

# LANGUAGE AS A TRADE BARRIER: EVIDENCE FROM GEORGIAN PUBLIC PROCUREMENT\*

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## Abstract

Provision of government contract information in English reduces the barriers to participation by foreign suppliers. We measure this effect using data from the country of Georgia, where English translations of government tenders were provided above specified contract size thresholds, which varied over time and across contract types. The provision of English documentation more than doubles foreign company participation for low value contracts, and leads to smaller, though still substantial, increases for higher value contracts. Because foreign bidder participation in Georgia is relatively small, the resulting impact on prices is in the order of only one percent. However, even these small price effects are a non-trivial fraction of the profit margins of domestic competitors.

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## 1. Introduction

Trade barriers have been steadily declining since 1960. The first phase of this decline was formalized through the General Agreement on Tariffs and Trade (GATT); since 1995, reductions in trade barriers were negotiated through the World Trade Organization apparatus, which also mediated trade-related disputes. The major focus of these trade liberalization efforts was on tariffs, which as a result are now (generally) at very low levels. However, total trade costs remain high, accounting for a third of the import price (Anderson and van Wincoop, 2004). An examination of the nature and the importance of each constituent component of these costs can improve our understanding of the remaining sources of trade frictions, and whether they can be further reduced by suitable policies.

The major portion of the remaining trade costs do not involve tariffs. They consist, among others, of transportation costs, border inspections, product regulation, accessing a distribution channel, obtaining local market knowledge, and cultural factors which may impede marketing and transactions. Language is one such non-tariff barrier: It increases the cost of communicating with distributors, retailers, and customers; it raises the difficulty of assessing the local market environment; it may also raise the transaction costs associated with any commercial documents and contractual agreements. Measuring the degree to which a common language between an exporting and importing country facilitates trade is an old staple of gravity-style regressions; the meta-analysis of Egger and Lassmann (2012) reports of 701 estimates with an average estimated effect of a common language on trade of approximately 60 percent. However, obtaining credible causal effects of language differences is complicated by the fact that a common language is typically associated with many other cultural commonalities. Recent contributions, such as Melitz (2008) and Melitz and Toubal (2014), have increased our understanding of the channels through which language impacts trade, by distinguishing between commonality of mother tongues versus official languages, by accounting for linguistic proximity, and by controlling for a large set of trade-relevant observable characteristics. They have done so, however, by side-stepping to some extent the possible presence of unobserved heterogeneity in trade-propensity at the country-pair level that is correlated with a common language.<sup>1</sup> Some of these residual unobserved factors may have an effect on the trade intensity between the countries, e.g., similar tastes for products, affinity for each other's brands, and increased trust, and thus measured language effects are typically the composite of all unmeasured factors correlated with sharing a language

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<sup>1</sup> Incidentally, language is a confounding factor for those interested in the effect of cultural similarity on trade. Felbermayr and Toubal (2010) use data from the Eurovision Song Contest to circumvent the problem arising from culturally similar countries sharing the same (or similar) languages.

between two populations.<sup>2</sup> To put it more succinctly, a challenge in estimating causal effects is that language tends not to be time-varying; or at least not exogenously.<sup>3</sup>

In this paper we identify the extent to which language is a barrier to trade using a micro-level dataset of procurement transactions (tenders) in the country of Georgia. Some of these transactions were contracted in the Georgian language, while others were contracted based on documentation available in both the English and the Georgian languages. For firms operating in international government tenders, we treat English as the *lingua franca*, i.e., we implicitly equate the provision of English documentation as eliminating language barriers. Though this is not unreasonable, it is certainly a lower bound of the effect of using a common language. The partition of transactions in the group with documentation provided in both languages and the group with documentation only in Georgian is exogenous, based on estimated value thresholds. These thresholds differ across different types of products and over time. The resulting variation permits identification of causal effects based on a series of discontinuities across the cut-offs, i.e., allows us to estimate the effects of a common language for different transaction sizes; to do so, we use both cross-section (regression discontinuity) and time-series (difference-in-difference) variation.

Though our estimates are based on government tenders, these are likely to be informative for business-to-business transactions as well. Government procurement covers a wide range of products, since it includes purchases of goods, services, and infrastructure projects by bodies at all levels of government (including state-owned or state-controlled enterprises). It also varies in transaction value from small transactions, measured in the thousands of dollars, to transactions reaching into the millions. This variation is reflected in our dataset. Moreover, government procurement is an important part of the economy in its own right. Hoekman (2015) reports that internationally contestable public procurement markets represent five to eight percent of gross domestic product. One difference between government procurement and other transactions is that government tenders are often not based on posted prices, but rather on some type of bidding mechanism. However, many business-to-business transactions are also based on a competitive process.<sup>4</sup>

An important reason to focus on non-tariff barriers to government procurement is that there is a wide range of procurement policies around the world, and plenty of scope for

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<sup>2</sup> There is evidence, however, that language has a positive incremental effect on trade beyond enhancing trust, but not on foreign direct investment and financial flows, as shown in Guiso, Sapienza, and Zingales (2009).

<sup>3</sup> Its spatial variation within countries can provide a source of identification of causal effects, as has recently been done by Egger and Lassmann (2015) for Switzerland. They have used the distribution of mother tongues within the country to estimate how the trade flows with its neighbors are impacted at the zip code level by a common mother tongue between the trade partner and the Swiss locality.

<sup>4</sup> The government may also impose a specific set of conditions that a supplier needs to meet, but increasingly so do private sector companies.

changing these policies. Governments frequently pursue objectives other than maximizing value for money. Those include favoring certain types of suppliers, e.g., small and medium sized enterprises, suppliers from certain regions, or firms owned by persons from certain societal groups.<sup>5</sup> Government purchasing decisions are also influenced by industrial policy objectives. For these reasons, governments often discriminate against foreign suppliers. Economic research tended to focus on explicit discrimination, such as bans on foreign bidding, price preference policies that “inflate” foreign bids, performance requirements that discourage foreign firms, and reserving a share of procurement for bids from local firms. Implicit discrimination has been less studied.

This paper investigates one such form of implicit discrimination: providing tender information only in a local language. Not providing documentation in an international lingua franca, such as English, is a form of discrimination because it impacts domestic and foreign firms differentially. For this reason, providing documentation for government tenders in English is recognized as an important facilitating practice by the World Trade Organization; in fact, it is a proscribed practice for large contracts under the Agreement on Government Procurement to which many developed countries are a party to. Provision of documentation in English is also considered an important practice for increasing overall transparency of the government tendering process.

In the country of Georgia, translation has been mandated for contracts that exceed a certain level of estimated value, but the relevant thresholds differ both across the type of contract and over time. For the periods that are pertinent to our dataset, these thresholds are as follows. Tenders for goods and services were translated into English for values that exceeded 0.5 million Lari from April 2011 until August of 2015, at which point the threshold was increased to 2 million Lari.<sup>6</sup> The corresponding threshold for construction tenders was one million Lari from April 2011 until August of 2015, at which point it increased to 4 million Lari. This type of across contract type and across time period variation provides us with the source of identification for the effects of translation into English on bidder participation and tender outcomes.

Our results show that provision of documentation in English increases participation of foreign bidders dramatically. This effect is particularly pronounced for contracts of moderate to low value, i.e., in the half a million to a million-dollar range. The effects on contract prices are very small, however, because a large increase in foreign participation rates results in only a small increase in total participation: foreign bidders are a small

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<sup>5</sup> For the analysis of some policies implemented in auction-based procurement contexts see Krosnokutskaya and Seim (2011) and DeSilva, Dunne, Kosmopoulou and Lamarche (2012).

<sup>6</sup> Contracts were translated into English prior to April 2011, but the law described in the text mandating translation based on these thresholds took effect on that date. Contracts for which we are uncertain whether or not were subject to the English documentation mandate were not included in the analysis.

fraction of all bidders. Foreign bidders do not bid more competitively than domestic bidders; thus, increased foreign participation seems to increase competition without changing it qualitatively. There is, though, some weak evidence that domestic bidders themselves bid marginally more competitively in auctions where there is increased likelihood of foreign competition.

This paper is related to two other strands of literature. The first is research on government discriminatory prices against foreign competitors in public tenders. A conclusion of this work is that a government can increase domestic welfare by mildly price discriminating against foreign suppliers; in fact, it may even be able to lower procurement cost when foreign suppliers have (on average) lower costs than domestic producers (McAfee and McMillan, 1989).<sup>7</sup> These gains can be non-trivial (Evenett and Deltas, 1997). The second is research on auctions with endogenous bidder participation. This literature, which is mainly adopts a structural econometric paradigm, focuses on the estimation of the distribution of bidder costs following entry, the nature of these costs (e.g., the extent to which they are firm-specific and correlated across firms), and how much information firms have about them prior to entry. Entry is defined as the set of costly activities necessary prior to bid submission. The early theoretical literature on this topic considered two extreme cases: prospective bidders observe their contract cost prior to entry (Samuelson 1985), or they observe their contract cost following entry (McAfee and McMillan, 1987; Levin and Smith 1994). The two models are nested in modern econometric estimation approaches (Marmer, Shneyerov, and Xu, 2013; Gentry and Li, 2014, Gentry, Li, and Lu, 2015).

In the next section we describe the Georgian procurement process and the type of data in our disposal. We then discuss main features of the data, and proceed sequentially to analyze the effect of English documentation on bidder participation, bidder competitiveness, and the level of winning bids. The end the paper with some concluding remarks.

## **2. The Procurement Process and the Data**

A brief description of the Georgian tender process can facilitate a better understanding of our analysis and findings. Under the Georgian procurement system, bidders submit sealed bids during an initial phase known as “primetime.” During that phase, firms are allowed to lower their bids, if upon closer consideration they believe a lower bid would be to their advantage.<sup>8</sup> At the conclusion of the primetime phase, the bids are revealed (but not the

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<sup>7</sup> However, these beneficial partial equilibrium effects may completely disappear in general equilibrium, as first pointed out by Baldwin and Richardson (1972) and analyzed more generally by Evenett and Hoekman (2005). In fact, as Miyagiwa (1991) has shown, the net effects of such policies on imports could well become negative.

<sup>8</sup> A firm may lower its bid if it reassesses its cost for fulfilling the contract, e.g., if input costs or exchange rates become more favorable or if it experiences an adverse demand shock. Even though “primetime” bids are not

identity of the bidders), and competitors are asked sequentially whether they want to lower their bids. This phase of the tender is known as the “reverse auction.” The sequence at which bidders can revise their bids is based on their rank order in the primetime phase, with the highest bidder going first, the second highest bidder going second, and so on until the lowest bidder. If a bidder does not lower their bid, they withdraw from the auction. This process continues for three rounds. The bids submitted at the third round is the final offer of each firm. To the best of knowledge, this is a unique bidding process.<sup>9</sup> There are also tenders that are awarded without a reverse auction on the basis of bids submitted during the “primetime” phase. These tenders are only a small fraction of the total, and are excluded from our analysis. Also excluded from our analysis are tenders with donor financing, because these are subject to different rules and in many cases also awarded in foreign currency. Finally, we also exclude all design competitions, because in these tenders a bidder does not need to submit a bid during primetime.

Though typically the contract is awarded to the lowest bidder, this is not always the case. In a substantial number of cases, the tender was awarded to a higher cost bidder if the low bidders were deemed unlikely to fulfil the contract as required, or for other reasons. It is worth noting that no bids can be placed at a price that exceeds the estimated value of the contract, a figure that is based on the analysis of the Georgian procurement authorities. Perhaps because of this upper bound, in many auctions no bids are received, and in approximately half the tenders a single bid was received (these fractions are broadly constant over time). Tenders that received no bids or where otherwise not awarded to any bidder were not included in our analysis.<sup>10</sup>

We obtained information on each tender from the website of Transparency International Georgia ([tendermonitor.ge/en/root/index](http://tendermonitor.ge/en/root/index)). This website contains primary data as provided by the Georgian government agencies, which are electronically collecting and storing information since at least the middle of 2013. This database includes all the tender information used in our analysis, including the bidders, their bids, contract type information, contract value information, and information about the outcomes of the tender process. This is described in detail below. The database also includes additional fields that were not used in

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the final bids a firm can submit, a lower bid in this phase confers it an advantage in bid sequencing in the next phase.

<sup>9</sup> However, some other bidding competitions are similar in spirit. For example, some financial firms invite bids for assets in two rounds, with the group of most-competitive bidders in the first round invited to submit bids in a second round. Unlike the Georgian procurement process, the bids in the first round are non-binding, and the bidding in the second round is symmetric regardless of a bidder’s rank in the first round. These auctions, with an “indicative” first round, are formally analyzed in Quint and Hendricks (2018). See also Quigley (2018) for relevant analysis.

<sup>10</sup> A very small number of tenders (fewer than 0.2%) were awarded to a firm that did not submit a bid or could not be matched to a bidder. These were kept in the sample for most of the analysis. Their removal, in the case when the use of the narrow sample was more appropriate, is clearly indicated.

our analysis (e.g. a risk indicator code). We downloaded the data on March 22, 2017, which included information on tenders up to July 1, 2016.

Of special interest to our work is the geographic origin of the bidder. We are able to classify bidders as domestic or international based on the address on file and their bidder ID. All domestic bidders have numeric 9 or 11 digit IDs. International bidders can have an ID of any numeric or alphanumeric configuration. Therefore, all bidders with an international address or with IDs that are not 9 or 11 digit numbers are classified as international. Bidders with a domestic address are labeled as domestic.<sup>11</sup> Approximately one percent of the bidders cannot be matched to an address and have 9 or 11 digit IDs. These bidders could be either domestic or foreign and their national origin is initially set to missing. The typical bidder from this set tends to bid on only a few tenders, but which are of larger than average value. Some of them might thus represent consortia, joint ventures, or joint foreign/domestic collaborations. In some of the analysis, we treat these bidders as being domestic on account of their ID. Though this does not preclude some of them being domestic, we have sufficient information on the distribution of foreign firms by ID type to estimate that 2.8% of these bids are of foreign origin.<sup>12</sup> For this reason, also perform analysis where we prorate these firms to foreign and domestic components using the estimated 2.8% foreign and 97.2% domestic breakdown (and this analysis forms the bulk of the reported figures in this paper). As an additional robustness check, we repeat some of the analysis treating these firms as being of unknown origin.<sup>13</sup>

The data is generally of high fidelity, and has extensive information on the bidding process. Information that is of relevance to this paper includes the number, identity and national origin of bidders who have participated in each contract, the final (lowest) bid they submitted, the winning bid in the auction, the estimated value of the contract as provided by government authorities, the procuring agency, and the nature of the item in the tender (e.g.,

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<sup>11</sup> It is possible that a foreign firm competes through a domestic affiliate with a Georgian address, and which is registered as a Georgian company with a 9 or 11-digit code. There is no way to distinguish these foreign-owned entities from domestically-owned Georgian firms. But one can argue that these firms are for practical purposes equivalent to domestic competitors.

<sup>12</sup> There are 225 bids from firms with foreign addresses. The fraction of these without 9 or 11-digit bidder IDs is 67.5% (152 bids), while the remaining 32.5% (73 bids) has 9 or 11-digit IDs. We also have 149 bids from firms with no address information but with bidder IDs that are not 9 or 11-digit. These 149 bids *must* be from foreign bidders, bringing the total of foreign bidders with no 9 or 11-digit IDs to 351, nearly half of which have no addresses. Assuming that this ratio also applies to foreign bids from bidders with 9 or 11-digit IDs would imply that there are 71 foreign bids “missing” or “undercounted.” This is 2.8% of the 2,535 bids from firms with address information (and 16% of all bids that we expect were submitted by foreign firms).

<sup>13</sup> Another robustness check would be to drop all tenders where at least one of the bids is from a bidder with unconfirmed origin. Though this is technically feasible, it would not be very meaningful because it would remove most of the tenders in which foreign bidders participated. Bidders with unconfirmed origin may represent only one percent of the bids, but these are heavily concentrated on high value tenders for which most of the foreign bidders compete.

construction, goods, services, etc). Two other series, the contract value and the final contract value, which represent the amount at which the contract was awarded (the latter reflects any changes due to quantity adjustments or renegotiations), are not used directly in the analysis but are useful as flags for problematic observations as noted next.

Even though the data is high quality overall, some series occasionally contain coding errors, typically involving deleted or inserted digits. The issue mainly arises in the contract value series, which we do not use in the analysis, but sometimes also in the estimated value, which we do use.<sup>14</sup> These series are related to each other, and unlikely to differ by a very large amount. They are also related to the bid submitted by the winner (in fact, in most cases that bid is exactly equal to the contract value) and to the highest bid submitted in the auction (the highest bid, indeed all bids, must be no higher than the estimated value). We have thus identified problematic data using the following criterion: if the value of one of these three series is larger or smaller than all the others by a factor of seven, then that value is a likely typo. This approach has flagged 32 problematic estimated contract values. Because this number is small (and the figures not necessarily wrong), we kept them in the dataset. However, we performed two robustness analyses: first, we replaced the questionable values by the highest bid submitted for that tender, and second, we dropped these 32 observations from the sample. Neither change affected the numbers reported here in a meaningful way.

### **3. Descriptive Analysis and Stylized Facts**

Summary statistics of the data used in our econometric analysis are reported in Table 1. We have 104,735 tenders in our final sample, for each there were a total of 202,404 bids submitted by 16,941 distinct bidders. Overall competition is not particularly high, with only about two bids per tender on average. Most bidders participate in government tenders infrequently, with the median number of participations in our sample period being equal to 3, i.e., less than once annually; foreign bidders are less frequent participants than domestic ones, as expected. The average contract is worth approximately 75,000 Lari (measured by the winning bid), but there is big variation with a large upper tail; the median contract is only about 11,000 Lari, while the maximum is 48 million. Perhaps because of the weak competition, prices are on average only 13% below the estimated value, which is an effective binding reserve. Here again, there is large heterogeneity, with many contracts being awarded at the reserve, while others at only a small fraction of it. Foreign participation appears to be very rare, with only about 0.18% of the bids being submitted by foreign entities. Foreign firms win a similar fraction of the tenders. Because the vast majority of tenders is for small amounts, the provision of English documentation is mandated for only

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<sup>14</sup> Bid data are fed directly from the auction database and do not appear to have any issues.

1.6% of them over our sample period (which is dominated by the earlier transparency regime). Finally, construction contracts, for which higher thresholds for translation apply, represent approximately a quarter of all tenders by number.

Foreign bidders are but a small minority of participants in government procurement tenders. Detailed information about the extent of their participation, and its key associations with the type and size of tender are reported in Table 2. That table reports participation statistics by bidder nationality using two different approaches. In the first approach, we allocate the bidders with missing address information and with 9 or 11-digit ID numbers to foreign or domestic origin based on the nationality shares of bidders with known addresses (and ID numbers of the same format). Under the second approach, we assign all such bidders to a domestic origin (see preceding section for details). The first approach is more appropriate for the questions examined here, so we primarily discuss the first set of figures (columns 1 through 4), and only note any important differences when using the second set of figures (columns 5 through 8). The last (9<sup>th</sup>) column provides some useful context by listing the number of bids received for each tender.

Approximately only one fifth of a percent of bids are cast by foreign firms. This percentage is twice as high for construction contracts than for goods and services. It is unclear, at first pass, whether this is driven by the generally higher value of construction contracts, given that the proportion of foreign bids rises steadily with the value of the contract. Below the lowest threshold for tender documentation in the English language, only 0.14% of bids are foreign. Between the 500 thousand and one million Lari thresholds, the proportion rises dramatically to 1.05%, and between the million and two million Lari, it is 1.87%. These are still very small percentages, but no longer “rounding error.” Foreign participation for contracts in the 2 to 4 million Lari range is 3.15%, while for contracts above the highest threshold of 4 million Lari, the percentage becomes 4.45%. These latter figures, especially if they increase further over time as the government procurement market becomes more globalized, will be of some significance for the Georgian economy. Note, however, that the overwhelming majority of bids are in the first category, while the last two categories, where foreign participation is greatest, jointly account for less than one percent of the bids (and tenders). Small contracts predominate even when the comparison is made on the basis of total expected contract value, with the first category amounting to nearly four billion Lari, while the last two categories combined are less than three billion. The intermediate two categories are a bit over one billion each, for a combined total of around two and half billion Lari. Therefore, it is important to recognize that foreign bidder participation is of some importance in only one third of the government procurement market, as measure by value.

Another way to classify contracts is on the basis of whether relevant documentation must be provided in English. When such documentation need not be provided, foreign bidder participation is a paltry 0.16%, nearly as low as the participation rate for contracts of less

than half a million Lari. This is despite the fact that English documentation need not be provided for half the contracts above that threshold, and suggests that there must be some positive effect of English documentation on foreign bidder participation.<sup>15</sup> When English documentation must be provided, foreign participation rises to 2.68%. The causal effects of increased transparency (i.e., the provision of English documentation) are examined in the next section. The figures obtained in the next four columns, when all bidders with no confirmed nationality are assigned to domestic origin, are broadly similar to those just discussed. Most of the bidders reclassified to domestic are those competing for low value construction contracts, where English is not required for documentation. All other figures are only marginally affected. Therefore, the associations between foreign participation and contract value, and between foreign participation and English documentation are strengthened using this alternative bidder classification.

Of relevance to our subsequent analysis is the tendency of competition, as measured in the number of bids per contract, to increase with tender value. This increase is not driven (at least to any measurable extent) by increased foreign bidder participation, given that foreign bidders are a small fraction of overall bidders. Rather, high value tenders attract more bidders, both domestic and foreign (especially the latter). This is of importance since our empirical strategy would first need to disentangle the effects of contract value on participation from that of transparency on participation. It would then need to disentangle the effects of transparency on prices from the effect on prices of increased participation due to contract size.

Before we turn to systematic econometric analysis, we discuss some summary measures of association between various measures of prices and contract characteristics. These are reported in Table 3. The first panel, provides information on the winning bid (for the contracts where the winner has been identified among the bidders), and shows that winnings bids are slightly increasing with contract value, and also with the provision of English documentation. Because English documentation is required for higher value contracts, the two effects must be carefully separated in the empirical analysis. The bottom panel of Table 3 reports some statistics at the bid level. The most noteworthy observation is that the average bid is in fact lower than the average winning bid, with the gap being particularly large for low value tenders. This may at first appear to be a puzzle, since the winner of bidding contest typically submits the lowest bid (or close to the lowest bid). The explanation for this is the number of bidders varies across tenders, and (as we show in subsequent analysis) bids are lower when more bidders compete in an auction (within a given contract value range). Therefore, the auctions with more bidders also have lower

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<sup>15</sup> Take the probability of foreign participation as a function of estimated value as given. Then, if participation were independent of English documentation at each estimated value bracket, foreign participation in the absence of documentation would have been somewhat higher than 0.16%.

winning bids. But the average winning bid is not weighted by the number of bidders, while the average bid is, leading to the observed paradoxical pattern. Indeed, when we first compute the mean bid for each tender, and then take the average value of this for different contract value ranges, we observe that these values are higher than winning bids (though still slightly increasing with contract value). Foreign bidders submit higher bids, but also tend to compete in higher value contracts, where bids are generally higher. This discussion, and especially the association between bids and estimated value, makes it quite clear that any effects of competition on prices must be conditional on the tender size.

#### **4. Bidder Participation**

In this section, we investigate to what extent does the higher rate of foreign participation for tenders of higher estimated value is due to the lower entry barriers arising from the provision of documentation in the English language. A more formal analysis than the one embodied in the statistics of Table 2 would utilize the unique nature of the thresholds in Georgian procurement, which differ across construction and goods/service contracts and have also changed over time. This time variation permits us, in principle, to use a variety of estimation approaches. These range from classic difference-in-difference analysis, to parametric and semi-parametric models that incorporate a range of factors that affect bidder participation, and to non-parametric approaches that either pool data or focus on individual thresholds (the latter known as Regression Discontinuity designs).<sup>16</sup> These reduced form approaches are sufficient to obtain credible estimates for the outcomes of interest.<sup>17</sup>

A key observation from the data is that the distribution of tender value is heavily skewed towards low values with a long upper tail. This observation suggests that tender values and bids be expressed in logs, leading to a less dispersed distribution. A second important observation is that the English documentation requirement applies for tenders in the upper tail, particularly so with regards to the most recent thresholds. This observation suggests that semi-parametric and non-parametric methods be employed; simple parametric models

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<sup>16</sup> An implicit assumption for the identification of Regression Discontinuity designs is that one cannot select into the treatment group around the point of discontinuity. In our case this means that the procurement authorities do not strategically move the estimated contract value to be right above (or right below) the English documentation requirement threshold. Testing for this is complicated by the fact that these thresholds are big round numbers, and there is a tendency for estimates to naturally fall on these round numbers. However, we are able to test for the possibility of strategic manipulation utilizing the fact that the thresholds vary for different contract types and over time. We find no evidence of such manipulation.

<sup>17</sup> Use of structural approaches is hampered by the fact that the Georgian procurement auctions, involving two stages and up to four rounds in the second stage, with minimum bidding increments, do not conform to the standard auction formats. Imposing the wrong paradigm can lead to substantial biases in structural analysis (see, for example, Hickman, Hubbard, and Paarsch 2017). Developing a novel approach for structural analysis of this data is likely possible, but certainly complicated and not necessary for the questions examined here.

tend to capture tail behavior less well, and there is the risk that the estimated effects of English documentation might be driven by functional form.

Our first approach utilizes the full variation in the data and estimates the expected number of foreign bidders as a function of the (log) estimated contract value, year fixed effects, and whether English documentation was required for the specific tender. The impact of the estimated contract value is represented by a flexible linear spline of 24 segments, but we have also estimated specification with fewer segments for the purpose of robustness yielding similar results.<sup>18</sup> To account for heterogeneity across different types of contracts, we include individual dummies for each of the 47 European Union CPV categories.<sup>19</sup> Robust standard errors are utilized through-out for the purpose of inference. A typical specification would be of the form

$$NF_j = a + g(\ln(EV_j)|\gamma^K) + \delta E_j + u_y + v_c + \epsilon_j$$

where  $g(\ln(EV_j)|\gamma^K)$  is a linear spline of the log estimated value for contract  $j$  with a  $K$  dimensional slope vector  $\gamma^K$

$$g(\ln(EV_j)|\gamma^K) = \gamma_0 \ln(EV_j) + \sum_{k=1}^{K-1} \gamma_k \max\{\ln(EV_j) - \overline{LEV}_k, 0\}$$

and  $K - 1$  knots  $\overline{LEV}_k$  determined by the process outlined in the footnote to this paragraph,  $NF_j$  is the number of foreign bidders competing for contract  $j$ ,  $E_j$  is a dummy variable that indicates whether the provision of English documentation was required for this contract,  $u_y$  are year fixed effects,  $v_c$  are contract type fixed effects, and  $\epsilon_j$  is a disturbance term. Because foreign bidder participation may impact domestic participation, we also estimate similar regressions using as dependent variables the number of domestic bidders, the total number of bidders, and the fraction of bidders who are of foreign origin.

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<sup>18</sup> We constructed the spline using a two-step procedure. We first broke up the range of log estimated value to five intervals based on the four thresholds for English documentation. The first knot corresponds to one thousand Lari, and an additional 10 equally spaced knots were placed until the first threshold (spacing determined on the basis of log values). The range between the 500 thousand and one million Lari was divided in five intervals (380 observations each, on average); the range between the one million and 2 million Lari was divided in 3 intervals (288 observations each, on average); the remaining two ranges were divided in 2 intervals each (the intervals of the top range have on average 99 observations each, while those of the penultimate range have 183 observations on average).

<sup>19</sup> The CPV (or Common Procurement Vocabulary) codes is a classification system developed by the European Union for public procurement. Their main purpose is to help procurement personnel properly classify their contract notices, to facilitate fast and accurate translation of contract notices for publication in the Official Journal of the European Union, and to make it easier to establish procurement statistics. This classification system contains multiple levels of refinement, similar to those in the industrial classification systems. We use the first two digits.

Baseline results are reported in Table 4. The first column is our base specification, and indicates that the provision of English documentation increases foreign bidder participation by 0.03 bidders per auction. This is a small number but not a trivial one given the relatively small foreign participation count. The set of contract categorical variables is strongly statistically significant, but the estimated effect of English documentation is robust to whether or not we include them (the year fixed effects are not significant). The equality of slopes in the spline is easily rejected for this specification, and for all others reported in this table. To account for the possibility that English documentation does not merely shift up the number of foreign bidders, but also changes the slope with respect to contract size, we estimated a variation in which we interact the English dummy with the log of the estimated contract value. Even though the joint effect of the two parameters involving the English dummy is strongly statistically significant, neither of them is in isolation; the reason is the high correlation between the English dummy and contract value. Therefore, it is not possible to estimate anything beyond an average participation effect.

Interestingly, the provision of English documentation appears to reduce domestic participation, but the estimate is not statistically significant (see column 3). Because domestic bidders dominate in overall bidder counts, the effects of English documentation on total bidder participation are also not statistically significant (point estimate negative). Though these effects are not statistically significant and should not be over-interpreted, the negative sign suggests that the prospect of increased foreign competition leads some of the weaker domestic rivals to forgo participation in the procurement market. The evidence on prices, presented later, is supportive of this conjecture. Both the CPV and year dummies are statistically significant for these sets of regressions.

Of special interest is the fraction of bidders in an auction who are foreign. Results for this are reported in the last two columns of Table 4. English documentation increases the percentage of bids that are foreign by two percentage points, and the estimate is strongly statistically significant (column 7). Recall from Table 2 that 2.68% of submitted bids are foreign when English documentation is provided. Thus, one way to read this result is that most of the foreign participation is driven by the provision of English documentation! These results parallel those reported in the tables of summary statistics. In the last column of Table 4, we interact the English dummy with the log of estimated contract value. Again, significance of the individual coefficients is lost because of high correlation between the English dummy and its product with estimated value. But the point estimates are suggestive of an additive effect; even though a high value contract may have more complex documentation making a translation more valuable, foreign bidders may have incentives to incur the translation cost themselves for such contracts, resulting in null effects.

A concern with using splines is that even a flexible specification may result in biases that can swamp or exaggerate quantitatively small effects, like those that are expected to be

induced by English documentation. Additional biases may result from possible misspecification relating to other variables, e.g., the assumption that year effects are additive and independent of contract value, even though overall participation levels are a function of contract value.<sup>20</sup> Traditional non-parametric Regression Discontinuity (RD) analysis can reassure us that functional form plays no role in the spline regression estimates. To minimize biases from confounding factors, the RD analysis is based on relatively narrow temporal windows, and also performed separately for construction and goods/services contracts (which have different thresholds).

In particular, we first partition the tenders for each sample to those with and without English documentation, and analyze each group as a separate dataset. We then define an equally spaced grid of log expected tender values indexed by  $\kappa$ . We compute a non-parametric estimate of the mean number of foreign bidders,  $\widehat{NF}_\kappa^E$ , for this grid using the locally weighted average

$$\widehat{NF}_\kappa^E = \frac{1}{\sum_{j \in \mathcal{S}^E} K\left(\frac{\ln(EV_j - \kappa)}{h^E}\right)} \sum_{j \in \mathcal{S}^E} K\left(\frac{\ln(EV_j - \kappa)}{h^E}\right) NF_j$$

where  $K(z)$  is the Epanechnikov kernel given by

$$K(z) = \frac{3}{4\sqrt{5}} \left(1 - \frac{z^2}{5}\right)$$

and the constant  $h^E$  is an asymptotically optimal plug-in bandwidth given by

$$h^E = \frac{0.9 \min \left\{ \sigma_{\ln(EV_j)^E}, \frac{IQR_{\ln(EV_j)^E}}{1.349} \right\}}{\sqrt[5]{n^E}}$$

with  $E = 1$  for the sub-sample with English documentation and zero for the sub-sample without,  $\mathcal{S}^1$  being the set of tenders with English documentation and  $\mathcal{S}^0$  the set without,  $IQR_{\ln(EV_j)^E}$  and  $\sigma_{\ln(EV_j)^E}$  are the interquartile range and standard deviation of  $\ln(EV_j)$ , respectively, and  $n^E$  is the number of observations in the sub-sample (see Silverman 1986). Because the bandwidths vary substantially across the various samples, we fix a common bandwidth of 0.4, which is near the low end of the range of the bandwidths computed by the above formula. This permits for easier comparisons across the different samples, and more

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<sup>20</sup> Some of these shortcomings, e.g., the additivity assumption, could be relaxed by estimating a Poisson model which forms a naturally multiplicative specification. Unfortunately, any Poisson specification that is sufficiently flexible in terms of functional form is computationally intractable.

responsive local means; but our conclusions would not have been affected if we had used the default bandwidths.

This analysis has been repeated for the number of domestic bids, obtaining estimated values,  $\widehat{ND}_k^E$ , for the total number of bids, obtaining estimated values,  $\widehat{N}_k^E$ , and for ratio of foreign to total bids, obtaining estimated values,  $\widehat{FR}_k^E$ . The non-parametric analysis is performed for the old threshold, using data from 2014 and 2015 up to and including July, and for the new threshold, using data from September 2015 up to and including June 2016 when our data series ends. Older data is not used as it might be less comparable with that under the new threshold. Construction contracts are analyzed separately from Goods and Services, which have a different threshold. These analyses are of the traditional Regression Discontinuity type. We have also pooled data across the two sample periods, which allows for estimation of English documentation effects for the range of contract values that are between the new and the old thresholds. This analysis is of the first difference type, and valid only if there are no other changes between the two periods.

The results can be observed in the attached figures, each consisting of six panels plotted with the same vertical scale (within figures) to facilitate comparisons. The top three panels provide estimates for construction contracts, while the bottom three for goods and services. Within each group, the first panel is for the old threshold, the second panel for the new threshold, while the third panels pools data across the two thresholds. Each panel plots the expected outcome when English language documentation is not required (thin black line) and the expected outcome when English language documentation is required (thick blue line). The lines are plotted for the range of values that are close to the relevant thresholds. The associated error bands are plotted in dashes.

Let us now turn to the results. The first figure (Figure 1) shows that English documentation doubles foreign participation for construction contracts at either threshold, though the effect is not statistically significant (barely so for the old threshold). When pooling data across the two thresholds, we observe that participation rates are uniformly higher under English documentation, with the difference being either statistically significant or nearly so for the entire overlap range. With regards to goods and services, there is a large and statistically significant effect at the low threshold. There are so few goods and services contracts above the high threshold in the 10 months that it applies that no foreign firms participate in contracts in that value range. There is no meaningful estimate of the effect of the English language. However, when pooling contracts across the two and a half years that cover both thresholds (bottom right panel), we observe that the effect of providing English documentation is positive over the entire range, and statistically significant for most of it. It is worth recalling that even the pooled sample used in this non-parametric analysis includes only half of the time period in our dataset which covers nearly five years, and the sample is further split into construction and non-construction contracts (and then further split into

old and new threshold periods). This sample splitting results in higher standard errors than those in the spline regression analysis.

Figure 2 shows the effects for domestic participation. Domestic participation is generally more stable with respect to contract value. Because domestic participation is a more frequent event, standard errors are also generally much smaller relative to the mean. There seems to be a positive effect for construction at the low threshold (top left panel), but this effect appears to not extend much beyond the threshold (top right panel). All other effects are basically null (and for goods/services, precisely estimated null effects). This general pattern seems to underpin the not statistically significant estimate in the full sample obtained in the regression splines. Figure 3 shows the effect on the total number of bidders in the tender competitions. Because domestic bidders predominate, this Figure looks similar to Figure 2.

The last figure, Figure 4, shows the effects for the fraction of bidders that are of foreign origin. This figure paints a picture that is similar to that of Figure 1. Providing English documentation increases the proportion of bidders who are of foreign origin for both construction contracts and for goods and service contracts. The importance of English documentation on foreign bidder participation. For goods and service contracts, the increase in foreign bidder ratio is slightly larger in absolute levels compared to construction contracts, but smaller proportionately. In fact, for goods and service contracts, foreign participation rates approach 8% when their value exceeds two million Lari.

To summarize, our estimates to this point suggest that there are measurable and statically significant effects of English documentation on foreign participation. These effects are substantial in percentage terms, often leading to a doubling of foreign participation. However, with foreign participation rates being low, a doubling of those rates leads to only a small increase in total bidder participation in tenders. There are no robust findings with regards to domestic participation. Some estimates are positive, some negative, and generally measured effects not statistically significant. An implication of these findings is the proportion of foreign bidders in contracts subject to the English documentation provision is higher. At the same time, there are no measurable effects on the total number of bidders because the foreign participation effect is small relative to overall competition (and under some specifications it could be more than “undone” by reduced domestic participation). This has implications for the price effects from the provision of English documentation, which are discussed further below.

## 5. Bidder Competitiveness

An important characteristic of tender competition is how competitive the bids are, i.e., how low are the prices bidders are willing to accept given the characteristics of tender. We define bidder competitiveness to be the ratio of the lowest (and final) bid that was entered by a bidder  $i$  on tender  $j$  divided by the estimated value of the contract. We refer to this ratio as the normalized bid,  $NB_{ij}$ , i.e.,  $NB_{ij} = \frac{B_{ij}}{EV_j}$ . No bidder is allowed to enter a bid that exceeds the estimated value, i.e., a normalized bid that exceeds unity, but some bidders submit final bids that are substantially lower than it. Foreign bidders do not seem to bid differentially than domestic bidders in the same auction. Using information from tenders that had both foreign and domestic bidders, we have ascertained that the average foreign bid did not differ in a statistically significant way from the average domestic bid. We have done so by estimating a regression with the normalized bid as the dependent variable, and using as independent variables an exhaustive set of tender dummies and an indicator variable for whether the bidder is foreign or not (sometimes interacted with the English documentation dummy).<sup>21</sup> We also estimate variants of this regression where we include a measure of the bidder's extent of participation in government tenders, measured in number of tenders or their combined value (or both). These regressions correspond to the specification

$$NB_{ij} = a_j + bF_i + bF_iE_j + dPRT_i + \epsilon_{ij}$$

where  $F_i$  takes the value of one if bidder  $i$  is a foreign bidder and zero otherwise, and  $PRT_i$  is a measure of bidder participation in government tenders. The results are reported in Table 5. For auctions with no English documentation, the coefficient is very close to zero: bids by foreign bidders are on average essentially identical to those by domestic bidders (column 1). For auctions where English documentation is provided, foreign bids are on average 1% smaller than domestic bids, but the difference is not statistically significant (column 4). These results are not affected if either or both measures of bidder participation are included in the regression (remaining columns). In other words, foreign bidders do impact the competitiveness of auctions by increasing the number of competing bidders, but do so in the same extent as would be an equal increase in domestic participation. In this sense, foreign bidder participation in contract auctions results in competition that is “more of the same.” Incidentally, bidders that participate in many tenders tend to place higher bids; they possibly adopt a deliberate strategy of entering many contests hoping to win only a few but earn a higher profit on each.

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<sup>21</sup> In this regression, bidders are considered foreign only when we have a known foreign address for them, or their ID is incompatible with a Georgian origin. Other bidders are considered domestic. However, the results are essentially unchanged if we drop from the sample bidders with unknown addresses and Georgian-format IDs.

At this point it may be worth noting what a simpler analysis that pooled all bids across all tenders in a single regression without tender fixed effects or without accounting for the number of bidders would conclude. Such a regression would suggest (likely erroneously) that foreign bidders are less competitive than domestic ones. The positive association between foreign bidder origin and bid level is driven by the fact that foreign bidders tend to be concentrated in tenders where bidding is somewhat less aggressive. In particular, the propensity of a foreign bid declines with the number of bidders when that number is small. A bid is more likely to be submitted by a foreign bidder if there are only a couple of bidders or if there are more than eight. Because the marginal effect of an incremental bidder on competitiveness is rather small from the 9<sup>th</sup> bidder onwards, but very large for the first few bidders, a foreign bid would be negatively correlated with intensity of competition. This highlights the importance of adequately accounting for the systematic patterns in foreign bidder participation in Georgian tenders when investigating their impact on competition outcomes.

The absence of any differential competitiveness between domestic and foreign bidders manifests itself in how bidders respond to the presence of competitors of different national origin in a tender. An increased number of competitors leads to more aggressive bidding, as expected, but the foreign vs domestic composition of these bidders is immaterial.

## **6. Analysis of Prices (Winning Bids)**

Any effect of increased transparency through the provision of documentation in English that leads to increased foreign bidder participation would likely have some effect on the winning bids.<sup>22</sup> However, effects of this kind are expected to be minimal or completely absent for a number of reasons. First, the measured effects on foreign participation, despite being substantial in percentage terms, are small in magnitude. Second, increased foreign bidder participation might lead to reduced domestic bidder participation. Finally, foreign bidders are not different in terms of competitiveness than domestic bidders, and thus what is most pertinent is the total number of bidders rather than their composition. However, the provision of English documentation might have an effect if it leads to more competitive domestic bidding.

We investigate the price effects using the same mix of techniques used in the analysis of participation. Using linear spline regressions, we estimate the relationship between the winning bid, normalized by the estimated value, and a set of relevant tender characteristics,

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<sup>22</sup> Though unlikely, it is theoretically possible that increases in the number of potential bidders, through the provision of English documentation, does not lead to increases in the number of actual bidders or decreases in the expected winning bid (see Li and Zheng 2009).

including the provision of English documentation. In particular, we estimate spline regressions of the form

$$P_j = a + g(\ln(EV_j)|\gamma^K) + h(N_j|\xi^\Xi) + \zeta NF_j + \delta E_j + u_y + v_c + \epsilon_j$$

where  $P_j$  is the winning bid, our measure of “price” for contract  $j$ ,  $h(N_j|\xi^\Xi)$  is a linear spline of the number of bids with  $\Xi$  segments, and other terms are as defined earlier. Because the number of bidders is discrete, the linear spline has knots (break-points) at specific integer values, so that the parameter vector  $\xi^\Xi$  yields the marginal effect of adding a bidder on the transaction price. This marginal effect varies across groups of bidders that are not in the same spline interval. The bidder groups and the associated parameter estimates are reported in the Table of results. Not all terms are present in all price regression specifications we estimate.

Our measure of price is the winning bid in the tender, i.e., the bid submitted by the bidder who was awarded the contract, divided by the estimated value of the contract. In approximately half the tenders, the winning bid was not the transaction price because of contract adjustments, renegotiations, or other reasons. In fact, in a small number of cases, the bid was awarded to an entity that is not identified as a bidder in our database. However, we treat these post-competition adjustments as orthogonal to the bidding competition, and more variable (i.e., it seems to contain additional noise). Because some winning bids are a small fraction of estimated value, to an extent that seemed very surprising to us, we also estimate regressions after trimming the winning bids by dropping the highest and smallest one-percent of values.<sup>23</sup>

The main set of results are reported in Table 6. The first three columns report the results with the full price distribution, while the remaining three columns report the results using the trimmed distributions. Within each group, the columns correspond to the same specifications. The specification in column 1 contains, beyond the English dummy, only contract type fixed effects and year fixed effects. English documentation does not have a statistically significant effect on the winning bid, though the sign is negative as expected. This is the full effect of English documentation. It is the net outcome of effects from changes in the number of bidders, changes in the type of bidders, and changes in bidder costs (the latter should affect only foreign bidders). We try to separate these effects in the next two models.

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<sup>23</sup> Trimming might introduce a small truncation bias, if the observations that are trimmed were in fact correct, but the procedure increases robustness to tail errors. An alternative procedure would be to estimate a median regression, but the results would have been less directly comparable because the distributions are not symmetric (and thus the mean and the median differ).

In the second column we report the estimates of a specification that includes the full set of bidder participation count variables. After controlling for the level of bidder participation, the price decrease due to English documentation is statistically significant and of the order of half to one percentage point. To properly understand this effect, recall from the preceding section that foreign and domestic bids are statistically indistinguishable (though foreign bids are slightly lower). Also recall from the bidder participation results in section 4 that foreign bidder participation is higher with English documentation, but domestic participation slightly lower. The explanation reconciles these facts with the estimates of model 2 is that domestic bidders who no longer participate when there is English documentation are the relatively high cost ones, and that the ones who do participate bid more competitively due to the foreign competition. This explanation also helps illuminate the finding that foreign bids are not much lower than domestic ones, *within a given auction*: when foreign participation is expected, the high cost domestic bidders tend not to participate. Therefore, in auctions with English documentation domestic bidders tend to submit somewhat lower bids (due to selection and competition). As a result, conditional on the number of bidders who do participate, these auctions yield lower winning bids. Prices decline with the number of bidders smoothly and at a declining rate, as expected from standard bidding theory.

In the third column, we add as an additional variable to number of foreign bidders. Holding total bidder participation constant, foreign bidder participation is associated with higher winning bids. This variable is not to be interpreted causally: we have already established that foreign bidders are, if anything, slightly more competitive than domestic ones. Rather, this variable indicates that foreign bidders compete for tenders where domestic bidders are expected to be high cost providers. In other words, foreign bidders do not seem to enter tenders at random, but appear to participate in tenders where prices are expected to be higher. A related explanation is that foreign participation is sometimes the only participation, and thus English documentation may lead to a tender being awarded to the sole foreign bidder at a presumably high price, rather than not being awarded to anyone and being dropped from the database.

Comparing the explanatory power of models 1 through 3, we see that it increases dramatically when bidder participation is included. Quite clearly, competition is the most important driver of systematic variation in prices. This finding continues to hold if instead of the winning bid we used the average bid in an auction (thus removing “mechanical” order statistic effects from a higher number of bidders). Trimming the winning bid distribution (columns 4 through 6) does not materially affect the regression results.

What is less apparent from the figures in Table 6 is that the value of the winning bid, does not vary strongly with the estimated value of the contract. Though the spline coefficients are jointly statistically significant, they are about equally divided in terms of sign. Unlike bidder participation in a tender, price, is more-or-less “flat” with respect to tender value. Therefore,

the effect of contract categories, years, and English documentation, are likely to be independent of tender value, and thus can more reasonably be approximated by an additive function. As a result, we have a high degree of confidence in these regression estimates.

We have also performed non-parametric, Regression Discontinuity style, analysis using kernel smoothing, similar to the one described in the bidder participation section. These results are shown in Figure 5. This analysis is somewhat most comparable with the simplest spline specifications, which exclude the bidder participation variables. The results, presented in a series of six panels that follow the same sequence as in the participation figures, show the relative stability of normalized winning bid and for tenders of different sizes, and the small effects of English documentation, which are generally not statistically significant and sometimes positive. These findings corroborate the small and not statistically significant estimates of model (1) in Table 6.

To summarize, we find small negative price effect from English documentation, but only when accounting for bidder participation. This effect reduces prices by half of a percent to one percent. One should note, however, that small price effects may reflect a substantial impact on contractor profitability. Profits are typically 10% to 20% of prices, and thus what may appear as a miniscule one percent reduction in price could lower profits by 5% to 10%. Nonetheless, the finding that English documentation has a relatively minor impact remains: the addition of one more bidder has a larger impact, at least up to the point that there are at least 10 bidders competing in the tender.

It is noteworthy, however, to highlight one area in which foreign bidder participation leads to larger gains for Georgian procurement. In approximately 70 tenders, foreign bidders do not face any domestic competition. These tenders are few in number, but include a dozen of somewhat large ones (over one million Lari). It is reasonable to assume that the absence of any domestic competition whatsoever suggests that domestic suppliers are not able to fulfil the tender at below the estimated value. Without any foreign bidder participation, these contracts have a substantial probability of not being awarded or being awarded to some domestic supplier at a very high cost to the procuring authority. Increased foreign participation in tenders appears to reduce the frequency of such events.

## **7. Concluding Remarks.**

To summarize, our findings provide strong evidence that transparency rules, as exemplified here by the provision of tender documentation in the English language have strong effects on foreign bidder participation and small, but measurable, effects on prices. Conservative estimates of the effect on foreign bidder participation imply a doubling due to the provision of English documentation, with the upper end of the estimates being more than twice as

large. These dramatic effects translate to only a small effect on prices largely because foreign bidders appear to not be particularly lower cost suppliers compared to those of domestic origin, and because they are relatively few in number to begin with. Thus, even large proportional increases in their number do not greatly impact competition.

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**Table 1. Summary Statistics**

	Average	Std. Dev.	Median	Min	Max	Obs.
<u>Panel I: Tender Statistics</u>						
Estimated Value	86.54	511.59	12.96	0.04	48,000.00	104,735
Winning Bid	75.78	470.78	10.80	0.02	48,000.00	104,523
Winning Bid / Estimated Value	0.87	0.16	0.93	0.01	1.00	104,523
Lowest Submitted Bid	75.20	466.75	10.75	0.02	48,000.00	104,735
Number of Bidders	1.961	1.550	1	1	35	104,735
Number of Foreign Bidders	0.004	0.066	0	0	4	104,735
<i>(including allocated)</i>	<i>0.004</i>	<i>0.068</i>	<i>0</i>	<i>0</i>	<i>4</i>	<i>104,735</i>
Fraction of Bidders Foreign	0.002	0.038	0	0	1	104,735
Foreign Firm Winner	0.15%					104,514
English Documentation	1.63%					104,735
Construction Contract	24.50%					104,735
<u>Panel II: Bid Statistics</u>						
Foreign Bidder	0.18%					202,869
<i>(including allocated)</i>	<i>0.18%</i>					<i>205,404</i>
Bid	104.02	534.54	14.49	0.02	48,000.00	205,404
Bid/Estimated Value	0.84	0.16	0.88	0.01	1.00	205,404
Bid/Estimated Value if Domestic	0.84	0.17	0.88	0.01	1.00	205,030
<i>(excluding with no address)</i>	<i>0.84</i>	<i>0.16</i>	<i>0.88</i>	<i>0.01</i>	<i>1.00</i>	<i>202,495</i>
Bid/Estimated Value if Foreign	0.87	0.15	0.92	0.23	1.00	374
<u>Panel III: Bidder Statistics</u>						
Tender Participation	12.12	42.41	3.00	1.00	2,156.00	16,941
Tender Participation if Domestic	12.23	42.61	3.00	1.00	2,156.00	16,770
<i>(excluding with no address)</i>	<i>13.16</i>	<i>44.36</i>	<i>3.00</i>	<i>1.00</i>	<i>2,156.00</i>	<i>15,386</i>
Tender Participation if Foreign	2.19	3.58	1.00	1.00	36.00	171

Notes: The mean of binary indicators is listed as a percentage; other statistics are redundant for these variables. Financial variables are in thousands of Lari. See text for further details.

**Table 2. Number of Submitted Bids by Bidder Nationality**

	Prorating missing locations based on ID distribution				Allocating missing location bids to domestic				Bids per tender
	Domestic	Foreign	All Bidders	% Foreign	Domestic	Foreign	All Bidders	% Foreign	
<b>By type of contract</b>									
-- Construction	64,885	215	65,100	0.33%	64,945	155	65,100	0.24%	2.54
-- Goods/Services	140,074	230	140,304	0.16%	140,085	219	140,304	0.16%	1.77
<b>Total</b>	<b>204,959</b>	<b>445</b>	<b>205,404</b>	<b>0.22%</b>	<b>205,030</b>	<b>374</b>	<b>205,404</b>	<b>0.18%</b>	<b>1.96</b>
<b>By Estimated Value</b>									
-- less 500K Lari	195,363	278	195,641	0.14%	195,422	219	195,641	0.11%	1.93
-- 500K to 1,000K Lari	5,381	57	5,438	1.05%	5,387	51	5,438	0.94%	2.87
-- 1,000K to 2,000K Lari	2,628	50	2,678	1.87%	2,633	45	2,678	1.68%	3.10
-- 2,000K to 4,000K Lari	999	33	1,032	3.15%	1,000	32	1,032	3.10%	2.83
-- higher than 4,000K Lari	588	27	615	4.45%	588	27	615	4.39%	3.11
<b>Total</b>	<b>204,959</b>	<b>445</b>	<b>205,404</b>	<b>0.22%</b>	<b>205,030</b>	<b>374</b>	<b>205,404</b>	<b>0.18%</b>	<b>1.96</b>
<b>By Documentation language</b>									
-- English is not required	200,321	317	200,638	0.16%	200,386	252	200,638	0.13%	1.95
-- English is required	4,638	128	4,766	2.68%	4,644	122	4,766	2.56%	2.79
<b>Total</b>	<b>204,959</b>	<b>445</b>	<b>205,404</b>	<b>0.22%</b>	<b>205,030</b>	<b>374</b>	<b>205,404</b>	<b>0.18%</b>	<b>1.96</b>

Notes: Prorating bidders results in decimal counts; for this reason, reported figures in the first two columns are rounded to the nearest integer. See text for details.

**Table 3. Price Statistics by Tender Value, Bidder Origin, and Documentation Requirement.**

	Average	Std. Dev.	Min	Max	Obs.
<b>Winning Bid / Estimate</b>					
-- less 500K Lari	0.868	0.163	0.006	1.000	101,237
-- 500K to 1,000K Lari	0.883	0.127	0.149	1.000	1,879
-- 1,000K to 2,000K Lari	0.878	0.122	0.428	1.000	851
-- 2,000K to 4,000K Lari	0.895	0.108	0.377	1.000	363
-- higher than 4,000K Lari	0.907	0.101	0.521	1.000	193
-- English is not required	0.868	0.162	0.006	1.000	102,835
-- English is required	0.888	0.127	0.149	1.000	1,688
<b>Bid / Estimate</b>					
-- less 500K Lari	0.836	0.167	0.006	1.000	195,641
-- 500K to 1,000K Lari	0.862	0.122	0.077	1.000	5,438
-- 1,000K to 2,000K Lari	0.855	0.116	0.085	1.000	2,678
-- 2,000K to 4,000K Lari	0.885	0.098	0.377	1.000	1,032
-- higher than 4,000K Lari	0.888	0.100	0.521	1.000	615
-- domestic bidders	0.838	0.165	0.006	1.000	205,030
-- foreign bidders	0.871	0.148	0.228	1.000	374

Notes: The domestic bidder average for the bid/estimate ratio includes bidders with domestic-style IDs but no address. See text for details.

**Table 4. Participation Effects of English Documentation Provision.**

	Foreign Bidders		Domestic Bidders		Total Number of Bidders		Foreign Bidder Fraction	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
log(estimated value), 24-knots	included	included	included	included	included	included	included	included
joint test of slopes (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
test of slope equality (p-value)	0.0000	0.0000	0.0004	0.0014	0.0007	0.0015	0.0000	0.0000
English documentation	0.0322	0.1367	-0.1395	-4.0183	-0.1073	-3.8816	0.0197	0.1247
(standard error)	<i>0.0097</i>	<i>0.3086</i>	<i>0.0904</i>	<i>2.8399</i>	<i>0.0907</i>	<i>2.8781</i>	<i>0.0057</i>	<i>0.1558</i>
English doc. * log(estim. value)		-0.0076		0.2834		0.2758		-0.0077
(standard error)		<i>0.0225</i>		<i>0.2087</i>		<i>0.2116</i>		<i>0.0113</i>
English doc. joint test (p-value)		0.0041		0.0706		0.1397		0.0025
Year fixed effects (p-value)	0.5607	0.5681	0.0000	0.0000	0.0000	0.0000	0.0212	0.0186
CPV fixed effects (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.0273	0.0273	0.1152	0.1153	0.1159	0.1160	0.0197	0.0197
observations	104,735	104,735	104,735	104,735	104,735	104,735	104,735	104,735

Notes. Number of foreign and domestic bidders includes allocation of bidders with known bidder codes but unknown addresses based on the joint distribution of bidders by ID type. Robust standard errors reported in italics below parameter estimates; robust p-values are reported for joint coefficient significance in parentheses. See text for details.

**Table 5. Bidder Competitiveness: Normalized Bid and Bidder Characteristics.**

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Foreign Bidder	-0.0042	-0.0029	0.0021	-0.0004	0.0009	0.0027	0.0018	0.0028
(standard error)	<i>0.0125</i>	<i>0.0125</i>	<i>0.0125</i>	<i>0.0167</i>	<i>0.0167</i>	<i>0.0166</i>	<i>0.0125</i>	<i>0.0166</i>
Foreign Bidder * English				-0.0133	-0.0133	-0.0021		-0.0033
(standard error)				<i>0.0215</i>	<i>0.0215</i>	<i>0.0214</i>		<i>0.0214</i>
Participation (Count)		0.0200			0.0200		0.0069	0.0069
(standard error)		<i>0.0020</i>			<i>0.0020</i>		<i>0.0022</i>	<i>0.0022</i>
Participation (Value)			0.0004			0.0004	0.0003	0.0003
(standard error)			<i>0.0000</i>			<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>
Tender Fixed Effects	included							
R-squared	0.6590	0.6596	0.6603	0.6590	0.6596	0.6603	0.6604	0.6604
observations	150,044	150,044	150,044	150,044	150,044	150,044	150,044	150,044

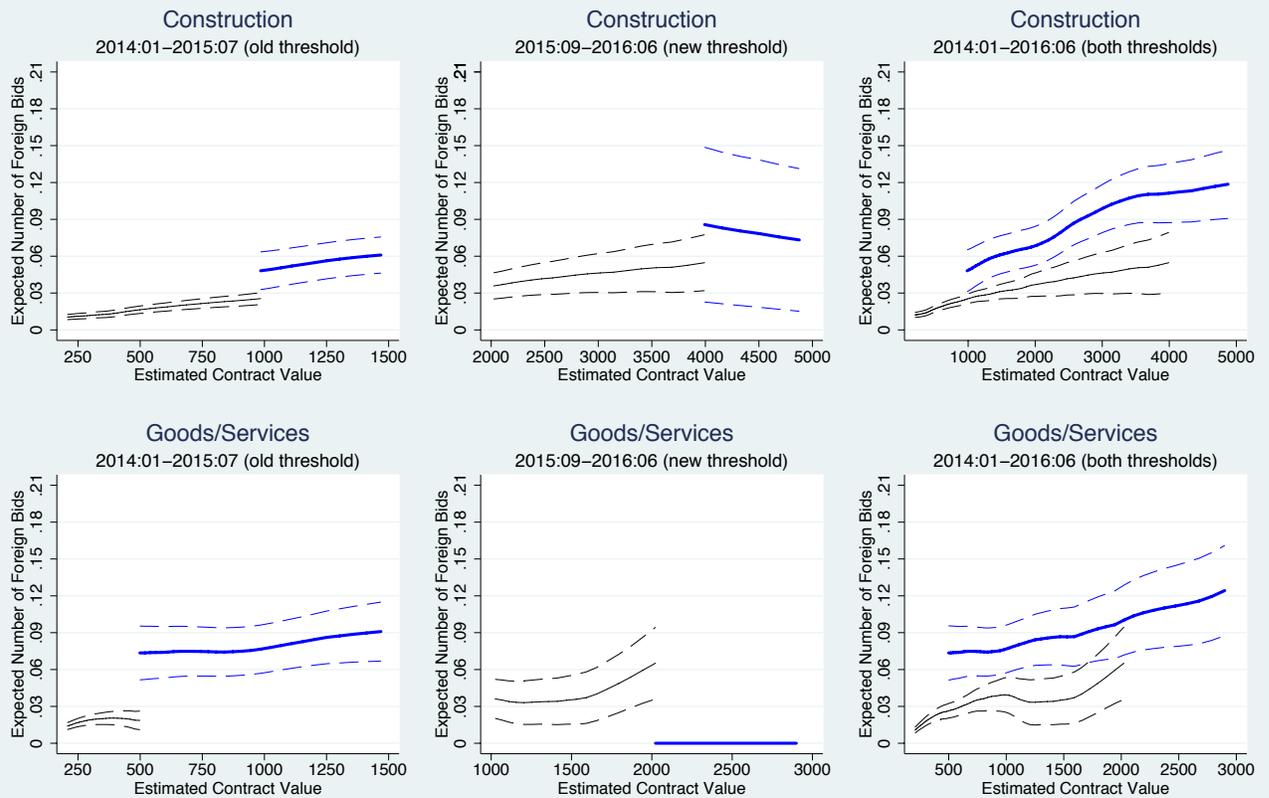
Notes: Participation count is measured in thousands of tenders. Participation value is measured in millions of Lari. Only bids in tenders with more than one bidder are included in these regressions. Bidders with unknown addresses and 9 or 11 digit IDs are classified to domestic rather than missing. Robust standard errors clustered at the tender level reported throughout.

**Table 6. Price Effects of English Documentation Provision.**

	Full Price Distributions			1% Symmetrically Trimmed Distributions		
	Model (1)	Model (2)	Model (3)	Model (1)	Model (2)	Model (3)
log(estimated value), 24-knots	included	included	included	included	included	included
joint test of slopes (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
test of slope equality (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
English documentation	-0.0013	-0.0073	-0.0078	-0.0033	-0.0082	-0.0087
(standard error)	<i>0.0052</i>	<i>0.0043</i>	<i>0.0043</i>	<i>0.0050</i>	<i>0.0041</i>	<i>0.0041</i>
2nd bidder		-0.1473	-0.1473		-0.1404	-0.1404
(standard error)		<i>0.0010</i>	<i>0.0010</i>		<i>0.0009</i>	<i>0.0009</i>
3rd bidder		-0.0827	-0.0827		-0.0775	-0.0775
(standard error)		<i>0.0016</i>	<i>0.0016</i>		<i>0.0015</i>	<i>0.0015</i>
4th and 5th bidder		-0.0458	-0.0459		-0.0408	-0.0408
(standard error)		<i>0.0014</i>	<i>0.0014</i>		<i>0.0013</i>	<i>0.0013</i>
6th and 7th bidder		-0.0220	-0.0220		-0.0202	-0.0202
(standard error)		<i>0.0024</i>	<i>0.0024</i>		<i>0.0021</i>	<i>0.0021</i>
8th to 10th bidder		-0.0175	-0.0178		-0.0153	-0.0155
(standard error)		<i>0.0031</i>	<i>0.0031</i>		<i>0.0026</i>	<i>0.0026</i>
11th to 14th bidder		-0.0079	-0.0086		-0.0111	-0.0116
(standard error)		<i>0.0038</i>	<i>0.0038</i>		<i>0.0033</i>	<i>0.0033</i>
15th and above bidders		-0.0072	-0.0075		-0.0063	-0.0066
(standard error)		<i>0.0042</i>	<i>0.0042</i>		<i>0.0032</i>	<i>0.0033</i>
Number of Foreign Bidders			0.0205			0.0198
(standard error)			<i>0.0059</i>			<i>0.0055</i>
Year fixed effects (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CPV fixed effects (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.0611	0.5028	0.5029	0.0543	0.5037	0.5037
observations	104,523	104,523	104,735	103,478	103,478	103,478

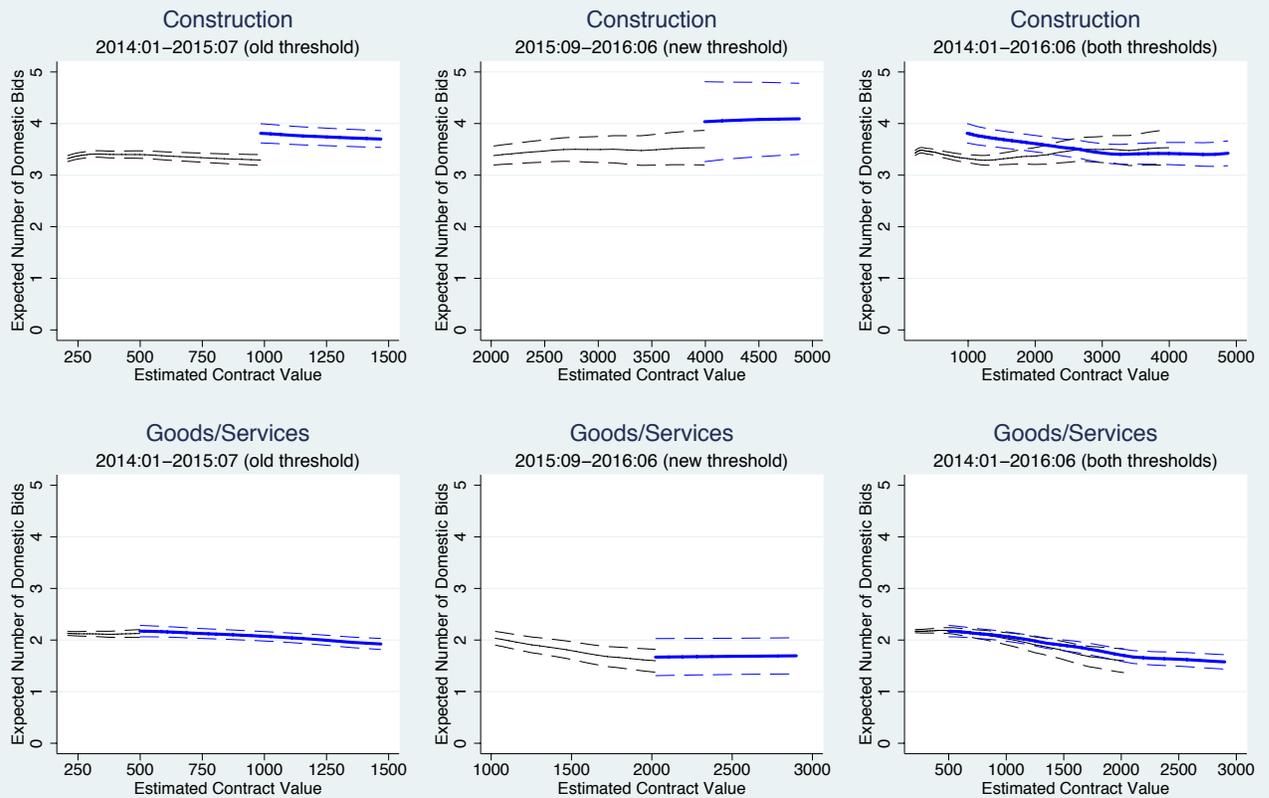
Notes: Number of foreign and domestic bidders includes allocation of bidders with known bidder codes but unknown addresses based on the joint distribution of bidders by ID type. Robust standard errors reported in italics below parameter estimates; robust p-values are reported for joint coefficient significance in parentheses. See text for details.

Figure 1. Expected Count of Foreign Bidders by English Documentation



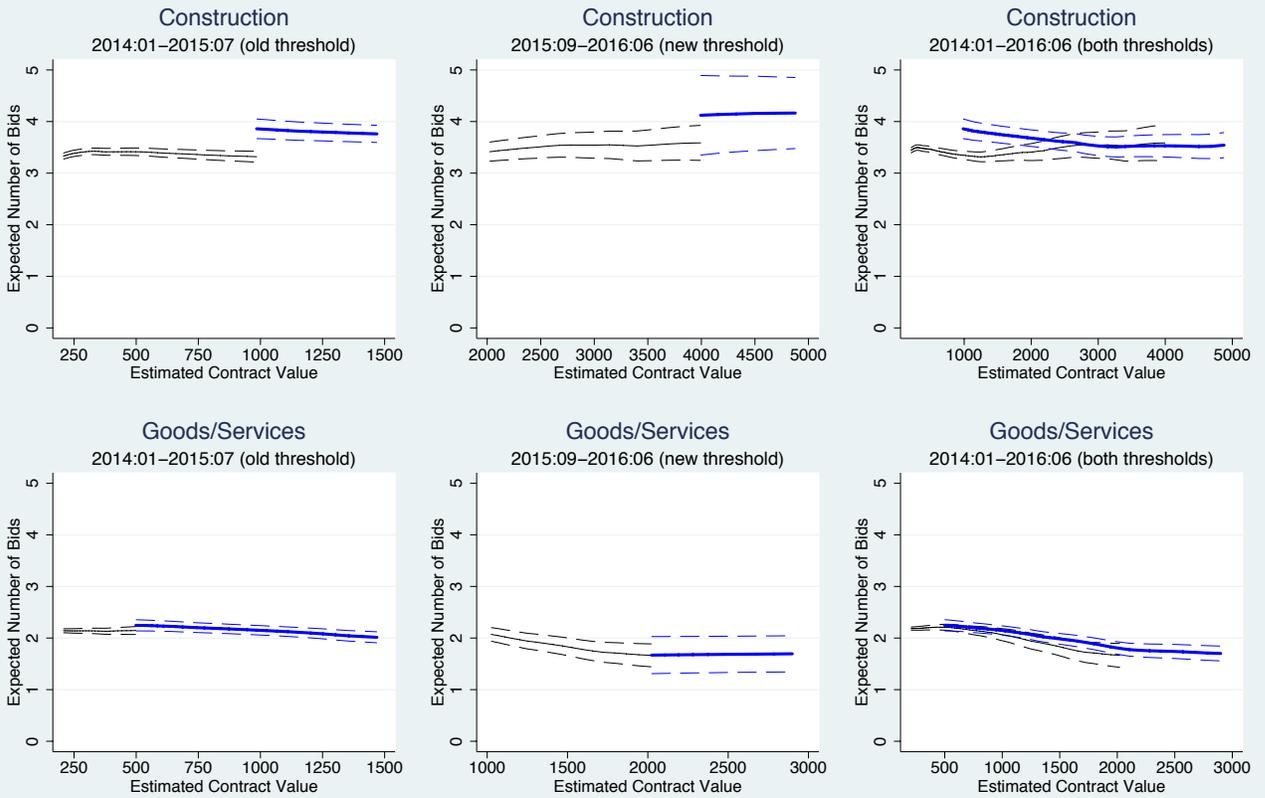
Heavy (blue) line: English required, Thin (black) line: English not required; (bandwidth = 0.4)

Figure 2. Expected Count of Domestic Bidders by English Documentation



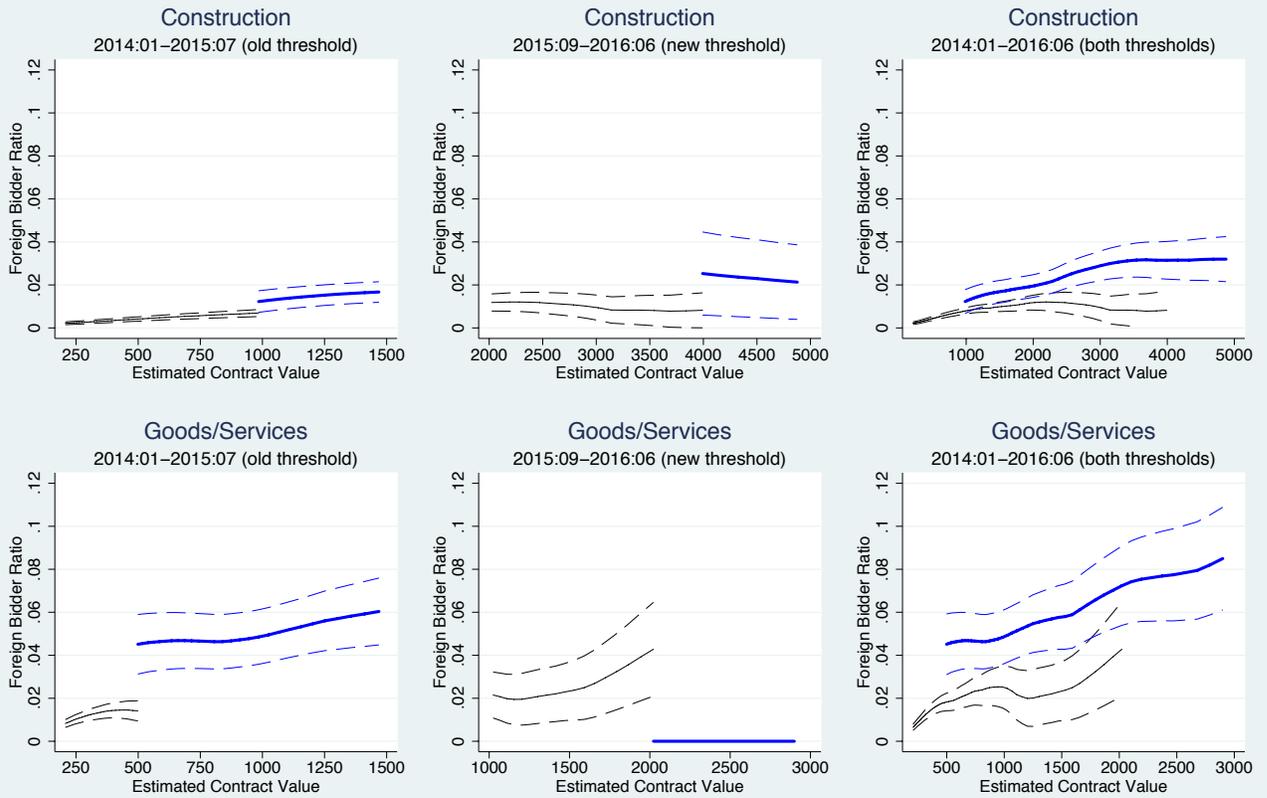
Heavy (blue) line: English required, Thin (black) line: English not required; (bandwidth = 0.4)

Figure 3. Expected Count of Bidders by English Documentation



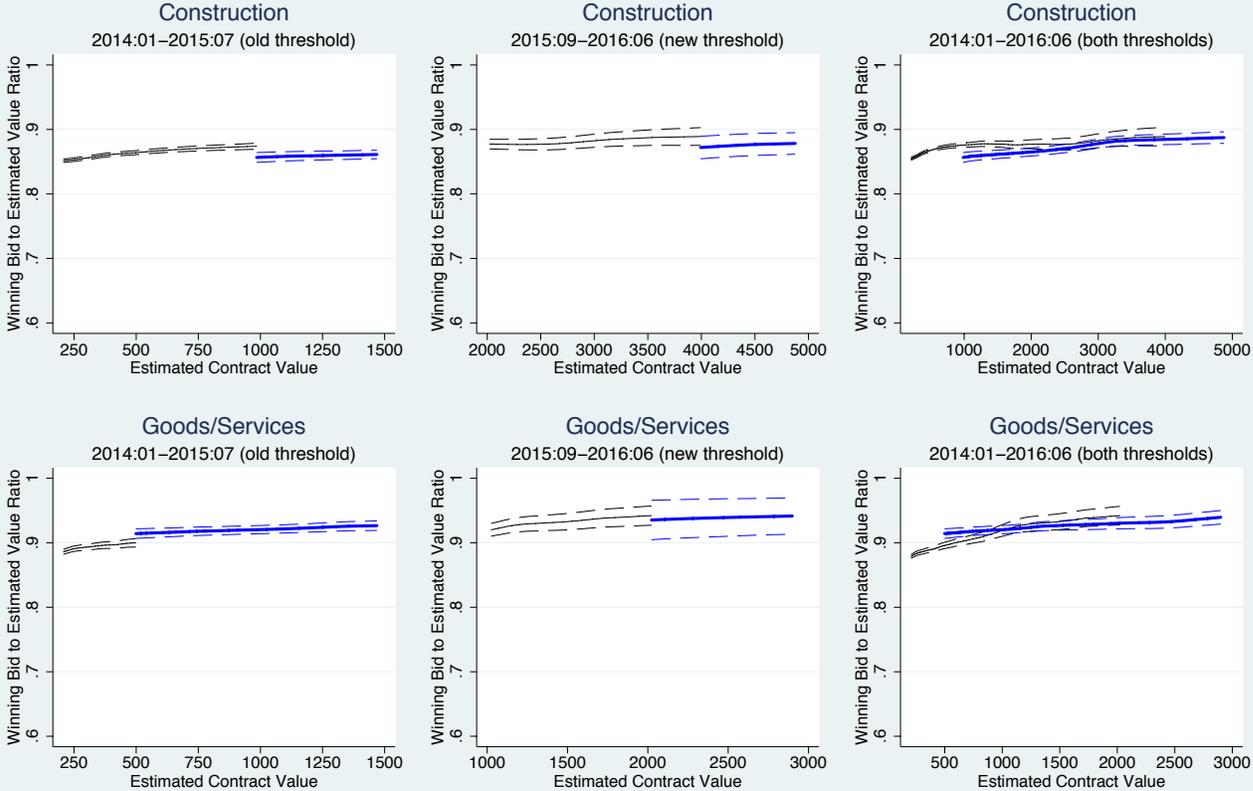
Heavy (blue) line: English required, Thin (black) line: English not required; (bandwidth = 0.4)

Figure 4. Foreign Bidders as Fraction of Total by English Documentation



Heavy (blue) line: English required, Thin (black) line: English not required; (bandwidth = 0.4)

Figure 5. Winning Bid as Fraction of Estimated Value by English Documentation



Heavy (blue) line: English required, Thin (black) line: English not required; (bandwidth = 0.4)