think is the percentage of these contracts that are **completed in time**, according to the initial plan?

[3] Think about the contracts that a public entity signs in a typical year. What do you think is the percentage of contracts in which **providers are paid in time, as established in the contract?**

[4] In a typical year, what do you think is the percentage of contracts in which **the public entity explained to each bidder the reasons for not being selected?**

[5] In a typical year, what do you think is the percentage of contracts that are **won by providers that have a personal connection with public officials?**

[6] In a typical year, what do you think is the percentage of contracts in which **the winning firm had to give a gift, a counterfavour or some extra money to public officials?**

[7] On a scale from 0 to 100, how much do you think each of these public entities **comply with the rules and regulations** that should be followed by law when engaging in public procurement? (where 0 means "they do not comply with any rule" and 100 means "they comply with all the rules and regulations.")

[8] When a public entity needs to procure a good or service it will invite providers to present their bid. If they are following an open bidding method, they will publish a tender notice in newspapers and websites inviting all firms to present their bids. On the other hand, if they are not following an open bidding method, they will only invite specific providers to present their bids. The entity will receive a certain number of bids for the contract, one from each bidder who is interested in providing the good or service. In a typical year, what do you think is the percentage of contracts **that**

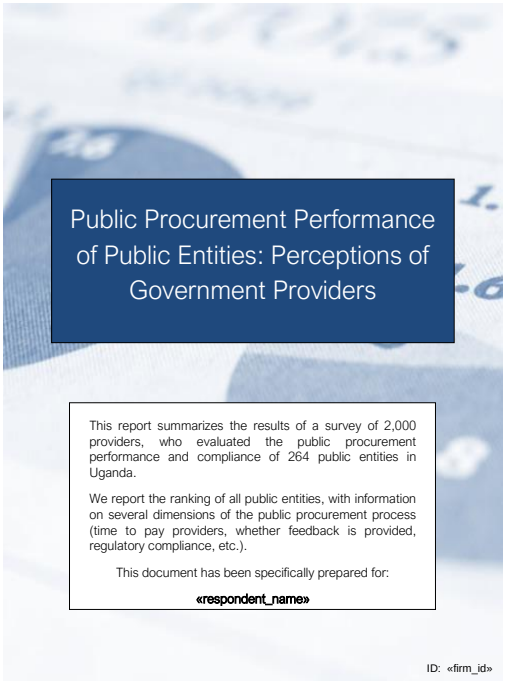
for International Economic Studies, working in collaboration with the Independent Evaluation and Research Cell (IERC) of BRAC Uganda. It has been approved by the Mildmay Uganda Research and Ethics Committee and the University of Chicago Institutional Review Board (IRB). If you have any questions regarding your rights as a participant, you may direct your questions to any of these institutions.

receive more than two (2) bids? That is, the percentage of contracts that receive bids from more than two (2) providers.

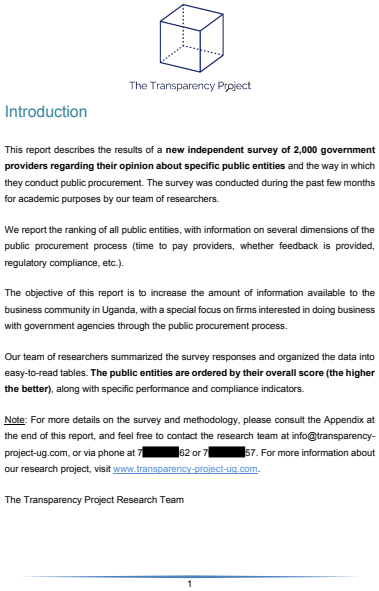
Appendix D. Market Perceptions and Audits Reports: Examples

In this section we report the first pages of the market perceptions and the audit reports, which we use in Experiment 2 with the goal of addressing firms' perceptions about government entities. Each report is customized, and we print the firm's name in the covers under a short summary of the purpose of the report. We proceed by carefully explain how the report was constructed and highlight the details of the scoring and ranking system.

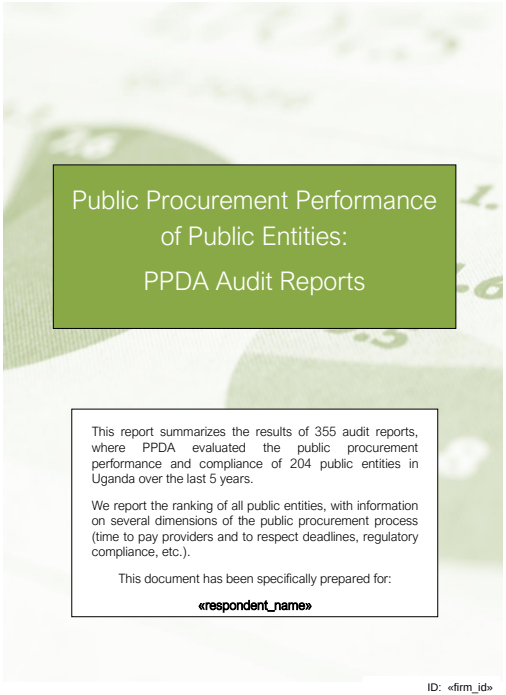
FIGURE A.6. Screenshots from Reports: Intro Pages



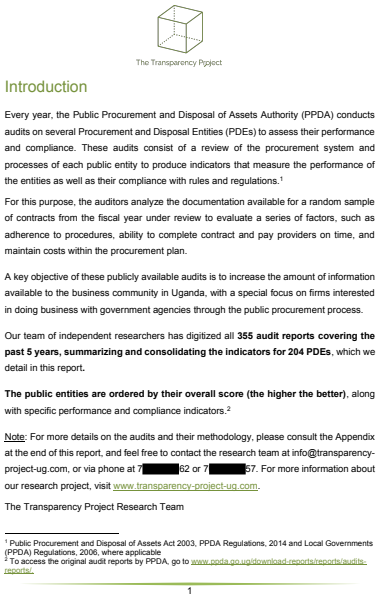
(**A.**) Market Perceptions: First Page



(**B.**) Market Perceptions: Second Page



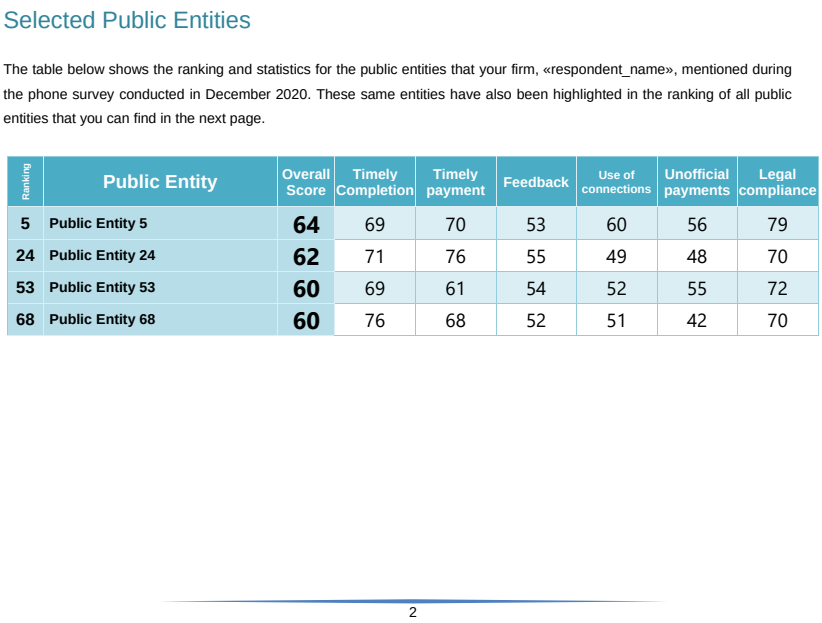
(**C.**) Audits Report: First Page



(**D.**) Audits Report: Second Page

Notes: This figure plots the first two pages of the Market Perceptions Report (Panel a and B) and the Audits Report (Panel C and D).

FIGURE A.7. Screenshots from Reports: Example PDE Lists



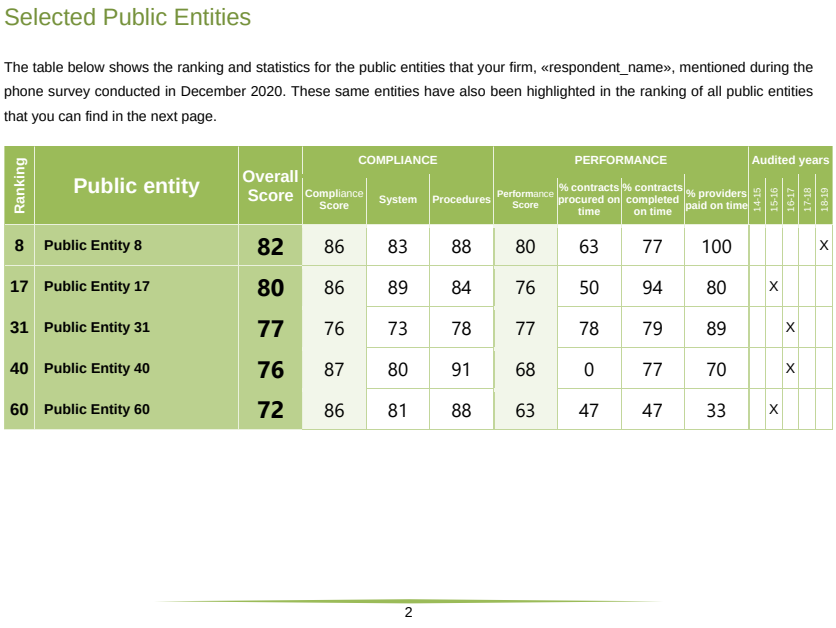
Selected Public Entities

The table below shows the ranking and statistics for the public entities that your firm, «respondent_name», mentioned during the phone survey conducted in December 2020. These same entities have also been highlighted in the ranking of all public entities that you can find in the next page.

Ranking	Public Entity	Overall Score	Timely Completion	Timely payment	Feedback	Use of connections	Unofficial payments	Legal compliance
5	Public Entity 5	64	69	70	53	60	56	79
24	Public Entity 24	62	71	76	55	49	48	70
53	Public Entity 53	60	69	61	54	52	55	72
68	Public Entity 68	60	76	68	52	51	42	70

2

(**A.**) PDE list from Market Perceptions Report



Selected Public Entities

The table below shows the ranking and statistics for the public entities that your firm, «respondent_name», mentioned during the phone survey conducted in December 2020. These same entities have also been highlighted in the ranking of all public entities that you can find in the next page.

Ranking	Public entity	Overall Score	COMPLIANCE			PERFORMANCE				Audited years				
			Compliance Score	System	Procedures	Performance Score	% contracts procured on time	% contracts completed on time	% providers paid on time	14-15	15-16	16-17	17-18	18-19
8	Public Entity 8	82	86	83	88	80	63	77	100					X
17	Public Entity 17	80	86	89	84	76	50	94	80		X			
31	Public Entity 31	77	76	73	78	77	78	79	89			X		
40	Public Entity 40	76	87	80	91	68	0	77	70			X		
60	Public Entity 60	72	86	81	88	63	47	47	33		X			

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(**B.**) PDE list from Audits Report

Notes: This figure plots a screenshot from the PDE lists shared with firms. Panel A shows the first entries of the table from the Market Perceptions Report. Panel B shows the table from the Audits Report.

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