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Deterring Kickbacks and Encouraging Entry in Public Procurement Markets

Evidence from Firm Surveys in 88 Developing Countries

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Abstract

There is relatively little systematic evidence on the links between procurement systems and outcomes such as competition and corruption levels. This paper adds to the evidence base, using data on almost 34,000 firms from the World Bank's Enterprise Surveys, in 88 countries that also have procurement systems data from Public Expenditure and Financial Accountability (PEFA) assessments. The analysis finds that in countries with more transparent procurement systems, where exceptions to open competition in tendering must be explicitly justified, firms are more likely to participate in public procurement markets. Moreover, firms report paying fewer and smaller kickbacks to officials in countries with more transparent procurement systems, effective and independent complaint mechanisms, and more effective

external auditing systems. These findings—particularly on kickbacks—are robust to the inclusion of many controls and to a range of sensitivity tests. The study finds evidence that better procurement systems matter more for smaller firms' participation in procurement markets and payment of kickbacks to obtain contracts, consistent with the view that information and transactions costs that are incurred in learning about bidding opportunities and fulfilling bidding requirements are more onerous for smaller firms. Falsification tests show that other, non-procurement indicators from the PEFA assessments are not associated with procurement outcomes, and that the PEFA procurement indicators are not strongly associated with other "governance"-related outcomes in firm surveys that are unrelated to procurement.

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The World Bank

1. Introduction

Public procurement of services, works and supplies is estimated to account for 15-20% of GDP in developing countries, and up to 50% or more of total government expenditure (World Bank, 2015). Efficient and effective procurement is vital to core government functions, including public service delivery and provision of infrastructure. Weaknesses in procurement systems can lead to large-scale waste of public funds, reduced quality of services, corruption, and loss of trust in government.

Where procurement processes are vulnerable to fraud and other forms of corruption, public expenditure allocation may be distorted, in favor of highly-differentiated products where corruption is more difficult to detect, due to the absence of comparable reference prices (Mauro, 1998; Evenett and Hoekman, 2005a). If tendering processes are rigged, "competition cannot play its role of driving the prices down and the quality up" (World Bank, 2016).

Maximizing "value for money" and minimizing corruption in procurement are thought to be facilitated in general by competitive tendering procedures that limit discretion on the part of procurement officials (Ware et al., 2007: 297). More transparent systems that make procurement information widely accessible, and complaints mechanisms and auditing procedures that establish accountability for procurement decisions, are believed to encourage participation by more firms and deter "kickbacks" and other forms of fraud and corruption (Ware et al., 2007: 296-297).

However, there is relatively little systematic evidence on the links between procurement systems and outcomes. "The paucity of quantitative, cross-country analyses of national procurement practices is striking" (Evenett and Hoekman (2005b: 11). This paper adds to the evidence base, using data on almost 34,000 firms from the World Bank's Enterprise Surveys, in 88 countries that also have data on procurement systems from PEFA (Public Expenditure and Financial Accountability) assessments.[1] We find that in countries with more transparent procurement systems, where exceptions to open competition in tendering must be explicitly justified, firms are more likely to participate in public procurement markets. Moreover, firms report paying fewer and smaller kickbacks to officials in countries with more transparent procurement systems, with effective and independent complaints

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[1] Descriptions of these data sources can be found at http://www.enterprisesurveys.org/data and https://pefa.org/.

mechanisms, and with more effective external auditing systems. These findings – particularly on kickbacks – are robust to the inclusion of numerous controls and to a range of sensitivity tests.

Another procurement indicator, on the appropriateness of the legal and regulatory framework, is not associated with firms' kickbacks or participation in procurement markets. That measure is primarily a *de jure* indicator of official rules regarding transparency, competition, etc., in contrast to the other more *de facto* indicators of actual systems and practices.

We expect better procurement systems to matter more for smaller firms' participation in procurement markets and payment of kickbacks to obtain contracts. The information and transactions costs incurred in learning about bidding opportunities and fulfilling bidding requirements (including paying fees and deposits) should be more onerous for smaller firms. Larger firms are more likely to have the necessary expertise and connections to meet bidding requirements while avoiding the need to pay bribes. Dividing the sample into three groups of small, medium-sized, and large firms, these expectations find support in the data.

Although we cannot fully rule out endogeneity bias in our estimated relationships between procurement systems and outcomes, there are several arguments for a causal interpretation. First, a causal argument from procurement systems to outcomes is consistent with the heterogeneous effects by firm size. Arguments for reverse causation, or for simultaneity bias, cannot easily predict stronger relationships for smaller firms. Second, any reverse causality is likely to bias key coefficient estimates downward (in absolute value) rather than upward. Poor outcomes in the form of corruption scandals or lack of competition are more likely than favorable outcomes to motivate reforms in procurement practices, particularly where pressure from donors is involved. This downward bias should apply particularly for our *de jure* indicator (legal and regulatory framework for procurement), which is the only one that is never significant in our tests. Third, we report a series of falsification tests showing that other, non-procurement indicators from the PEFA assessments are not associated with procurement outcomes, and that the PEFA procurement indicators are not strongly associated with other "governance"-related outcomes in the firm surveys unrelated to procurement. Results from these tests do not support a view that our main findings merely reflect simultaneity bias, whereby procurement systems and outcomes indicators are both correlated with some broader, omitted aspects of "good governance."

Section 2 below summarizes related literature on participation and corruption in procurement markets. It also describes the indicators on procurement systems and outcomes, and briefly

summarizes the research literature that analyzes either the PEFA indicators or the Enterprise Survey question on kickbacks in procurement. Section 3 explains the main hypotheses and rationale for various control variables. Sections 4-7 report empirical results, including for tests that disaggregate by firm size, and from a series of robustness tests. Section 8 builds the case for a causal interpretation of the main findings, while section 9 concludes.

2. Related Literature and Data Sources

To ensure value for money, procurement systems are designed to generate competition among suppliers for contracts. Hoekman (1998: 255) cites evidence from several sources that noncompetitive procedures can increase costs by 30% or more, and asserts that "in most situations competition is the best rule of thumb" in procurement.

A larger number of bidders on a contract does not necessarily reflect stronger competition, depending on the particular auction mechanisms used, and on whether firms are colluding. In general, however, "the presence of numerous bidders is at least one indication of active competition for contracts" (Kenny and Crisman, 2016: 3). Costs generally fall with larger numbers of bidders, although the number of bidders needed to minimize costs (and the actual number of bidders on a typical contract) appears to vary by sector (Estache and Iimi, 2008). Using data on donor-financed road projects in developing countries, Estache and Iimi (2008) estimate that the average cost per kilometer of road construction is $700,000 USD when there are only two bidders but falls below $500,000 when there are six or more bidders for each contract. Rigid bidding systems that eliminate buyer discretion and mandate selection to the lowest-cost bidder reduce costs, but often at the expense of lower-quality works, goods or services (e.g. Cameron, 2000; Celentani and Ganuza, 2002; Decarolis, 2014).

Two studies exploit value thresholds to test the impact of more widespread advertising of contract tenders on bidding, using regression discontinuity designs. Using a database of World Bank financed contracts, Kenny and Crisman (2016) show that better advertising of contract tenders[2] increases the number of bidders. Coviello and Mariniello (2014) analyze Italian procurement auctions, where values above a certain threshold must be publicized in the Regional Office Gazette and two

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[2] Contracts above a certain threshold in value must be published in UN Development Business online, with bidding documents available in English, French or Spanish.

provincial newspapers. They find the publicity requirement reduced procurement costs (by 7%), and that an increase in the number of bidders (by 9.3%) was the channel through which publicity cut costs. There were no apparent effects on quality or on delays in executing contracts. A third study (Ohashi, 2009) exploits the introduction of a transparency requirement for large contracts in a Japanese prefecture, and shows from a difference-in-differences analysis that bidding rates increased while costs declined (by 8%). A fourth study, by Lewis-Faupel et al. (2016), analyzes data from the gradual adoption of e-procurement at the state or provincial level in India and Indonesia. They concluded from their difference-in-differences tests that e-procurement did not reduce prices paid by government, but improved road quality in India and reduced delays in Indonesia. The positive findings of these four studies suggest that other transparency-related rules may potentially improve procurement outcomes.

Greater competition not only tends to lower costs, but also prevents collusion among suppliers (Estache and Iimi, 2008). A larger number of bidders does not necessarily deter (or encourage) another type of corruption in procurement: "kickbacks" from firms to buyers.[3] If open competition is the rule and departures from it must be justified, purchasers likely have less discretion in awarding a contract to the firm offering the largest bribe instead of to a firm offering a lower price or higher quality. On the other hand, where renegotiation of contracts is common, firms may underbid, pay the bribe, and obtain more generous terms that compensate it for the bribe payment.

At higher decision-making levels in government, opportunities for corruption can distort the composition of public expenditure toward works or services where bribery is less easily detected (e.g., Mauro, 1998; Keefer and Knack, 2007; Hessami, 2014). Standardized items that are frequently purchased (e.g. textbooks) are more likely to have comparable reference prices than highly-differentiated works or services (e.g. aircraft or construction projects), making it easier in the latter case to inflate prices to cover the cost of kickbacks (e.g., Evenett and Hoekman, 2005a: 178-179).

Bandiera et al. (2009) document large variations in prices for generic goods paid by public bodies in Italy. By exploiting a policy change in the procurement system (namely, the establishment of a centralized procurement agency from which public bodies have the option of ordering generic goods), they estimate that most of the excessive spending was attributable to mismanagement rather than to corruption. Collier et al. (2015) document a large dispersion in unit costs for comparable road

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[3] "Kickbacks are bribes – generally a percentage of the value of the contract - by a company to public officials who awarded the contract to that company, despite offering less value for money than other bidders" (Ware et al., 2007: 306).

work activities, and find that costs are significantly higher on average in countries that score poorly on corruption indicators.

Analyzing a large database on firms' banking transactions, Mironov and Zhuravskaya (2016) conclude that "tunneling" of cash to fly-by-night firms is likely directed to politicians in exchange for allocation of procurement contracts. They show that where procurement awards depend more on bribes and kickbacks, contracts tend to get awarded to less productive firms.

Several studies provide evidence that external audits reduce corruption in procurement. In a randomized control trial in Indonesian villages, Olken (2007) found that a large increase in the probability of being audited reduced corruption in road construction. Di Tella and Schargrodsky (2003) found prices paid for homogeneous inputs in public hospitals in Buenos Aires fell by 17% when intensive audits were performed as part of a crackdown on corruption. The introduction of random audits of procurement processes in Brazilian municipalities significantly reduced corruption, even when the probability of being audited remained low (Avis et al., 2016; Zamboni and Litschig (2016).

Cross-country evidence on the relationships between procurement systems and outcomes is very sparse. Evenett and Hoekman (2005b: 3) note the dearth of evidence on the relative payoffs to alternative types of procurement reforms, and the need for research "to shed light on the success or otherwise of public procurement policies in a range of developing countries." This paper aims to begin filling this evidence gap, using data for 88 countries from PEFA assessments and the World Bank's Enterprise Surveys. We look at two outcomes experienced by business firms: participation in procurement markets, and kickbacks needed to obtain government contracts. According to Ware et al. (2007: 306): "kickback schemes are the primary vehicles through which corruption is perpetrated in public procurement." Our data do not measure other aspects of procurement processes experienced by firms, such as other forms of corruption, transactions costs, or payment delays, or outcomes valued by public procuring agencies, such as cost, quality, or collusion by firms.

Procurement outcomes are measured in our study by two linked questions in the World Bank's Enterprise Surveys.[4] The first question asks: "Over the last year, has this establishment secured or attempted to secure a government contract?" Among the 33,385 firms in the 88-country surveys in our

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[4] Surveys are designed to be broadly representative of formally-registered firms in the manufacturing and service sectors. Sampling is stratified by size, sector, and geographic region. Sample sizes typically vary from about 150 to 1,800, increasing with the size of the country. Survey methodology and content are described in more detail at http://www.enterprisesurveys.org/methodology.

sample with valid responses, 18.8% replied affirmatively. Despite some ambiguity regarding the term "attempted," we use this variable as a proxy for whether firms actually submitted a bid for a government contract. We are thus assuming that firms that are deterred from actually submitting a bid by high transactions costs, lack of information, distrust in the integrity of the process, etc., do not report that they attempted to obtain a contract.

For firms replying in the affirmative to this first question, a second question asks: "When establishments like this one do business with the government, what percent of the contract value would be typically paid in informal payments or gifts to secure the contract?" Bribe-paying is a sensitive issue so the question asks about "establishments like this one" instead of specifying "your establishment" to encourage candor. We follow common practice in using responses as a proxy for the firm's own payments (World Bank, 2000).[5] Among the 5,371 firms in our sample that report they attempted to secure a government contract, 1,050 replied that an informal payment was needed, with an average payment of 11.6% of the contract value. Among all 5,371 firms, including those reporting that no payment (0%) is needed, the average value is 2.3%.

The World Bank's Enterprise Surveys have been used in numerous research studies, but the procurement questions have received relatively little attention. World Bank (2002) reports that informal payments for obtaining government contracts tend to be larger for smaller and privately-owned firms, and lower for foreign-owned firms, in an analysis of over 6,500 firms in Enterprise Surveys conducted in 2002 in 26 transition countries. World Bank (2005) has similar findings regarding firm ownership, in a later round of surveys for the same set of countries, and reports that the "kickback tax" – its term for informal payments for obtaining public contracts - is higher on average for younger firms.

Kisunko et al. (2013) analyze data from a Russian Federation Enterprise Survey with 4,223 firms, designed to be representative at the level of 37 regions. Of the 27% of firms reporting that they attempted to obtain a government contract, 23% stated that an informal payment was needed, and that the required payments averaged 15% of the contract value. Firm-level characteristics were mostly not significant in explaining differences in these informal payments. However, such payments were

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[5] Some managers responding to the survey may not be well informed about their firms' payments, adding one more source of measurement error.

significantly higher for firms located in larger (higher-population) regions, and in regions where information on public procurement was more transparent.[6]

Kenny (2009) uses Enterprise Surveys for ECA (Eastern Europe and Central Asia) countries to examine bribe-paying by construction firms. He reports that kickbacks are lower on average in wealthier countries, and for larger firms. Ownership of firms (state, private foreign, or private domestic) and city size made no significant difference in kickbacks.

We add to this literature by analyzing the impact of procurement institutions on kickbacks and on bidding rates. This study is the first one to analyze the relationship between procurement outcomes, as measured by the Enterprise Surveys, and procurement rules and practices, as measured by question 19 in the PEFA assessments.[7] Although PEFA assessments have been conducted since 2005, the procurement question was changed substantially beginning in the 2011 assessments, and again in 2016. Of the three versions, the largest number of assessments were implemented using the second version, between 2011 and 2015. The quality of assessments is also believed to be more consistent in recent years than in PEFA's earlier years (PEFA Secretariat, 2016). We therefore limit our use of PEFA procurement indicators to this period.[8]

The PEFA indicators are measured for the central government level. In some countries a substantial share of public procurement occurs at sub-national levels, using systems that are likely weaker (Transparency International, 2014). The quality of procurement systems at the central government and sub-national levels are plausibly correlated across countries, but not perfectly. For this reason, and because the share of procurement occurring at sub-national levels varies across countries, our ability to measure system quality only at the central government level introduces some measurement error.[9]

The PEFA indicators have been used in a limited number of cross-country research studies, and most of these do not single out the procurement question for emphasis. In regression analyses of 57

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[6] The transparency measure is from Balsevich et al. (2011), who examined how well 83 regional public procurement websites complied in 2007 with the recently-passed Federal Law on Public Procurement.

[7] Detailed information can be found in PEFA Secretariat (2011), available at https://pefa.org/sites/default/files/PMFEng-finalSZreprint04-12_1.pdf.

[8] Three of the four sub-indicators from the second version ("PEFA 2011') are changed only slightly in the third version ("PEFA 2016"), so those could be treated as comparable. To date, however, very few assessments have been implemented using PEFA 2016 and no cross-country data set has been compiled for it.

[9] PEFA assessments have been conducted at the sub-national level but only for a limited number of countries and sub-national units in each of them. Note the procurement questions in the Enterprise Surveys do not ascertain from which public entities firms are trying to obtain contracts.

PEFA assessments conducted between 2005 and 2007, De Renzio (2009) uses as a dependent variable the average of the 28 questions, and finds that the quality of public financial management systems is positively associated with country size (population), per capita income, and aid dependence (ODA/GNI). Andrews (2010, 2014) notes that countries tend to suffer "implementation gaps" on public financial management systems in general, scoring better on PEFA's *de jure* indicators of laws and official procedures on the books than on *de facto* indicators of PFM practices and performance. Scores also tend to be higher in areas of PFM where reform implementation requires the engagement of only a relatively small number of "concentrated agents" (e.g. in a Ministry of Finance), in contrast to procurement and other areas where implementation requires the engagement of a larger number of "distributed agents" (e.g. across sectoral ministries or sub-national governments). Knack (2014) finds that donors' use of recipient countries' national procurement systems (defined as the share of aid to government that is "not subject to additional or special requirements by donors for procurement of works, goods and services") is positively and significantly related to the quality of procurement systems, as measured by PEFA question 19. Each 1-unit increment in the 7-point PEFA-19 scale is associated with a 3 percentage point increase in use of country procurement systems.

Numerous countries have multiple Enterprise Surveys, but only a small number have multiple PEFA assessments with the second version of the procurement question. It is therefore not practicable to construct a time-series cross-sectional panel. In constructing a cross-sectional database, we maximized the number of countries where PEFA assessments precede the relevant Enterprise Survey in time. In the relatively few cases where more than one PEFA assessment using the second version of the procurement question was available, this meant selecting the first one that was conducted. We then selected the first Enterprise Survey conducted subsequent to that PEFA assessment. In many cases, however, there was not one, and we then selected the most recently completed Enterprise Survey, as long as it was from 2009 or later. These decision rules produced a sample of 88 countries. For the median country, the Enterprise Survey actually precedes the PEFA assessment by two years. We therefore rely rather heavily on the assumption that the quality of procurement systems is fairly persistent, i.e. that practices in effect in year t are very highly correlated across countries with those in effect in year t-2. However, our key results on kickbacks (but not on bidding) reported below are highly robust to dropping all countries for which the Enterprise Survey precedes the PEFA assessment in time, despite the drastic decline in sample size.

3. Hypotheses and Control Variables

The overall score for the PEFA procurement question (numbered PI-19 in the PEFA questionnaire) is assigned as the average of four separately-scored components:

19-1: transparency, comprehensiveness and competition in the legal and regulatory framework;

19-2: use of competitive procurement methods;

19-3: public access to complete, reliable and timely procurement information;

19-4: existence of an independent administrative procurement complaints system.

For brevity we name these four sub-indicators LEGAL (19-1), METHODS (19-2), ACCESS (19-3), and COMPLAINT (19-4), and the PI-19 average grade, OVERALL.

The PEFA procurement indicators were developed by the PEFA Secretariat and staff from the PEFA partner institutions, including the World Bank, IMF, EU and many bilateral donor countries. Their content is consistent with recommendations on procurement systems and policies from the OECD (2009) and Transparency International (2014).

The sub-indicators have possible scores of A, B, C and D. For the overall PEFA-19 indicator, the average of them, possible scores include A, B+, B, C+, C, D+ and D.[10] We follow De Renzio (2009) and others in assigning numerical values on a 1 (D) to 7 (A) scale and treating them as cardinal indicators in our initial tests, but we also construct dichotomous versions of the sub-indicators as described in a subsequent section, after testing whether cardinality can be justified.

Ware et al. (2007: 298) argue that "a clear and adequate regulatory environment" is needed to foster perceptions of fairness and predictability, encouraging participation by more firms in bidding processes. If so, firms operating in countries with higher LEGAL scores should have a greater likelihood other things equal of reporting that they bid on a public contract in the last year. To the extent the legal framework promotes transparency, it may also be associated with less corruption, including lower kickbacks by firms to procurement agents.

Higher scores for METHODS are awarded where exceptions to open competition are more consistently justified in compliance with legal requirements, indicating less discretion on the part of officials to award contracts using inappropriate criteria. Open bidding "generally attracts more bidders than restricted procedures," maximizing competition and obtaining better "value for money" (World Bank, 2015: 33). Where exceptions to open bidding are allowed, the rules should be clear and

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[10] See PEFA Secretariat (2011: 11) for the full conversion chart from each combination of four grades to an overall grade.

discretion by officials thereby restricted (Ware et al., 2007). Excessively discretionary procedures can adversely affect perceptions of fairness and predictability, discouraging firms from entering a market (Evenett and Hoekman, 2005b: 32). The incidence of corruption, including kickbacks, should be less frequent where officials have less discretion in deciding contract winners (Kenny, 2009: 28; Yakovlev et al., 2015), and where exceptions to competitive bidding are "justified and recorded in writing to provide an audit trail" (OECD, 2009: 25). Accordingly, METHODS should be positively associated with the likelihood of bidding, and inversely related to kickbacks.

ACCESS measures the public availability of key procurement information, including procurement plans, bidding opportunities, contract awards, and data on resolution of procurement-related complaints. We expect ACCESS to be positively associated with bidding probabilities, as more widespread advertising of tenders and of how to submit bids reduces information and transactions costs for firms, particularly small and medium-sized enterprises (SMEs). According to World Bank (2015: 11), "SMEs identified difficulties in accessing public procurement information as one of the major obstacles to entering" the EU's public procurement markets.[11] Transparent information on contract awards and complaints resolution can also encourage participation by improving perceptions of fairness, integrity and predictability. Bids may also be deterred, particularly for SMEs, if bribe payments are more common in less transparent systems (Evenett and Hoekman, 2005a: 179).

Higher ACCESS scores may be associated with lower corruption, including kickbacks, through several channels. By encouraging more entry, widespread advertising can undermine bid-rigging schemes (Ware et al., 2007: 309). Insufficient information provides procurement agents with more discretion, and creates more opportunity for fraud and corruption (World Bank, 2015: 13-14, 16): "When the government has no obligation to publish the name of the contract winner, it cannot be held accountable for its decision and there is a greater risk of tendering rules being broken."

An independent and effective complaints mechanism for bidders to challenge decisions can encourage participation by enhancing confidence in the system's integrity and fairness. It also provides a check against fraud and favoritism (World Bank, 2015: 62), potentially deterring procurement officials from demanding kickbacks. Higher COMPLAINT scores should thus be associated with lower kickbacks and a higher likelihood of bidding for contracts.

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[11] In Chile, the introduction of an integrated information system to centralize public procurement information is reported to have doubled participation by SMEs, and generated sizeable cost savings (World Bank: 2015: 15).

Performance and financial audits of procurement systems by an external auditing agency can also deter corruption schemes (World Bank, 2015: 84). "Reporting and auditing are critical to identifying corrupt transactions and to increasing the risks of detection" (Ware et al., 2007: 321; also see Avis et al., 2016; Olken, 2007; Di Tella and Schargrodsky, 2003). The PEFA assessments include a question (PI-26) on the comprehensiveness and timeliness of external audits, as well as on evidence of follow up on recommendations. The question encompasses audits of procurement systems, including performance audits such as assessing value for money in major infrastructure projects. However, there is no separate score provided for auditing of procurement and other elements of public expenditure systems. We expect higher scores on this indicator (AUDIT) to be associated with lower kickbacks. By enhancing firms' perceptions of fairness and integrity, and reducing their expectations of paying costly bribes, AUDIT may also be positively related to the likelihood of bidding on contracts (World Bank, 2015: 84-87; Ware et al., 2007: 315-321).

We estimate equations of the general form:

$$Y_{ij} = \beta P_j + \gamma X_j + \eta Z_{ij} + u_{ij}$$

where Y_{ij} is the relevant procurement outcome (bidding or making informal payments) for firm i in country j, P_j is the relevant procurement system indicator(s), X_j is a vector of country-level controls, including region dummies and survey year, and Z_{ij} is a vector of firm-level controls, including sector dummies.

Firm-level control variables include size (log of the number of employees), age (log of the number of years it has operated), the top manager's experience (log of the number of years), ownership composition, and a dummy for whether the establishment being surveyed is part of a larger firm or not. Smaller and younger firms with less experienced managers are more likely to "lack the resources and management expertise to plan, draft and complete tender applications," and face greater difficulty in obtaining necessary information and providing required financial guarantees (World Bank, 2016: 7). Procurement systems sometimes establish preferences for domestic over foreign-owned firms, so we expect higher shares of foreign ownership to be associated with a lower probability of bidding for contracts, other things equal. Foreign firms might resort to kickbacks to gain access when discriminated against, but foreign firms might resort to bribery less often than domestic firms overall

as a result of the OECD's anti-bribery convention.[12] Firms with a larger share of state ownership may have beneficial ties with the procuring agencies that increase their likelihood of bidding, and reduce their need to pay bribes.[13]

In bidding regressions, we control for two additional firm-level variables. The first is a dummy indicating whether or not the firm has an internationally recognized quality certification, which may either reflect or give it advantages over other firms. The second is the share of the firm's sales that are national, i.e. not exported, directly or indirectly. We expect firms producing mostly for export markets will be less likely to bid on public contracts.[14]

We also control for sector or industry with 53 dummy variables. Some sectors have larger procurement markets than others, so more potential bidding firms. Sectors (such as construction) that involve "large, complex, non-standard activities in which quality can be very difficult to assess" are more vulnerable to kickbacks and other corruption schemes (Kenny, 2009).[15]

Country-level controls include (log of) per capita income, size (log of population and log of land area in square kilometers), and aid (log of per capita official development assistance). These and other country-level controls used later in robustness tests are all lagged by one year.

Higher income and size are rough proxies for market size so may be positively correlated with the likelihood of bidding for public contracts. Smaller markets may facilitate collusion among firms, or between firms and procuring agents. Interactions between officials and suppliers are more likely to involve ties between family and friends, so may increase the number of improper awards but perhaps not with any direct informal payments being made. In micro-states with extremely limited public sector capacity, it may not be possible in many cases to separate the various functions of procurement systems among different officials, as "good practice" recommends (OECD, 2009: 57, 72). In larger countries, however, a larger share of procurement transactions may occur at sub-national levels using weaker systems; if so, area and population may be positively associated with kickbacks. Countries with higher incomes tend to have higher scores on the PEFA procurement indicator (De Renzio, 2009),

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[12] See http://www.oecd.org/corruption/oecdantibriberyconvention.htm.
[13] The survey excludes enterprises that are 100% state owned. About 1 in 60 firms in our sample have some state ownership, but only 40 firms (out of more than 33,000) are majority state-owned. About 14% of firms have some foreign ownership, and about 2% are wholly foreign-owned.
[14] This control variable is not exogenous, however, as successful bids will increase the non-exported sales share.
[15] Based on surveys of business executives around the world, Transparency International's "Bribe Payers Index" ranks 19 sectors with respect to the incidence of bribery, with bribery least frequent in agriculture and light manufacturing, and most frequent in public works and construction. See http://www.transparency.org/bpi2011/.

and on a newly-available index of transparency in procurement (World Bank, 2016: 4). Kenny (2009: 29-30) finds that corruption in procurement is lower in higher-income countries. Kenny (2009: 29-30) and Avis et al. (2016) respectively find that corruption in procurement is lower in higher-income countries and in higher-income Brazilian municipalities.

Aid could matter in several ways. A small share of aid directly supports procurement reform, e.g. through technical assistance, IT projects, or policy conditions in budget support grants or loans. De Renzio (2009) reports that an index of 9 PEFA indicators on budget execution, including the one on procurement, is positively related to aid/GNI, controlling for per capita income and other variables. To the extent aid finances infrastructure projects and other non-salary public expenditures, it can enlarge procurement markets and expand bidding opportunities. The World Bank and some other donors require contracts above a certain value to be advertised more widely through being subject to international competitive bidding. However, some aid from certain bilateral donors is tied to purchases from home-country providers (Hoekman, 1998: 266; Evenett and Hoekman, 2005a: 7). When aid is provided in response to natural disasters or other humanitarian crises, pressures to disburse quickly may result in more sole source contracts or other exceptions to competitive bidding, and weaker oversight, making aid funds more vulnerable to corruption.[16] Moreover, aid in general is sometimes viewed as a source of windfall revenues (akin to natural resource revenues) that fuels corruption and rent-seeking. On the other hand, international financial institutions such as the World Bank actively monitor procurement systems in borrowing countries, and investigate numerous complaints, sometimes resulting in sanctions against firms (Ware et al., 2007: 321). Aid from at least some donors thus may have a deterrent effect on corruption, including kickbacks. Rather than attempting to disaggregate aid by donor and purpose to assess the various ways in which it might influence bidding and kickbacks, we simply control for overall aid per capita, to measure its net effects.

We also control for regional dummies, using the World Bank's classification: Sub-Saharan Africa (AFR), East Asia and the Pacific (EAP), Eastern Europe and Central Asia (ECA), Latin America and the Caribbean (LCR), Middle East and North Africa (MNA), and South Asia (SAR). We have no particular hypotheses regarding regional differences, although Evenett and Hoekman (2005b: 19) note that transition economies "had to create from scratch procedures for purchasing from their

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[16] For example, see "Nigeria's President orders probe into missing aid funds" (*Financial Times*, April 19, 2017).

(often recently developed) private sectors." Finally, we control for a simple time trend, defined by the year in which the Enterprise Survey was completed.

4. Basic Results

Table 1 reports results from probit regressions for BID. Marginal effects are reported instead of unadjusted probit regression coefficients, which are not readily interpretable. Standard errors in all regressions are adjusted for non-independence of errors within each country cluster of observations.

Equation 1.1 tests the OVERALL score (PEFA question 19). Its coefficient is positive and significant, with each 1-unit improvement on the 7-point scale associated with an increase of .01 in the likelihood of bidding for a contract, e.g. from the mean of .188 to .198 (or from 18.8% to 19.8%). Thus, firms located in countries scoring more highly on PEFA question 19 overall are more likely (as hypothesized) to bid on contracts. However, this finding does not tell us which aspects of procurement rules and practices matter more for procurement outcomes experienced by firms. Accordingly, in equations 1.2-1.5 respectively we test each of the four components or sub-indicators of PEFA 19. Coefficients are positive and significant for two of the three *de facto* sub-indicators, METHODS and ACCESS, but not for COMPLAINT, or for the mostly *de jure* sub-indicator, LEGAL. The sub-indicators can take on only one of four possible values (D=1, C=3, B=5, and A=7), so the METHODS coefficient, for example, implies that a 1-grade increment is associated with an increase in BID of 1.8 percentage points. The positive coefficient for ACCESS is consistent with other studies (e.g. Kenny and Crisman, 2016), using entirely different data and methods, that find easier access to information on public procurement increases bidding. Coefficients for AUDIT are positive but not significant in each of the BID regressions.

Larger and older firms, and those with more experienced managers, international certification, a higher share of sales in country, a higher percentage of state ownership, and that are merely one "establishment" in a larger firm, are significantly more likely to bid for contracts. Foreign ownership is associated with a significantly lower likelihood of bidding, relative to the omitted category of private domestic ownership, perhaps reflecting explicit preferences for domestic suppliers. Bidding probabilities increase with the share of state ownership.

Any given firm is more likely to bid for a contract in a less-populated country,[17] but also (other things equal) in a geographically-larger country. Per capita income and aid are not significant. Time trend coefficients imply an increasing likelihood of bidding, but this trend is not significant. Regional effects (not shown in the table) are jointly significant, with predicted bidding highest for AFR and LCR, by about 11 percentage points over the lowest region, SAR.

Table 2 presents OLS tests with unofficial payments (KICKBACKS) as the dependent variable. In equation 2.1 the coefficient for OVERALL is negative and marginally significant (at the .10 level). Each 1-unit increment on the 7-point scale is associated with a decrease in informal payments paid of 1/4th of a percentage point, e.g. a reduction from the mean of 2.3% of the contract value to just over 2%. The difference between the minimum score of D and maximum score of A can account for a 1.5-point decline on average, i.e. a nearly two-thirds reduction in the average size of kickbacks. Of the three other *de facto* sub-indicators, METHODS (in equation 2.3) and COMPLAINT (equation 2.5) have negative and significant coefficients. Each 1-grade (i.e., 2-point) increase in METHODS or COMPLAINT, respectively, is associated with a decrease in kickbacks of .29 or .64 percentage points. The finding on COMPLAINT is consistent with the view that an independent complaints mechanism can deter procurement officials from requesting kickbacks as a condition for awarding contracts. The METHODS result suggests that where procurement officials have more discretion to limit competition without an explicit justification, it is easier for them to award contracts based on criteria other than price and quality - including which firm offers the largest kickback.

Coefficients for AUDIT are negative and significant in every case, and imply fairly sizeable deterrent effects on kickbacks. Each 1-unit increment is associated with a decrease in informal payments of about 0.4 percentage points. The difference between the minimum score of D and maximum score in the sample of B+ can thus account for a decline of about 2 points. This finding on AUDIT is consistent with other studies showing that an increased likelihood of an external audit deters corruption in public procurement (Avis et al., 2016; Olken, 2007; Di Tella and Schargrodsky, 2003).

Larger and older firms, and those with a higher share of foreign or state ownership, pay less in kickbacks on average. Establishments that are part of a larger firm pay (about 1 percentage point) more. Managerial experience is not significantly related to kickbacks.

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[17] Note this does not necessarily mean that there are more bidders on average for any given contract in smaller countries.

Country-level regressors in Table 2 are mostly insignificant, but higher aid is associated with larger kickbacks (significant at the .10 level). Understanding the mechanism behind this association would require more detailed analysis, however. For example, aid in response to disasters may be more prone to corruption due to disbursement pressures. Or, reverse causation could be partly responsible, if donors provide more aid for governance reform where they observe more corruption.

Predicted kickbacks are significantly lower for MNA, by about 3 percentage points, than in each of the other five regions.[18] The time trend is positive but insignificant.

If the four components of the overall PEFA 19 OVERALL measure were highly inter-correlated, one could argue their coefficients in Tables 1 and 2 are biased upwards (in absolute value, in Table 2). Testing them all together in a single regression, on the other hand, would risk multicollinearity problems. These correlations turn out to be relatively modest. At the country level, the highest (Spearman) rank correlation is .61 (for METHODS and ACCESS), and the lowest is .29 (for LEGAL and METHODS). The average of the six inter-correlations is .39.

Table 3 summarizes results from regressions that test all four components together, recognizing the likelihood of some collinearity problems. In the table, only results for the PEFA variables are reported, but the specifications otherwise are identical to those for the baseline tests in Tables 1 and 2. When all four components are entered together in the BID regression (equation 3.1), only METHODS is significant, with a coefficient only slightly smaller than in equation 1.3 of Table 1. By contrast, the coefficient for ACCESS is less than half as large as in equation 1.4, and it is not significant when controlling for METHODS and other components of PEFA question 19. For informal payments, COMPLAINT remains significant, with a coefficient nearly identical to that in equation 2.5 of Table 2, when all four components are included together. In contrast, the METHODS coefficient is cut by half, and it is no longer significant.

The one component that is never significant in any regressions in Tables 1-3 is LEGAL, which assesses the legal and regulatory framework for procurement, with respect to its comprehensiveness, transparency, and its promotion of competition. It can be viewed primarily as a *de jure* measure of how the procurement system is designed to function, while the other three components are *de facto* measures of its actual functioning. It is unsurprising that bidding and kickbacks are more strongly

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[18] The mean of kickbacks for firms in the three MNA countries (Jordan, Morocco and Tunisia) is only .54%, compared to 2.35% for non-MNA countries.

related to actual practices on competition (METHODS), transparency (ACCESS), or dispute resolution (COMPLAINT) than they are to how those systems are designed to operate (LEGAL). Andrews (2010) notes that countries tend to suffer "implementation gaps" on public financial management systems in general, scoring better on *de jure* than on *de facto* PEFA indicators. Consistent with this finding, average scores in our sample on LEGAL are higher (4.48) than for METHODS (3.09), ACCESS (3.96) or COMPLAINT (3.29).[19]

Thus far we have treated PEFA question 19 (OVERALL) and its four components as interval-level scales, although they are technically only ordinal level. In doing so, we follow De Renzio (2009) and other precedents, but it is not clear that this practice is justified. Accordingly, we constructed a full set of dummies for each of the five PEFA question 19 indicators (OVERALL and its four components) as well as for AUDIT. By testing them in regressions otherwise identical to those in Tables 1 and 2, we found some evidence for threshold effects that indicate some categories on certain sub-indicators can be collapsed, with little or no loss of information. For METHODS, for example, coefficients for all dummies corresponding to a score of B or lower were all similar to each other, but notably smaller in magnitude than coefficients for a score of A, in both BID and KICKBACK regressions. For both ACCESS and COMPLAINT, there is little evidence for distinguishing between A and B grades, or between C and D grades. In subsequent tests, we therefore use dichotomous transformations of those three components: "METHODS-A" = 1 for countries graded A, and = 0 for those graded B, C or D. "ACCESS-AB" and "COMPLAINT-AB" = 1 for countries graded A or B, and = 0 for those graded C or D.

Equations 3.2 and 3.4 in Table 3 replicate equations 3.1 and 3.3, respectively, but substituting the three dichotomized sub-indicators for their 4-point counterparts. In equation 3.3, METHODS-A remains as the only component significantly related to the likelihood of bidding. Its coefficient implies that an A or B grade is associated with an increase of about 5 percentage points in the likelihood of bidding, compared to having a grade of C or D. In equation 3.4, COMPLAINT remains the only component significantly related to kickbacks. Its coefficient implies that an A or B grade is associated with a decrease of about 2.2 percentage points in kickbacks, compared to having a grade of C or D.

For consistency with the use of these three dichotomous sub-indicators, we constructed a new composite procurement indicator, as an alternative to the OVERALL score. Specifically, we

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[19] Median grades are B for LEGAL, C for ACCESS, D for METHODS and COMPLAINT, and C/C+ for OVERALL.

standardized the four sub-indicators LEGAL, METHODS-A, ACCESS-AB, and COMPLAINT-AB to have means equal to 0 and standard deviations equal to 1, and computed the average of these four values. We use this composite measure, INDEX, or one of its four components, in subsequent tests reported below.[20]

5. Disaggregating by Firm Size

There are strong theoretical reasons to believe that procurement practices designed to reduce transactions costs, and encourage competition and transparency, will have greater effects on smaller than on larger firms. "High costs affect all bidders, but small and medium enterprises to a greater extent, hindering their participation and access to the public procurement market" (World Bank, 2016: 4). Greater public access to procurement information, as measured by ACCESS-AB, should reduce transactions costs, which will tend to be proportionately larger for smaller firms (OECD, 2009: 23). We therefore expect the effect of ACCESS-AB on the likelihood of bidding on contracts to be largest for small firms (those with fewer than 20 employees), and smallest for large firms (those with 100 or more employees). Similarly, a low-cost, independent complaints mechanism (as measured by COMPLAINT-AB) is likely to encourage participation more for smaller than for larger firms. Bidding tends to be more frequent for larger firms: about 16% of small firms in the sample report they tried to secure a government contract, compared to about 21% for medium-sized firms and 23% for large firms. Informal payments are higher on average for smaller firms, averaging 2.9% of contract value for firms with fewer than 20 employees, 2.0% for medium-sized firms, and 1.3% for firms with 100 or more employees.[21] Prevailing procurement practices on balance appear to disadvantage small firms, but systems that encourage transparency, competition, and trust, and that reduce transactions costs, can potentially level the playing field somewhat for smaller firms.

Accordingly, we ran the BID and KICKBACK regressions for each of three sub-samples - small, medium-sized, and large firms – as well as for the full sample, for comparative purposes. Results are summarized in Table 4. Each regression includes only one procurement sub-indicator (or the composite INDEX), and otherwise follows the specifications of Table 1 (for bidding) and Table 2

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[20] This index is correlated at .94 with an alternative index based on weights from a principal-components analysis, and results reported below are similar if this alternative index is used instead.

[21] Small (21%) and medium-sized (18.6%) firms are more likely to report having to pay a bribe than large firms (13.5%). For those who report that bribes are needed, average size of bribes is also largest for small firms (13.9% of contract value), with modest differences between medium (11%) and large firms (10.4%).

(for kickbacks). For each regression, however, only the coefficient and standard error for the procurement indicator are shown. The first row, for example, shows that LEGAL has small, insignificant coefficients in BID regressions for the full sample and for each of the sub-samples of small, medium, and large firms. In KICKBACK regressions, the coefficient for LEGAL is much larger (in absolute value) for the small-firm sub-sample, but is also not significant.

In the BID regressions, coefficients for METHODS-A are fairly similar in magnitude across all three size categories, but are significant only for the small and medium-sized groups. In KICKBACK regressions, the METHODS-A coefficient is significant only for small firms, and is about twice as large (in absolute value) as in the regressions for medium-sized or large firms.

ACCESS also appears to "level the playing field" for small and medium-sized firms with respect to bidding. Coefficients on ACCESS-AB are larger for those groups, and statistically significant only for them. In KICKBACKS regressions, the ACCESS-AB coefficient is largest in the case of small firms, but is not significant in any of the sub-samples.

Complaints mechanisms are not significant in BID regressions for any of the three size categories, although the coefficient is largest for the small-firm group. Stronger complaints systems are significantly related to lower informal payments for each of the three size groups, but the COMPLAINT coefficient again is largest for the small-firm sub-sample.

Coefficients for INDEX exhibit their predicted signs in both BID and KICKBACK regressions, for all three sub-samples. They are significant, however, only in the small-firm sub-samples.

Results overall are consistent with theoretical reasons for expecting stronger competition, transparency and dispute resolution systems to help level the playing field for smaller firms, which are likely to have less expertise on public procurement and to face disproportionately high transactions and information costs. There are six significant coefficients (all with the expected signs) for the small-firm sub-samples, three for medium-sized firms, and only one for large firms. Coefficients are larger for small-firm than for large-firm sub-samples in all five pair-wise comparisons for BID regressions, and they are larger in absolute value in all five pair-wise comparisons for KICKBACK regressions.

Admittedly, the differences in these coefficient magnitudes across size categories are not statistically significant in most cases. The most straightforward way to test explicitly for such differences is to interact firm size with the relevant procurement indicator, e.g. adding the product of log of employees and ACCESS-AB to a regression using the full sample of firms. In BID regressions, interactions of both ACCESS-AB ($t = -2.82$) and INDEX ($t = -1.95$) with firm size are significant,

implying that access to information matters less for larger firms. In the kickback regressions, an interaction of METHODS-AB and firm size is significant at the .01 level (t = 1.88), consistent with the view that unjustified exceptions to competitive methods are disproportionately associated with higher kickbacks for smaller firms.

6. Robustness to Additional Regressors

For the full sample of firms, Table 3 showed that bidding is most strongly associated with METHODS-A, when testing all four components of question 19 in the same regression. Similarly, kickbacks are most strongly associated with COMPLAINT-AB. We therefore focus on those indicators, and on the INDEX of the four sub-indicators, in robustness tests.

Table 5 tests robustness to the addition of more control variables, not included in the baseline specifications of Tables 1 and 2 because they substantially reduce the sample size. Regressions reported in Table 5 are otherwise based on those specifications, but results are shown only for the procurement system indicators and the added controls.

Legal systems, specifically well-functioning courts, can play an important role in resolving disputes and deterring corruption in procurement. If more firms have faith in the courts' integrity, fairness and efficiency, they may be more encouraged to participate in bidding processes, and less likely to pay kickbacks (either because firms are less likely to be asked for bribes, or less likely to comply with such requests). Table 5 shows that results on the procurement system indicators (METHODS-A in equation 5.1 and INDEX in 5.2) remain significant, controlling for firms' level of agreement that "the court systems is fair, impartial and uncorrupted." In equations 5.1 and 5.2, this measure of trust in courts itself is not significantly related to the likelihood of bidding. However, kickbacks are significantly and inversely related to perceptions of quality of the courts, as shown in equations 5.5 and 5.6. Each 1-point increment in the 1-4 scale of courts' quality is associated with a decline of about 0.4 percentage points in kickbacks. Results for COMPLAINT-AB (in equation 5.5), INDEX (5.6) and AUDIT are robust to the addition of this variable and the associated reduction in sample size.

More firms are likely to participate in bidding where government procurement markets are larger. In equations 5.3 and 5.4, we show that results on METHODS-A and INDEX are robust to the addition of two more proxies for the size of procurement markets: government consumption and public

investment as shares of GDP.[22] Coefficients for government consumption and investment are both positive and highly significant. A one-standard-deviation increase in public investment/GDP (3.7 percentage points) or government consumption (5.3 points), respectively, is associated with an increase in the likelihood of bidding by about 2.5, or 3.2, percentage points.

Compared to bidding, there is less reason to expect kickbacks as a share of contract value to be affected systematically by the size of government expenditures. In equations 5.6 and 5.7, government consumption is unrelated to kickbacks, but more public investment is associated with large and highly significant reductions in kickbacks. There is no obvious explanation for this result, but it is consistent with the possibility that when each procurement official is handling a larger volume of contracts, the average bribe request is reduced (e.g., if the probability of detection is a positive function of an official's total bribe receipts).[23] COMPLAINT-AB remains significant with the addition of these variables (and the associated reduction in sample size) in equation 5.7, but INDEX is not significant in equation 5.8.

In several more robustness tests not reported in tables (but available from the authors on request), results on these procurement system measures are affected very little by the addition of other regressors. First, we added three city size dummies, the inclusion of which reduces sample sizes by about 7%. Firms located in larger cities may have more bidding opportunities. For some services "…geographic proximity may be a precondition for effectively contesting procurement markets; procurement agents can economize on marketing costs by choosing local suppliers" (Evenett and Hoekman, 2005a: 167). Consistent with these arguments, firms located in larger cities are more likely to report having bid for a contract. METHODS-A and INDEX retain their positive and significant coefficients in these tests. Kickbacks are unrelated to size of the city in which firms are located, consistent with a finding by Kenny (2009: 36).

Second, we controlled for inflation, as measured by the implicit GDP deflator.[24] Higher inflation can increase bidding participation by adding to uncertainty about the winning bid's price offer. It may also increase kickbacks, if higher inflation makes it easier to incorporate the cost of kickbacks in the contract price. Inflation turns out to be positively and significantly related to bidding:

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[22] Public investment is measured as the difference between total and private gross fixed capital formation. It is missing for 33 of the 88 countries in the sample.

[23] As noted in section 2 above, the composition of government expenditure, including the amount devoted to public investment, may be endogenous to opportunities for corruption at higher levels.

[24] Inflation data are missing for one country in our sample, the Democratic Republic of Congo.

each 1 percentage point increase in inflation is associated with an increase in the likelihood of bidding by 0.2 percentage points. Surprisingly, inflation is associated with lower kickbacks (significant at .10 level). Recall that kickbacks is measured as a share of contract value, and it is possible that bribe payments tend to adjust more slowly than contract values to inflation.

Third, we controlled for legal heritage, using the classifications from LaPorta et al. (2008). Pimenta and Rezai (2015: 331-332) argue that "public procurement systems in Latin America are endowed with an emphasis on legalism, control and procedural formality…triggering excessive rigor in the application of norms that stifle competition and increase the costs of doing business with government." They attribute these characteristics to the region's legal heritage, however, and specifically to "principles of Napoleonic or Roman law." We therefore controlled for legal heritage, but found no significant differences between groups (British, French and German). Moreover, results on the procurement indicators are unaffected.

Fourth, we controlled for the professionalization of government bureaucracy index from the Quality of Government project's survey of experts (Dahlstrom et al., 2015). Higher scores reflect greater reliance on merit in recruitment and promotion. Ware et al. (2007: 317-318) and OECD (2009: 30) argue that corruption in procurement is likely to be lower where procurement staff are more independent from political pressure, and where remuneration, career prospects and personnel development are sufficient to attract and retain capable staff willing to abide by ethics codes. The professionalization index is a rough proxy for such arguments. Among the 88 countries in the sample, 37 are missing data on the professionalization index. Coefficients on COMPLAINTS-AB and INDEX remain significant in the KICKBACK regressions despite the reduction in sample size. However, results on METHODS-A and INDEX in the BID regressions are no longer significant with this smaller sample. Moreover, the professionalization index itself is not significant in the BID or KICKBACKS regressions.

Finally, we controlled for two more PEFA indicators potentially related to bidding or kickbacks. If payments to suppliers are often delayed, bidding may be deterred, particularly for smaller firms. The PEFA assessments include (but for only 65 of the 88 countries in our sample) an indicator (question 4 in the PEFA 2011 Framework) on "stock and monitoring of payment arrears" with higher scores assigned to countries with smaller stocks of arrears. This variable can be used as a rough proxy for payment delays to suppliers, although it covers arrears to employees and creditors, as well as to contractors and suppliers. When added to our regressions, however, it turns out to be

unrelated to bidding, for the full sample or for any single size category of firms. The procurement system indicators remain significant in these tests, for the full sample of firms. In the kickbacks regressions, we controlled for a second auditing-related variable, question 20 on "effectiveness of internal controls for non-salary expenditure," which addresses among other issues "compliance with rules in procurement..." (PEFA Secretariat, 2011). Coefficients for this internal controls indicator in kickbacks regressions are positive and significant, but the procurement systems and external audit indicators also remain significant.

Corruption and competition in procurement markets may be mutually endogenous. The presence of corruption may induce exit from markets, reducing the number of bidders (Bliss and Di Tella, 1997). The number of bidders in a market can affect certain forms of corruption - e.g., if collusion is easier when fewer firms participate in a market – although not necessarily kickbacks (Ware, 2007: 319; Celentani and Ganuza, 2002). Fully addressing these relationships is beyond the scope of this paper, but we re-ran our tests with country-level averages for BID on the right-hand-side of the KICKBACK regressions, and vice versa, as additional controls.[25] Results on the procurement variables are not sensitive at all to these additional controls, and the country-level averages for BID and KICKBACK are not significant in any of these tests.

7. Robustness to Changes in Sample and Methods

The main findings are robust to dropping firms from the 11 countries with populations under 500,000 from our 88-country sample. Results are also robust to dropping firms from the 10 countries for which no kickbacks are reported. These are mostly very small countries, with fewer firms in their samples. On average, only 22 firms in each of these countries report that they bid on contracts, so the absence of any reported kickbacks does not necessarily reflect a lack of candor or survey administration problem.

Kickbacks as a share of contract value is bounded by 0% (4,930 observations) and 100% (6 observations). We therefore ran the kickback tests using tobit regression. Coefficients for COMPLAINT-AB and INDEX remain highly significant.

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[25] Ideally it would be feasible to use country-sector instead of country averages, but there are too few firms in each sector within countries.

We also separated the kickbacks variable into two parts: whether or not firms report that an informal payment is needed, and (conditional on one being needed) its size as a share of contract value. Results from the probit regression found that bribes are significantly less likely to be needed where COMPLAINT-AB or INDEX scores are higher. Among the approximately 1,050 firms reporting that a bribe is needed, the OLS regression found a highly significant inverse relationship between the size of bribes and COMPLAINT-AB or INDEX scores.

Conditional on a bribe being needed, one might expect the average size of kickbacks to increase with AUDIT: as the risk of detection and punishment rises, a larger bribe may be required to justify the risk from an official's standpoint (e.g., Kenny, 2009: 29). If so, the coefficient on AUDIT should be negative for the probit equation but positive in the OLS equation (for observations with kickbacks > 0). However, the coefficient estimates were negative (and significant) in both regressions: a stronger external audit mechanism is associated with a lower likelihood an informal payment is needed, and with a smaller bribe conditional on one being needed.

Kickback regressions could suffer from sample selection bias, if firms that report bidding on contracts, and that respond to the survey question on informal payments needed to obtain contracts, are systematically different from other firms. We therefore tested a Heckman selection model, using as selection variables in the first stage the firm's share of sales made in the domestic market, and the dummies for international certification and city size. Inverse Mills ratios were not significant, consistent with the null hypothesis of no selection effects. Coefficients for COMPLAINT-AB and INDEX remain significant, and differ little in magnitude from OLS tests.

8. Endogeneity of Procurement Systems

Reverse causation is often a potential concern when governance outcomes are found to be associated with policies or institutions. For example, perceptions of corruption levels across countries may influence subjective assessments of public institutions. In our case, PEFA assessments are implemented by specialists in public financial management, and procurement (question 19) is merely one of 28 topics assessed. Bidding and kickbacks are measured by objective experiential questions in enterprise surveys, and it is highly unlikely that country-level results from these surveys are known by the PFM specialists conducting PEFA assessments.

Governance outcomes can also motivate policy or institutional reform. For example, procurement reforms may be triggered by low levels of competition or by corruption scandals in

procurement (Pimenta and Rezai, 2015: 332). If so, a bias would be created against finding a positive (negative) link between bidding (kickbacks) and the PEFA procurement indicators. It is easier to pass laws (e.g. establishing a complaints mechanism) than to implement them fully (e.g. ensuring a complaints mechanism functions as intended), so reforms prompted by poor performance would likely affect the *de jure* indicator (LEGAL) more than the *de facto* indicators (METHODS, ACCESS and COMPLAINT). Reverse causation may thus be partly responsible for the fact that LEGAL is never significant in any of the regressions, and may reduce the coefficients (in absolute value) of the *de facto* indicators, even where they are nevertheless significantly related to bidding and kickbacks.

Another potential threat to a causal interpretation of our results is that our procurement system indicators and procurement outcomes indicators could be capturing a much broader relationship between "good institutions" and good governance outcomes. Some countries may score highly on a range of indicators measuring recommended practices on tax administration, legal systems, private sector regulation, etc., and on a range of governance outcomes (tax compliance, corruption in various sectors, delays in issuing permits, etc.), while other countries score poorly. If so, our indicators for procurement policies and outcomes - as merely one of many elements of governance systems - could be proxying for these broader systems. Then, well-governed countries may score highly on PEFA procurement indicators and on procurement outcomes in Enterprise Survey questions, even if there is no causal effect of the former on the latter.

However, there is a surprising degree of variation in country performance across policy areas or sectors within countries. For the Enterprise Surveys, Kenny (2009) reports considerable variation in corruption experiences across economic sectors within countries. Nor are country rankings on different types of corruption measured by the Enterprise Surveys very highly correlated with each other. Moreover, (Spearman) rank correlations among the various aspects of public financial management, as measured by PEFA, are quite modest, averaging +.10 and ranging from -.34 to +.42.

If the results in Tables 1-5 merely reflect something about the quality of governance more broadly, and not about procurement systems and outcomes more narrowly, then they should be spuriously "robust" to substituting less conceptually relevant indicators from the same data sets. We report results from these falsification tests in Table 6. First, we replicate Tables 1 (BID regressions) and 2 (KICKBACK) regressions, substituting PEFA question 18 (on payroll controls) and its four sub-

indicators for question 19 (on procurement) and its four sub-components.[26] The first two columns of Table 6 show, for bidding (column 6.1) and kickbacks (column 6.2), only the coefficient and standard error for the relevant PEFA indicator. None of the ten coefficients are significant: the largest test statistic is -1.64 and they are below 1 in every other case.

Second, we replicate the KICKBACK regressions from Table 2, including the question 19 procurement indicators, but substitute two broader outcomes for kickbacks. Column 6.3 reports results with the "time tax" – a measure of the regulatory burden - as the dependent variable: the percentage of top managers' time spent dealing with government regulations, including taxes, customs, licenses, etc.[27] Of the five procurement indicators, only COMPLAINT is significant. In contrast, three of them were significant (including OVERALL at the .10 level) in Table 2 with kickbacks as the dependent variable. Column 6.4 reports results with the "bribe tax" as the dependent variable: total "gifts" or "informal payments" needed "to get things done" with regard to licensing, taxes, etc., as a percentage of firm revenues.[28] Of the five procurement indicators, again only one (METHODS) is significant.

To summarize, better procurement policies tend to predict more favorable procurement outcomes (more bidding, fewer and smaller kickbacks), but they do not predict other "good governance" outcomes very well. Nor do better PFM practices in other areas such as payroll controls predict more favorable procurement outcomes. Our findings thus appear to be reflecting particular relationships about procurement practices and outcomes, and not merely distinguishing well-governed from poorly-governed countries more broadly. Consistent with this interpretation, our main results are also robust to controlling for country-level measures of "good governance," such as the Freedom House indexes of political freedoms and civil liberties.

9. Conclusion

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[26] The procurement and payroll controls questions are grouped with several others in the PEFA questionnaire under the heading "predictability and control in budget execution." Of all the PEFA questions, payroll controls is conceptually the most closely related to procurement, as it measures the performance of systems for implementing and monitoring another, even larger, expenditure category: salaries of public employees. As with procurement, deficiencies in payroll systems can result in corruption, in this case in the form of "ghost workers."

[27] The mean value in our sample is 10.7%. The manual for survey enumerators (World Bank, 2011) states that responses to this question "should not include time spent negotiating procurement contracts with the government – only time dealing with red tape and bureaucracy" associated with regulations, inspections, etc.

[28] The mean value in our sample is 0.27%. It is not possible to subtract kickbacks from this amount, because there is no measure of the volume of sales to government.

This study contributes to the literature on competition and corruption in procurement markets. It finds fairly robust evidence that more firms participate on procurement markets when exceptions to competitive methods must be explicitly justified. There is some evidence that more transparent systems also encourage more bidding by firms. We also find highly robust evidence for the importance of independent, effective complaints mechanisms in deterring kickbacks. Comprehensive and timely external audits are strongly associated with lower kickbacks, and with a higher likelihood of bidding by firms in some but not all specifications.

Despite the robustness of these relationships in terms of statistical significance, the estimated effects implied by the regressions coefficients we report should be interpreted cautiously. They may be subject to some endogeneity bias (likely downward, in absolute value), and affected somewhat by multicollinearity among the various PEFA indicators, including the one on external audit. They also represent average effects over 88 countries and numerous industries or sectors, and the highest payoff reforms will vary somewhat by country and sector (Kenny, 2009: 26). Moreover, we recognize that reforms in other areas of public sector management, "both upstream towards budgeting and project selection, and downstream towards the final quality of deliverables," will often be necessary to reap the full benefits of reforms in procurement systems (Kenny, 2009: 33-34).

As our insignificant results on the *de jure* procurement indicator suggest, implementation can be a more difficult challenge than identifying the most promising reform areas. For example, establishing an e-procurement site to improve transparency and reduce transactions costs has limited benefits if links to tender documents merely lead users to an empty page (World Bank, 2016: p. 3).

We also readily acknowledge that our study is not designed to answer many other aspects of procurement quality, such as quality or cost, or the appropriate choice of projects in upstream procurement needs assessments. For example, a differently-designed study could test for links between another PEFA indicator on whether budget documents reflect a multi-year perspective (question 12 in the PEFA 2011 framework), and more "downstream" outcomes such as quality of public infrastructure and service delivery. Nor does our study address all forms of corruption in procurement, e.g. bid rigging among firms where no kickback to a public official occurs. "Corrupt actors" can "intrude into a procurement procedure at many points along the procurement chain" (Ware et al., 2007: 297). OECD (2009: 10) notes that "the stage of needs assessment…is particularly vulnerable to political interference."

Finally, future cross-country analysis of procurement can benefit from new indicators as more data become available. A new sub-indicator on "procurement monitoring" in the 2016 PEFA Framework assesses the accuracy and comprehensiveness of databases on procurement contracts. More importantly, a new "Benchmarking Public Procurement" data set for 180 countries provides objective indicators on various stages of the procurement life cycle, from the standpoint of information and other transactions costs to private suppliers (World Bank, 2017). Numerical indexes cover the stages of needs assessment, call for tender and bid preparation; bid submission; bid opening, evaluation and award; content and management of the procurement contract; performance guarantee, and payment of suppliers. In addition to the indexes, the underlying information on which they are calculated is available, as well as (non-scored) information on complaints mechanisms.

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Table 1: Bidding for public contracts (probit)

Equation	1.1	1.2	1.3	1.4	1.5
PEFA question	OVERALL	LEGAL	METHODS	ACCESS	COMPLAINT
PEFA 19 score	0.010	-0.002	0.009	0.008	0.002
	(2.04)	(-0.52)	(2.43)	(2.24)	(0.48)
AUDIT	0.005	0.006	0.008	0.007	0.006
(PEFA 26)	(0.94)	(1.09)	(1.60)	(1.28)	(1.15)
Log of no.	0.031	0.031	0.031	0.031	0.030
Employees	(9.97)	(10.08)	(10.10)	(9.89)	(9.80)
Log of firm age	0.013	0.012	0.013	0.014	0.011
	(3.23)	(2.81)	(3.31)	(3.39)	(2.73)
Log of	0.017	0.020	0.017	0.017	0.018
mgr. experience	(3.23)	(3.55)	(3.08)	(3.17)	(3.30)
Establishment part	0.021	0.021	0.021	0.019	0.023
of larger firm	(1.76)	(1.73)	(1.71)	(1.58)	(1.82)
Other	-0.011	-0.011	-0.012	-0.014	-0.010
ownership (%)	(-0.96)	(-0.96)	(-1.10)	(-1.30)	(-0.88)
Private foreign	-0.049	-0.056	-0.054	-0.050	-0.052
ownership (%)	(-2.35)	(-2.69)	(-2.59)	(-2.41)	(-2.50)
State ownership	0.165	0.162	0.170	0.163	0.156
(%)	(2.87)	(2.81)	(2.90)	(2.84)	(2.75)
International	0.034	0.034	0.035	0.036	0.034
Certification	(2.84)	(2.78)	(2.93)	(2.96)	(2.75)
National sales	0.001	0.001	0.001	0.001	0.001
(%)	(5.10)	(5.18)	(5.01)	(5.14)	(4.72)
Log of GDP per	-0.014	-0.017	-0.018	-0.014	-0.016
capita	(-0.88)	(-1.09)	(-1.25)	(-0.95)	(-1.05)
Log of population	-0.031	-0.027	-0.027	-0.029	-0.024
	(-2.44)	(-2.27)	(-2.34)	(-2.42)	(-1.82)
Log of land area	0.022	0.023	0.022	0.023	0.022
(sq. km)	(3.38)	(3.61)	(3.36)	(3.68)	(3.20)
Log of per capita	0.017	0.022	0.022	0.020	0.020
ODA	(1.24)	(1.60)	(1.63)	(1.46)	(1.49)
Enterprise survey	0.006	0.004	0.007	0.007	0.003
Year	(0.97)	(0.69)	(1.22)	(1.07)	(0.47)
# obs., countries	33385, 88	33385, 88	32793, 86	32929, 87	32561, 86
Mean dep. var.	.188	.188	.189	.190	.184
pseudo R^2	.07	.07	.07	.07	.07

Dependent variable is dummy for whether firms report attempting to procure a government contract in the last 12 months. All regressions include region and sector fixed effects. T-statistics, reported in parentheses below point estimates, are based on standard errors adjusted for non-independence of errors within country clusters of observations. Marginal effects are reported rather than unadjusted probit regression coefficients.

Table 2: "Kickbacks" needed to obtain contracts

Equation	2.1	2.2	2.3	2.4	2.5
PEFA question	OVERALL	LEGAL	METHODS	ACCESS	COMPLAINT
PEFA 19 score	-0.252	-0.126	-0.147	-0.117	-0.319
	(-1.78)	(-0.69)	(-1.98)	(-1.02)	(-2.34)
AUDIT	-0.377	-0.374	-0.429	-0.399	-0.336
	(-2.30)	(-2.37)	(-2.51)	(-2.40)	(-1.91)
Log of number	-0.326	-0.324	-0.323	-0.319	-0.340
employees	(-3.81)	(-3.76)	(-3.73)	(-3.75)	(-3.90)
Log of firm age	-0.373	-0.361	-0.368	-0.370	-0.393
	(-2.05)	(-1.97)	(-2.00)	(-2.02)	(-2.18)
Log of	-0.150	-0.189	-0.176	-0.176	-0.088
mgr. experience	(-0.74)	(-0.93)	(-0.83)	(-0.86)	(-0.46)
Establishment part	0.915	0.910	0.908	0.910	0.990
of larger firm	(1.98)	(1.97)	(1.95)	(1.95)	(2.06)
Other	0.834	0.847	0.833	0.825	0.887
ownership (%)	(1.24)	(1.25)	(1.22)	(1.23)	(1.34)
Private foreign	-2.418	-2.328	-2.317	-2.377	-2.483
ownership (%)	(-1.77)	(-1.73)	(-1.73)	(-1.75)	(-1.84)
State ownership	-3.089	-3.220	-3.352	-3.138	-2.780
(%)	(-2.18)	(-2.13)	(-2.18)	(-2.15)	(-2.17)
Log of GDP per	-0.059	-0.101	0.001	-0.032	0.025
capita	(-0.10)	(-0.20)	(0.01)	(-0.06)	(0.05)
Log of population	0.784	0.697	0.738	0.741	0.944
	(1.59)	(1.50)	(1.50)	(1.49)	(1.69)
Log of land area	-0.083	-0.109	-0.069	-0.111	-0.106
(sq. km)	(-0.39)	(-0.55)	(-0.32)	(-0.52)	(-0.48)
Log of per capita	0.584	0.502	0.541	0.543	0.767
ODA	(1.82)	(1.60)	(1.77)	(1.66)	(2.31)
Enterprise survey	0.095	0.136	0.087	0.129	0.083
year	(0.50)	(0.68)	(0.45)	(0.65)	(0.41)
# obs., countries	5371, 88	5371, 88	5333, 86	5363, 87	5119, 86
Mean dep. var.	2.27	2.27	2.28	2.27	2.35
R^2	.05	.05	.05	.05	.06

Dependent variable is percentage of contract value "typically paid in informal payments or gifts to secure the contract." All regressions include region and sector fixed effects. T-statistics, reported in parentheses below point estimates, are based on standard errors adjusted for non-independence of errors within country clusters of observations.

Table 3: Multiple PEFA-19 components

Column #	3.1	3.2	3.3	3.4
Dependent variable	Bid for public contract		Informal payments	
LEGAL	-0.003	-0.004	-0.038	0.059
	(-0.67)	(-0.67)	(-0.22)	(0.37)
METHODS	0.008		-0.072	
	(2.12)		(-0.83)	
ACCESS	0.003		0.112	
	(0.76)		(0.87)	
COMPLAINT	-0.004		-0.321	
	(-1.04)		(-2.31)	
METHODS-A		0.048		-0.246
		(1.97)		(-0.49)
ACCESS-AB		0.025		-0.004
		(1.43)		(-0.01)
COMPLAINT-AB		-0.016		-2.176
		(-0.78)		(-2.94)
AUDIT	0.010	0.011	-0.343	-0.394
	(1.78)	(1.90)	(-1.97)	(-2.10)
# obs., countries	31971, 84	31971, 84	5081, 84	5081, 83
Mean dep. var.	.186	.186	2.36	2.36
R^2	.07	.07	.06	.06

Dependent variable in columns 3.1 and 3.2 is dummy for whether firms report attempting to procure a government contract in the last 12 months. Dependent variable in columns 3.3 and 3.4 is percentage of contract value "typically paid in informal payments or gifts to secure the contract." T-statistics, reported in parentheses below point estimates, are based on standard errors adjusted for non-independence of errors within country clusters of observations. Results are shown only for PEFA 19 indicators, from regressions based on equations 1.2 and 1.4 in Table 1.

Table 4: Disaggregating by Firm Size

Column	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
Dependent variable		Bid for public contract				Informal payments		
Sample of firms	All	Small (16937)	Medium (10457)	Large (5455)	All	Small (2842)	Medium (2110)	Large (1107)
LEGAL	-0.002	-0.001	-0.004	-0.002	-0.126	-0.256	0.032	-0.059
	(-0.52)	(-0.15)	(-0.60)	(-0.42)	(-0.69)	(-1.09)	(0.23)	(-0.31)
METHODS-A	0.055	0.051	0.068	0.045	-1.169	-1.474	-0.733	-0.784
	(2.29)	(2.17)	(2.41)	(1.40)	(-2.55)	(-2.45)	(-1.62)	(-1.47)
ACCESS-AB	0.040	0.051	0.037	0.019	-0.764	-0.981	-0.097	-0.658
	(2.43)	(3.01)	(1.83)	(1.00)	(-1.53)	(-1.48)	(-0.23)	(-1.16)
COMPLAINT-AB	0.018	0.028	0.004	-0.001	-2.183	-2.629	-1.163	-2.311
	(0.86)	(1.43)	(0.15)	(-0.03)	(-3.13)	(-3.43)	(-2.00)	(-2.22)
INDEX	0.054	0.032	0.026	0.014	-1.539	-1.371	-0.446	-0.886
	(2.29)	(2.39)	(1.41)	(1.00)	(-2.69)	(-2.80)	(-1.44)	(-1.63)
# of obs.	33,385	17,287	10,607	5,465	5371	2,319	1,962	1,090
Mean dep. var.	.188	.156	.213	.231	2.27	2.90	1.88	1.39

Dependent variable in columns 4.1-4.4 is dummy for whether firms report attempting to procure a government contract in the last 12 months. Dependent variable in columns 4.5-4.8 is percentage of contract value "typically paid in informal payments or gifts to secure the contract." T-statistics, reported in parentheses below point estimates, are based on standard errors adjusted for non-independence of errors within country clusters of observations. For probit regressions (columns 4.1-4.4), marginal effects are reported rather than unadjusted regression coefficients. Results are shown only for PEFA question 19 indicators, from regressions based on specifications in Tables 1 and 2. INDEX is the mean of the standardized scores of the LEGAL, METHODS-A, ACCESS-AB, COMPLAINT-AB. Number of observations and mean of dependent variable apply to regressions with INDEX. "Small" firms have fewer than 20 employees; "medium" firms have 20-99 employees; "large" firms have 100 or more employees.

Table 5: robustness to additional regressors

Equation	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8
Dependent variable	Bid for public contract				Informal payments for obtaining contract			
METHODS-A	0.059		0.050					
	(2.44)		(2.04)					
COMPLAINT-AB					-2.320		-1.162	
					(-3.15)		(-2.23)	
INDEX		0.027		0.032		-1.150		-0.349
		(2.03)		(2.39)		(-2.55)		(-1.10)
AUDIT	0.008	0.006	0.019	0.020	-0.408	-0.429	-0.265	-0.312
	(1.45)	(1.05)	(3.39)	(3.58)	(-2.36)	(-2.60)	(-1.57)	(-2.15)
Court system fair, Impartial	-0.0002	0.001			-0.401	-0.444		
	(-0.06)	(0.32)			(-2.23)	(-2.62)		
Government consumption/GDP			0.005	0.006			0.068	0.069
			(2.29)	(2.78)			(1.20)	(1.08)
Public inv./GDP			0.006	0.007			-0.208	-0.214
			(2.28)	(2.47)			(-3.60)	(-3.72)
# obs.	29351	29865	20534	20534	4683	4907	3259	3345
# countries	85	87	55	55	85	87	54	54
Mean dep. var.	.193	.191	.190	.190	2.40	2.32	2.07	2.03
R^2/pseudo R^2	.07	.07	.09	.09	.07	.07	.07	.07

Dependent variable in equations 5.1-5.4 is dummy for whether firms report attempting to procure a government contract, and in equations 5.5-5.8 is percentage of contract value "typically paid in informal payments or gifts." T-statistics (in parentheses) are based on standard errors adjusted for clustering by country. Results are shown only for PEFA indicators and added regressors, but regressions also include all control variables from Tables 1 and 2. "INDEX" is the mean of the standardized scores of PEFA components LEGAL, METHODS-A, ACCESS-AB, COMPLAINT-AB.

Table 6: Falsification tests

	Column #	6.1	6.2	6.3	6.4
	Dependent variable	BID	KICKBACK	Time tax	Bribe tax
Row #	PEFA indicator				
1	OVERALL			-0.262	-0.075
				(-0.63)	(-1.58)
2	LEGAL			-0.579	-0.020
				(-1.46)	(-0.56)
3	METHODS			-0.032	-0.046
				(-0.11)	(-2.13)
4	ACCESS			0.057	-0.036
				(0.14)	(-1.20)
5	COMPLAINT			-0.537	-0.034
				(-2.58)	(-1.37)
6	PEFA 18 (payroll controls)	0.005	0.048		
		(0.74)	(0.35)		
7	18-1	0.0001	-0.134		
		(0.01)	(-1.07)		
8	18-2	-0.002	0.033		
		(-0.38)	(0.33)		
9	18-3	0.001	-0.339		
		(0.20)	(-1.64)		
10	18-4	0.001	-0.1874		
		(0.08)	(-0.87)		

Each cell in the table summarizes the key result from a separate regression. Dependent variables in columns 6.1-6.4 respectively are: dummy for whether firms report attempting to procure a government contract in the last 12 months, percentage of contract value "typically paid in informal payments or gifts to secure the contract," percentage of senior managers' time spent dealing with government regulations, and total unofficial payments to government officials as percentage of firm sales. T-statistics, reported in parentheses below point estimates, are based on standard errors adjusted for non-independence of errors within country clusters of observations. Results are shown only for PEFA indicators, from regressions based on Table 1 and Table 2 specifications.

	mean	Std. dev.	Min.	Max.	N
Firm level					
Bid for public contract	.188	.390	0	1	33385
Informal payment to obtain contract	2.32	7.64	0	100	6059
No. of employees	87.0	375.8	1	17000	33385
Firm age	21.0	74.4	0	2025	33385
Establishment part of larger firm	.168	.374	0	1	33385
Private domestic ownership	.872	.310	0	1	33385
Private foreign ownership	.032	.162	0	1	33385
State ownership	.001	.025	0	.99	33385
International certification	.384	.486	0	1	33385
National sales %	89.1	26.9	0	100	33385
Senior mgmt. time dealing with regulation	10.66	19.34	0	100	31564
Court system fair, impartial, uncorrupt	2.27	1.00	1	4	29865
Unofficial payments "to get things done"/sales	.267	3.535	0	100	26838
Country level					
OVERALL (PEFA 19)	3.76	1.66	1	7	33385
LEGAL (19-1)	4.48	1.68	1	7	33385
METHODS (19-2)	3.09	2.55	1	7	32793
ACCESS (19-3)	3.96	2.19	1	7	32929
COMPLAINT (19-4)	3.29	2.51	1	7	32561
METHODS-A	0.23	0.42	0	1	31806
ACCESS-AB	0.49	0.50	0	1	31806
COMPLAINT-AB	0.45	0.50	0	1	31806
INDEX (of 4 standardized components)	-0.02	0.69	-1.10	1.61	33
AUDIT (PEFA 26)	3.57	1.63	1	6	33385
GDP per capita	3048	2643	220	15921	33385
Population (millions)	45.5	64.6	.052	254.0	33385
Area (thousands of sq. km)	446.2	514.5	.26	2267	33385
Enterprise Survey year	2011.6	2.1	2009	2015.7	33385
ODA per capita	70.1	87.1	-1.53	901.1	33385
Government consumption/GDP	13.8	5.3	5.0	26.0	20535
Public investment/GDP	6.1	3.7	-2.8	17.7	20535

Table A2

country	ES year	PEFA year	proportion bidding	kickback %	PEFA 19 index	obs.
Afghanistan	2014	2013	0.145	5.921	0.798	365
Albania	2013	2012	0.058	1.154	1.110	313
Antigua and Barbuda	2010	2014	0.154	0.000	-0.779	149
Armenia	2013	2014	0.159	0.182	0.798	352
Azerbaijan	2013	2014	0.070	0.529	0.604	374
Bangladesh	2013	2016	0.053	3.054	0.798	1421
Barbados	2010	2013	0.250	0.276	-0.779	128
Belarus	2013	2014	0.254	0.976	-1.063	347
Belize	2010	2014	0.194	0.000	-0.779	144
Benin	2016	2014	0.322	4.595	0.012	149
Bhutan	2015	2016	0.344	0.287	0.295	253
Bosnia and Herzegovina	2013	2014	0.118	0.333	0.012	355
Botswana	2010	2013	0.529	0.794	1.110	263
Burkina Faso	2009	2014	0.417	1.172	1.110	367
Burundi	2014	2015	0.365	2.220	-0.494	156
Cambodia	2016	2015	0.124	1.677	-0.494	338
Cape Verde	2009	2016	0.084	0.000	0.012	143
Colombia	2010	2016	0.304	1.488	1.110	936
Congo, Dem. Rep.	2013	2013	0.120	3.870	0.012	518
Congo, Rep.	2009	2014	0.226	3.000	-0.494	106
Costa Rica	2010	2016	0.256	0.146	-0.209	520
Côte d'Ivoire	2009	2013	0.110	6.056	0.513	490
Dominica	2010	2015	0.113	0.000	-1.063	150
Dominican Republic	2010	2016	0.156	1.717	-0.494	327
Ecuador	2010	2014	0.313	2.064	0.604	361
El Salvador	2016	2013	0.170	1.513	0.604	717
Ethiopia	2015	2015	0.320	0.500	0.012	847
Fiji	2009	2013	0.163	0.136	-0.779	153
Gabon	2009	2014	0.149	2.500	-0.209	148
Georgia	2013	2013	0.201	0.074	1.394	343
Ghana	2013	2013	0.218	3.904	0.012	683
Grenada	2010	2015	0.184	1.038	-0.779	152
Guatemala	2010	2013	0.183	2.916	-1.063	579
Honduras	2010	2013	0.118	2.722	0.292	331
Indonesia	2015	2012	0.056	1.981	-0.494	1311
Jamaica	2010	2013	0.162	0.250	-0.278	327
Jordan	2013	2011	0.154	0.000	-0.182	571
Kenya	2013	2012	0.190	3.280	0.513	737
Kosovo	2013	2013	0.361	2.952	0.007	202

Kyrgyz Republic	2013	2015	0.278	4.036	0.007	263
Lesotho	2016	2012	0.233	5.233	-0.494	150
Liberia	2009	2016	0.193	6.222	0.012	140
Macedonia, FYR	2013	2015	0.100	0.886	0.825	359
Madagascar	2013	2014	0.092	6.222	-0.494	251
Malawi	2014	2011	0.273	2.303	0.012	466
Mali	2016	2016	0.525	6.672	0.012	185
Mauritania	2014	2014	0.310	2.030	0.798	126
Mauritius	2009	2015	0.187	1.016	-0.278	363
Micronesia, Fed. Sts.	2009	2013	0.176	0.000	-1.063	68
Moldova	2013	2015	0.234	1.871	0.007	696
Mongolia	2013	2015	0.349	1.682	-0.494	347
Montenegro	2013	2013	0.097	0.000	0.292	144
Morocco	2013	2016	0.191	0.317	0.007	393
Namibia	2014	2015	0.263	0.803	-0.779	543
Nepal	2013	2015	0.059	6.917	0.012	476
Nicaragua	2010	2015	0.187	3.333	0.292	321
Niger	2009	2013	0.429	3.558	0.798	147
Nigeria	2014	2013	0.177	10.817	-1.063	1080
Pakistan	2013	2012	0.091	6.371	-0.494	1005
Panama	2010	2013	0.020	0.000	-0.494	344
Papua New Guinea	2015	2015	0.246	1.000	-0.779	65
Paraguay	2010	2016	0.304	3.346	0.889	345
Peru	2010	2015	0.250	1.756	1.110	980
Philippines	2015	2016	0.094	1.815	0.513	1279
Rwanda	2011	2015	0.543	0.404	0.894	230
Samoa	2009	2014	0.390	3.061	0.103	100
Senegal	2014	2011	0.171	0.547	1.110	572
Serbia	2013	2015	0.081	0.650	1.110	356
Sierra Leone	2009	2014	0.083	6.667	-0.209	72
Solomon Islands	2015	2012	0.238	2.265	-1.063	147
South Sudan	2014	2012	0.148	7.942	-0.779	664
Sri Lanka	2011	2013	0.086	1.081	-0.563	582
St. Kitts and Nevis	2010	2016	0.209	0.767	-0.857	148
St. Vincent and the Grenadines	2010	2012	0.211	0.000	-0.779	152
Suriname	2010	2015	0.086	0.000	-1.063	152
Tajikistan	2013	2012	0.286	3.000	0.007	336
Tanzania	2013	2013	0.048	2.273	-0.243	546
Timor-Leste	2015	2014	0.333	14.850	-0.494	126
Togo	2009	2016	0.293	1.486	0.513	150
Tunisia	2013	2016	0.301	0.837	0.331	592
Uganda	2013	2012	0.137	4.500	-0.494	652

Ukraine	2013	2016	0.154	16.545	0.007	214
Uruguay	2010	2012	0.191	0.018	-0.182	593
Uzbekistan	2013	2012	0.124	0.614	-1.063	386
Vanuatu	2009	2013	0.213	3.375	-1.063	122
Vietnam	2015	2013	0.182	3.382	0.228	982
Zambia	2013	2013	0.166	2.939	-0.494	706
Zimbabwe	2011	2012	0.217	0.136	-0.273	594