

INFORMATION FRICTIONS IN GOVERNMENT-FIRM RELATIONSHIPS

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1. INTRODUCTION

Public procurement of goods and services represents the primary area of government investment, accounting for 14.5% of GDP in low-income countries. As a result, its potential as a driver of private sector development is massive. Yet, frictions in the functioning of procurement markets can lead to low competition, with a limited number of firms competing to obtain a contract, potentially resulting in an inefficient allocation of resources. Our project aims to estimate various information-related interventions that have been conducted in collaboration with the Uganda Public Procurement and Disposal of Public Assets Authority (PPDA), i.e. the national public procurement supervisory agency. We test whether the intervention affects competition, firm growth, resource reallocation, and several other economic outcomes.

2. CONTEXT AND DATA

2.1. Context. All public procurement contracts in Uganda are initiated by a Public Procurement Entity (PDE). PDEs are split between local and central government agencies, and include a mix of public hospitals and schools, ministries, local municipalities, and specialized agencies like the Uganda National Roads Authority and the National Water and Sewerage Corporation. Procurement officials follow a set of guidelines and, for each procurement contract, select a specific procurement method to allocate the contract to a provider. There are two broad categories of methods: (i) competitive open bidding for contracts above a certain threshold, and (ii) less competitive methods that require the pre-selection of a certain number of firms by public officials.

The context is characterized by several sources of information frictions, which potentially affect competition for government contracts. We identify the following three main information frictions, which our three treatment arms –two at the firm-level and one at the PDE-level– aim to target:

- (1) Firms may face difficulties to timely learn about potential public procurement opportunities that interest them, given the lack of a centralized online system to advertise bid notices. In fact, (a) bid notices are usually published in one of several potential newspapers, and in random parts of a newspaper, which makes spotting them difficult, and (b) tenders are usually published in very close proximity to the bidding deadlines, thus making it essential that firms are aware of them as soon as they are up.
- (2) Firms may have financial constraints and may lack sufficient information to determine the value of participating in public procurement, possibly underestimating the likelihood, and potential benefits, of obtaining procurement contracts. This may also stem from a (more or less accurate) perception that the system is rigged, and that the process of bidding is too cumbersome and costly, and more so for some PDEs and not others.

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- (3) Public procurement contracts allocated through less competitive methods suffer from a potential information friction on the side of public procurement officials, who often mostly rely on their own/PDE private information and rarely use information from other recommended datasets from PPDA and other PDEs.

2.2. Data. The baseline firm-level survey (Spring-Summer 2019) covers 3,049 firms interested in doing business with the government, randomly sampled from the PPDA Registry of Providers. The survey collects information on:

- Basic characteristics of the firm, such as age, location, legal ownership, specific sectors of activity, owner/manager’s demographic characteristics; balance sheet data such as revenues, profits, costs structure and investments; access to finance, employees and compensation structure, management practices, network data, perceptions of competition.
- Experience with public procurement and information access, such as: number of tenders to which the firm participated, number of tenders won, perceived barriers to participating in procurement, knowledge of procurement procedures and connections to public officials, interest in specific PDEs, perceptions about corruption in the market and across specific PDEs, and more.

The endline survey will be conducted around end of 2020, and it will be almost identical to the baseline survey, with the addition of questions (including open ended ones) to better understand mechanisms and impacts of our interventions. Between baseline and endline, depending on budget availability we may also conduct a few short phone surveys to collect information on the main outcomes of interest, such as procurement contracts inspected, applied for, won, and more.

On the PDE-side, by means of shorter surveys by PPDA, we also collected baseline data on information access and firms’ selection process. We will also conduct follow-up surveys of PDEs around end of 2020 (with the possibility of intermediate surveys as well, depending on PPDA officials’ availability).

We also rely on PPDA administrative data on public procurement contracts, with information on both firms bidding and winning and public entities (which will serve as the primary outcome data), as well as additional data that we digitized from PPDA archives such as audits, pre-qualification lists, complaints, blacklisted firms, and more. Finally, we also plan to collect data on the quality of bids submitted and of projects completed, and data on disaggregated prices of goods, depending on feasibility and budget constraints.

3. EXPERIMENTAL DESIGN

We conduct two information-based interventions: one at the firm-level with two treatment arms, and one at the PDE-level with just one treatment arm.

3.1. Firm-level intervention. The firm-level intervention is aimed at reducing information frictions for firms interested in doing business with the government. It consists of two treatment arms, T1 and T2.

T1 aims at providing information about tender opportunities to a subset of firms, in two ways. First, our research team, for the full duration of the intervention (i.e., approximately October 2019 to October 2020), will manually and daily collect all information about tender opportunities through all newspapers published in Uganda and by going over all sources of online news about tenders (including individual PDE websites). This information will then be shared through email/sms/whatsapp to the T1-treated firms twice a week for a full year;

importantly, each firm will only receive tenders that are marked as potentially interesting for them, after a selection made by our research team based on the tender description and the sector and economic activity of the firm. In the final phase of the project, we may select only a subset of the eligible tenders to disseminate, so as to have contract-level exogenous variation as well. Second, we collect procurement plans of most PDEs, and we shared these with firms; we do so only in February 2020, so that the staggered implementation allows us to look at its differential impact.

T2-treated firms will instead receive the T1 treatment and, in addition to that, a further treatment component. Specifically, T2 firms will also receive a one-time financial reimbursement for the purchase of bidding documents from an entity with which the firm did not do business before and for which the firm was not prequalified for. In the final phase of the project we may allow for a larger financial incentive or more than one reimbursement per firm.

3.1.1. *Randomization.* The randomization is done using Stata. We use strata for firm location (Kampala vs other), sector (works, supply, services), and size (above and below sample median). Out of 3,049 firms, 765 are allocated to T1, 761 to T2, and 1,523 to the control group.

3.1.2. *Analysis.* Our main analysis of the experimental results will consist of running regressions of the form:

$$Y_i = \beta_0 + \beta_1 T_i^1 + \beta_2 T_i^2 + X_s' \gamma + \epsilon_i$$

where Y_i is the given outcome variable for firm i measured after the treatment, T_i^1 is an indicator equal to one if firm i received the first treatment, T_i^2 is an indicator equal to one if firm i received the second treatment. X_s is a vector of stratification variables (location, sector, size) and ϵ_i is the error term. Additionally, primary specifications will also present both T1 and T2 combined into a unique Treatment indicator variable. Finally, we will also attempt to measure imperfect compliance (due to potential technical communication problems with the a subset of treated firms) by tracking click activity (if feasible) and with endline survey questions, so that we can also instrument for actual takeup with treatment assignment to estimate treatment effects on the treated.

3.1.3. *Outcomes.* Our main firm-level outcomes are the bidding and winning behavior in public procurement, as well as measures of firm performance such as revenues, profits, and employment.

Using data from our survey (unless specified otherwise), we will also study additional procurement-related outcomes to understand firm behavior, such as: outcomes split by more vs less competitive contracts (as our treatment primarily targets the former), contracts inspected (which we hope to also observe through the collection of the administrative PDE-specific records of inspections), whether the firm pre-qualifies with PDEs, sub-contracts obtained. Additionally, and especially relevant for T2, we will study whether the bidding and winning behavior varies with respect to PDEs the firm already had done business with (or pre-qualified for), and we will also create dummies for whether the firm interacts (bids, wins, inspects, pre-qualifies) with a new PDE (for T2, we are also interested in whether the firm interacts with new PDEs for which it did not ask the reimbursement for).

We will also use our survey data to understand how firm performance is affected. To this purpose, we will study the impact on employment composition, on whether the firm has employees dedicated to various aspects of public procurement, on management practices and productivity, and on other balance sheet items such as costs and assets. Finally, we will also investigate how firm's perceptions about corruption, competition, and other aspects of economic activity asked in the survey change after our intervention.

Several heterogeneities of interests (measured using responses to the baseline surveys) will be important to better understand the mechanisms behind any effect we may find:

- across firms: perceptions of corruption (and the other perceptions on competition and from Section 4 of our survey), access to finance, geographical distance from and other types of connection to the PDE, information type they primarily relied upon, access to networks of other firms (and its own centrality).
- across types of tenders: days between publication date (and/or notification to firms) and deadline to bid; tenders that also appear in online sources; tenders that appear in wide-spread versus other newspapers; tenders of PDEs for which we shared the procurement plan.
- across phases of the project, to look at differential effects before and after the procurement plan was shared, and before and after the reimbursement of T2 was increased (only in the case in which this happens)

We will additionally do the following:

- Analyze spillovers of our intervention on firms who belong to the networks (buyers, suppliers, competitors, information) of firms we surveyed, as well onto other firms who do business in similar markets (using administrative data from PPDA on firms, contracts, PDEs, sectors, if available)
- For the primary outcomes, depending on budget availability, we will also study the impact of the intervention on the primary outcomes of bidding and winning behavior using intermediate phone surveys. Similarly, depending on budget availability, we will also analyze longer-term outcomes by means of phone surveys of basic and mechanisms-related outcomes at several points in time in the one or two years after our endline survey.
- In case we do a contract level randomization near the end of our intervention (that is, we only disseminate to treated firms only a subset of the tenders we collect), we will also run an analysis where the outcome and the treatment dummy are both at the contract level. Specifically, we will investigate the impact on competition measures such as number of bidders, on value for money (computed as in Bandiera et al, 2009, for the set of contracts for which we can observe/collect prices), quality (conditional on measuring it through either PPDA audits or specific field measures), on other issues related to contract performance through audits (e.g., delays, complaints, performance score, ...).
- Analyze additional data sources that can provide us with data useful to explore mechanisms. In particular, we are collecting click data to understand who sees and acts on the tenders we disseminate, which we plan to analyze conditional on our ability to cleanly identify which firm is associated to a specific IP address. We also plan to use administrative PPDA data on bids and contracts of all PDEs, which depend on our ability to complement the online PPDA database with the digitization of all procurement records reported individually by each PDE at a monthly or quarterly frequency. Finally, if feasible, we may also estimate the willingness-to-pay of firms in our study for information about tender opportunities.
- In the endline survey, we also plan additional questions, including open-ended ones, to qualitatively study how our intervention affected firms. For example, we will ask questions about the cost of looking for information about tenders, the costs of bidding, how they change employment composition and tasks while our intervention was ongoing, and more.

3.2. PDE-level intervention. The PDE-level intervention is aimed at reducing information frictions for PDEs, considering that the majority of contracts are based on non-fully competitive methods that rely on an initial shortlisting of a limited numbers of firms by public officials. This intervention has one treatment arm T.

T consists of the delivery of physical booklets containing a list of firms that are pre-qualified with any entity in Uganda (or directly in the PPDA Registry of Providers), organized by specific economic activity and location. Each treated PDE receives three booklets, one for each main sector (works, supply, services). Notice that while each PDE has direct access to its own list of pre-qualified firms, and can potentially request access to the Registry of Providers from PPDA, it is practically extremely difficult to access other PDEs' pre-qualified lists, as these were only available on paper formats which we were the first to ever digitize (specifically for this project).

Starting in February 2020, until the end of 2020, both T and control PDEs will receive a monthly email and sms notification by PPDA, with a reminder that they are encouraged to use all available sources of information when pre-selecting potential bidders.

3.2.1. Randomization. The randomization is done using Stata. We use strata for PDE type (central, local) and for size based on number of contracts assigned (large, small). Out of 260 PDEs, 131 are allocated to treatment and 129 to control.

3.2.2. Analysis. Our main analysis of the experimental results will consist of running regressions of the form:

$$Y_p = \beta_0 + \beta_1 T_p + X_s' \gamma + \epsilon_p$$

where Y_p is the given outcome variable for PDE p measured after the treatment, T_p is an indicator equal to one if PDE p received the treatment. X_s is a vector of stratification variables (region, type) at the PDE-level, and ϵ_p is the error term. We will also attempt to measure imperfect compliance (due to potential issues in the delivery of the booklet or its maintenance) through field visits (if feasible) and with endline survey questions, so that we can also instrument for actual takeup with treatment assignment to estimate treatment effects on the treated.

3.2.3. Outcomes. Our main PDE-level outcomes are measures of competition and the quality/efficiency of executed contracts. Measures of competition include: number of firms (overall and new) bidding, number of firms (overall and new) winning, HHI, share of contracts won by top 1/4/10/20 firms, number of pre-qualified firms, number new of pre-qualified firms. Measures of quality/efficiency include: delays in the contract execution, cost overruns, performance measures recorded by PPDA audits (if we are able to digitize audits of both treated and control PDEs), quality/efficiency as measured by us/experts on the field (budget permitting).

Importantly, we will also split the main analysis into non-fully competitive and competitive open bidding contracts, with the former being the ones that our treatment targets directly. Moreover, we will also look at measures in numbers and value, and divided by PDE contracts to account for compositional changes. Depending on budget availability, we will also analyze longer-term outcomes. In the endline survey of public officials we will also ask additional questions, including open-ended ones, to qualitatively study how our intervention affected PDEs and their officials. In terms of heterogeneity, we will study how the effects vary depending on pre-existing use and access of information by PDE officials (as measured in our baseline survey of officials). Finally, if feasible, we may also estimate the willingness-to-pay of officials and PDEs in our study for information about firms.