

# DISCRETION AND SUPPLIER SELECTION IN PUBLIC PROCUREMENT<sup>\*</sup>

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**Abstract.** Public procurement outcomes depend on the ability of the procuring agency to select well-performing suppliers. Should public administrations be granted more or less discretion in their decision making? Using Italian data on municipal public works tendered in the period 2009-2013, we study how a reform extending the scope of bureaucrat discretion affects supplier selection. We find that the share of contracts awarded to politically connected firms increases while the (ex-ante) labor productivity of the winning firm decreases, thus suggesting a potential misallocation of the public funds. These effects are concentrated among lower quality procuring agencies.

**JEL codes:** D72, D73, H57, P16.

**Keywords:** discretion, supplier selection, public procurement, transparency, corruption

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# 1. Introduction

The criteria by which procuring agencies select their suppliers are a primary element in the design of procurement systems. One important dimension along which these criteria differ is the extent of discretion granted to the procuring agencies, that might range from almost none (as in open competitive auctions) to essentially complete (as in privately-contracted purchases). Open competitive auctions are seen as a powerful tool to avoid corruption, increase transparency and obtain fair prices (OECD, 2016). However, they are more complex and costly to organize than less formal procedures. Moreover, discretion may allow competent procuring agencies to exploit their local expertise in order to guarantee quality dimensions that are difficult to cover by explicit contractual terms. On the empirical side, lack of consensus on the effects of discretion is due to two main reasons. First, information on procurement outcomes may be incomplete along several dimensions (e.g. the quality of the purchased good is usually unobserved), which frustrates any attempt to provide an overall assessment of the effects of discretion. Second, the effectiveness of more discretionary power granted to the procuring agency may crucially depend on its ability and integrity and, more generally, on the quality of the surrounding institutional context.

This paper provides novel empirical evidence on the real effects of bureaucrat discretion. First, unlike other contributions in the literature which study procurement outcomes, we focus on supplier selection. On the one hand, this different perspective provides insights on the effects of public demand on the economic activity in procurement-related industries. Indeed, as a sizeable amount of resources is dedicated to public procurement, public administrations are important buyers in many sectors.<sup>1</sup> If they happen to favor a flow of resources from healthier to less-performing firms, this may lead to a misallocation of public resources and hinder the cleansing of the market. On the other hand, the *ex-ante* characteristics of the winning firms can provide indirect evidence on the quality of the procurement purchases, under a plausible assumption that a less productive firm would produce a worse outcome (in terms of quantity and/or quality) for a given price/quantity of inputs. Second, we study the heterogeneous effects of discretion on supplier selection along several dimensions of the quality of the procuring agency. This is motivated by the idea that discretion is less effective when granted to public administrations that are less qualified, more

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<sup>1</sup> According to the OECD, about 12% of the GDP is spent in OECD countries on public procurement.

opaque and more exposed to the risk of corruption.

To address these (and other related) questions we build a rich and novel dataset combining information on (i) public works contracts tendered by Italian municipalities, (ii) winning firms' identities and their balance-sheet information and ownership structure and (iii) identities of local politicians. The identification strategy exploits the fact that the procurement system is characterized by different degrees of discretion granted to administrations depending on tender size, as measured by the base price, and that a policy reform in 2011 relaxed the obligation to use an open competitive auction above a certain threshold. More specifically, before 2011 the use of discretionary (*negotiated*) procedures was severely restricted for public works with a base price above €500,000; the reform raised this threshold from €500,000 to €1mln, thus increasing the scope of discretion of procuring agencies.<sup>2</sup> No other substantial changes concerning bureaucrats' discretion were introduced by the reform.

Using a difference-in-differences (DID) empirical strategy we estimate that broader discretion leads to a large increase in the share of procurement contracts awarded to politically connected firms, i.e. those having a local politicians among its administrators or shareholders and to a decrease of winning firms' ex-ante productivity. The results are robust to alternative measures of political connections and productivity and to accounting for strategic manipulation of the tenders' base price by the procuring agencies. These findings suggest that more discretion results, on average, in a potential misallocation of public funds and in a lower ability of the procuring agency to select the most productive firms.

In order to better understand the mechanisms by which discretion induces changes in the awarding of tender contracts, we further study the different stages of the procurement process. We find that discretion leads to a significant drop in the number of participants, while the composition of the bidding firms' pool in terms of the observables does not change. These results show that discretion induces procuring agencies to more often choose politically connected and low-productivity firms from a smaller, but otherwise similar, pool of participants, highlighting a specific distortion in the screening of candidate firms.

The heterogeneity analysis shows that the negative effects of discretion are concentrated in municipalities characterized by a lower institutional quality, which we proxy by a composite indicator based on measures of corruption risk at the local level, the level of

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<sup>2</sup> Moreover, we note that the Italian law does not completely forbid the use of negotiated procedures over the base price threshold: they are indeed allowed under specific conditions (see Section 2 for details). Similarly, the use of such procedures is not completely unrestricted under the threshold. In practice, our data show that the use of negotiations in procurement procedures below the threshold is substantially more frequent than above it.

education of politicians and public officials and the (pre-reform) degree of transparency of the procuring agency (i.e. existence of information on the execution stage). These results suggest that the lack of competence may prevent local procuring agencies from exploiting potential benefits of discretion. Moreover, discretion effects appear to be adverse primarily in more opaque and corrupt environments, in which special interests are more likely to capture public officials intending to pursue private benefits in conflict with public interests.

Finally, we document the absence of information regarding the actual implementation of the project (e.g., cost overruns) for a large number of tenders. Most importantly, we show that higher discretion results in lower transparency. This result is in sharp contrast with the guidelines of the international institutions on public procurement recommending that more discretion to procuring agency should be accompanied by stronger accountability.

This paper contributes to a well-established literature on the trade-off between rules and discretion in public procurement. On the one hand, competitive procedures are often standard in conducting procurement, because of their potential to drive efficiencies, fight corruption and ensure competition (OECD, 2016). Indeed, evidence from countries with high levels of perceived corruption documents a negative relationship between bureaucrat discretion and procurement outcomes. Di Tella and Schargrodsky (2003) show that limiting bureaucrat discretion in Argentinian procurement improves price rebates. Palguta and Pertold (2017) show that an increase in discretion in the Czech Republic leads to manipulation of base prices and to more tenders awarded to “anonymous” firms. On the other hand, procedures which delegate higher decision making power to local public agencies may be desirable when projects’ management are particularly complex (Bajari et al., 2008); when important quality dimensions are not sufficiently guaranteed by contractual terms (Manelli and Vincent, 1995); to encourage public officials to acquire relevant information (Aghion and Tirole, 1997); to sustain reputational mechanisms and long-term relationships (Spagnolo, 2012; Coviello et al., 2018). Our contribution with respect to these studies is twofold. First, we provide firm-level evidence on the selection of suppliers rather than tender-level outcomes. Namely, we focus on firms’ productivity and a precise measure of political connection.<sup>3</sup> The former variable provides insights on the efficiency of the selection process (and indirect evidence on the

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<sup>3</sup> In this respect, our study connects to the literature studying procurement performance of firms with politically involved ownership and administration (in the same spirit as Goldman et al., 2013 and Schoenherr, 2017), and of firms that support politicians by monetary means (see, e.g., Baltrunaite, 2017; Mironov and Zhuravskaya, 2016). More broadly, this paper positions itself within a vast literature on political connections and their impact on other outcomes, such as firm value (e.g., Fisman, 2011), access to credit (e.g., Khwaja and Mian, 2005) and general public sector demand (e.g., Cingano and Pinotti, 2013).

quality of the outcome). The latter variable is arguably better suited to capture improper ties and favoritism than other variables, such as localism or firm anonymity, so far used in the literature on the effects of discretion. Second, we argue that the diverging results in the existing literature may be partially explained by the heterogeneity of public agencies and of the environments in which they operate.

Closest to our paper, Coviello et al. (2018) show that discretion is associated with larger chances of repeated wins by the same firm, but appears to have limited effects on *ex-post* execution of public works in Italian municipalities. Our results provide a less optimistic perspective on the effects of discretion on the functioning of procurement procedures and on its aggregate consequences. Indeed, we find that discretion leads to an advantage of politically connected and less efficient firms, this being especially true for local procuring agencies with less qualified governance and in more opaque and corrupt environments.<sup>4</sup> Thus, we also highlight a possible interaction between public sector inefficiencies due to bureaucratic frictions and those due to intentional diversion of resources (i.e., between *passive* and *active waste* as defined in Bandiera et al., 2009).

Last, but not least, our results show that strategic behaviors by public administrations have to be seriously taken into account when dealing with public procurement data. As in Palguta and Pertold (2017), we find evidence of significant manipulation of tender base prices, suggesting that procuring agencies set them strategically to avoid more formal procedures. Moreover, we find that information on execution outcomes are oftentimes not reported, and this lack of transparency worsens when discretion grows. This information manipulation constitutes another example of strategic response by public administrations to changes in the institutional set-up.

The rest of the paper is organized as follows. Section 2 presents the Italian institutional setting. Sections 3 and 4 describe the data and the empirical strategy, respectively. Sections 5 shows the main findings, as well as a sensitivity analysis and a wide set of additional results. Section 6 concludes the paper.

## 2. The Italian Regulatory Framework

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<sup>4</sup> We also note that our results confirm those by Coviello et al. (2018) when the same variables are examined. Indeed, though we use a different empirical strategy – exploiting time variation of the threshold induced by the reform instead of a (cross-section) regression discontinuity design around the threshold – and a broader set of public works sectors, we find broadly comparable results in terms of localism of the winning firms and cost overruns.

The Italian regulatory framework, which enforces the principles of publicity, transparency and equal treatment in the selection of private contractors, identifies three main types of procedures for awarding public works: open procedures, restricted procedures and negotiated procedures.<sup>5</sup>

Open procedures and restricted procedures are ordinary procedures for the assignment of public contracts. Both are characterized by limited discretionary powers for administrations in the selection of contractors. They presume the administration is capable of defining, accurately and from the outset, the subject of the contract and the relevant technical specifications, so that bidders may immediately submit definite, non-renegotiable offers. In *open procedures* the procuring agency publishes a contract notice containing, among other things, an accurate description of the subject of the contract. This notice precedes the presentation of the offers by all interested parties and their requisites are verified during the bids' assessment. *Restricted procedures*, instead, start with a pre-qualification phase in which requisites are verified to identify the suppliers which are invited to a subsequent bidding phase.

*Negotiated procedures*, on the contrary, are characterized by significant discretionary powers for the administration as the procuring agency consults potential suppliers and negotiates the contract conditions with one or more of them. As negotiated procedures depart from the general principle of no bid renegotiation, they are considered exceptional and are admissible only when specific conditions apply (chiefly those related to urgency or lack of appropriate offers or applicants), or for tenders below the established base price threshold (Decarolis and Giorgiantonio, 2015).<sup>6</sup>

This paper exploits a reform that took place in July 2011 with the primary aim of accelerating the awarding of public works. The reform raised the base price threshold below which procuring agencies can use negotiated procedures from €500,000 to €1mln.<sup>7</sup> The

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<sup>5</sup> The regulatory framework disciplines another award procedure, the competitive dialogue. In our analysis we do not consider this procedure because it is very uncommon.

<sup>6</sup> Under any of these procedures the “lowest price” criterion or “most economically advantageous tender” criterion can be used to award the tender contract. According to the former, the firm offering the lowest price is awarded the contract, provided that this price is not judged to be anomalous by the public administration. According to the latter, not only price, but a range of other parameters specified in the contract notice are assessed (e.g. the quality of the work or the time for completion). For more details see Decarolis and Giorgiantonio (2014).

<sup>7</sup> See Article 4 of Law Decree no. 70/2011, converted into Law no. 106/2011, which modified Article 122(7) of the Legislative Decree no. 163/2006 (the main source of public procurement regulation in the period analyzed in this paper).

reform also establishes that for public contracts between €100,000 and €500,000 the administration had to consult at least five economic operators (as in the period preceding the reform), while for contracts between €500,000 and €1mln the administration had to consult at least ten economic operators. Therefore, the reform arguably led to more discretion being granted to procuring agencies in the selection of suppliers.

In order to regulate potential conflict of interest, the Italian Law stipulates the cases in which contemporaneously holding positions in private firms and public sector offices leads to incompatibility with tendering. If the procuring agency is a municipality, the winning supplier must declare that it is not involved in any situation that is likely to entail conflicts of interest with the municipality and the public interests pursued by the municipality. In particular, the role of owner, administrator or legal representative of a firm awarded the tender contracts is not compatible with the office of mayor or municipal council member of the same municipality.<sup>8</sup>

### **3. Data and Variables**

The analysis relies on several sources of information. First, we use a rich dataset, built and managed by Telemat, containing data on all public works contracts tendered by Italian municipalities in the period 2009-2013.<sup>9</sup> It contains information on main tender characteristics: the name of procuring municipality/agency, the tender date, the type and the description of public works to be procured and the base price.<sup>10</sup> Moreover, the dataset contains information on tender outcomes, i.e., the name of the firm to which the contract is awarded (henceforth “the winner”), its address and the winning rebate. In addition, we retrieve information on non-winning participants from non-digitized documentation provided by Telemat. We complement these data with information on public works’ execution stage, provided by the Italian Anti-corruption Authority (ANAC).

Second, we obtain information on firm characteristics from two databases provided by, respectively, the Cerved Group and the Italian Chambers of Commerce. The former is the Company Accounts Data System (CADS) and contains identity details (name, sector of

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<sup>8</sup> See Article 63(2) of the Legislative Decree no. 267/2000.

<sup>9</sup> The period of the analysis is restricted to these dates in order to avoid possibly confounding effects due to other legislative changes prior to 2009 and after 2013.

<sup>10</sup> The official classification of public works distinguishes among 13 OG categories for general works (e.g., civic and industrial buildings; roads, railways and bridges; dams, etc.) and 35 OS categories for specialized works (e.g., ground works; demolition; waste disposal plants; etc.).

activity and location of headquarters) as well as information from balance sheets and income statements of Italian limited-liability companies. Around 940,000 firms are recorded, on average, in each year of the period under analysis. The second database (Infocamere) lists the identity of firms' administrators and shareholders (up to the fourth tier of ownership). Around 2,450,000 distinct individuals are identified as administrators and 6,230,000 as shareholders for the entire 2009-2013 period.

Finally, information on local politicians comes from the Registry of Local Administrators managed by the Italian Ministry of the Interior. It covers between 115,000 and 135,000 individuals per year, holding any municipal office, both elected (mayors and *consiglieri*, i.e. members of the municipal council) and appointed (*assessori*, i.e. members of the executive committee).

Our dataset is built by combining information from these sources. First, we merge information on the identity of firms' administrators and shareholders with that on the identity of local politicians. This allows us to construct a year-specific measure of each firm's political connections, defined as follows: for each firm  $i$  and each year  $t$ , we say that  $i$  is politically connected at  $t$  if at least one of the administrators or shareholders of  $i$  is recorded as a local politician in year  $t$  or in any year prior to  $t$ .

In our main analysis, we consider tenders with base price between €200,000 and €800,000 and whose winner can be identified on the basis of the winner's name or through the identification code. The former restriction is implemented in order to obtain a symmetric interval around the €500,000 threshold affected by the reform. The resulting sample contains 9,079 tender procedures. We then associate each procedure with the information on winning firms, including their political connections and other firm-level variables.

Table 1 shows the main descriptive statistics for all variables included in the empirical analysis. Overall, there is a marked increase in the share of negotiated procedures above the €500,000 threshold. About 8% of winners are politically connected in the year the contract is awarded to them; the fraction of connected winner increases after the reform, primarily among tenders above the threshold. In contrast, firms' labor productivity (and total factor productivity) decrease above the threshold (against an increase below the threshold).

[Table 1 here]



## 4. Empirical Strategy

We analyze whether and how the reform extending the scope of bureaucrat discretion affects the characteristics of the winning firm. In our empirical analysis we run tender-level regressions using information on public works procured by Italian municipalities in the period 2009-2013. As explained in Section 3, for each tender we observe, among other variables, the characteristics of the contract and of the winning firm (our dependent variables), the base price (to distinguish between tenders affected and unaffected by the reform) and the date of the tender (to distinguish between the periods before and after the reform). We use a DID estimation to compare the change in the outcome variable for tenders above and below the threshold of €500,000, before and after the reform of 2011. Formally, we estimate the following linear model:

$$Y_{imt} = \alpha + \beta_A ABOVE_i + \beta_P POST_t + \gamma ABOVE_i \times POST_t + \delta' X_{imt} + \varepsilon_{imt}$$

where  $Y_{imt}$  is the outcome variable for procedure  $i$  in municipality  $m$  at time  $t$ ;  $ABOVE_i$  is an indicator for procedures with a base price above €500,000;  $POST_t$  is an indicator for procedures executed after the introduction of the reform<sup>11</sup>;  $ABOVE_i \times POST_t$  is the interaction between the two indicators. The coefficient of interest is  $\gamma$ . We augment the specification with a broad set of controls ( $X_{imt}$ ) that include indicators for the type of works, the object of the contract, a flexible control function in the base price (fourth-degree polynomial), predetermined winning firm characteristics and the main socio-demographic characteristics of the municipality. We also include sector-specific and province-specific non-parametric time trends to capture, respectively, sector-specific shocks and the local economic cycle.

In our setting, a regression discontinuity design would seem feasible (as in, e.g., Spagnolo, 2012; Coviello and Mariniello, 2014; Coviello et al., 2018). However, the existence of a treatment being a discontinuous function of an assignment variable is not sufficient to justify the validity of a RDD. In our setting, RDD can be invalid if public officials strategically manipulate the base price of the procedure in order to gain (unobserved) benefits.

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<sup>11</sup> We exclude tenders in the three-month window around the date of the reform. This is done to avoid any potential misclassification of tender procedures as subject to the new rules (e.g., due to incomplete enforcement of the law in the weeks immediately following its approval). We also point out that our results are robust to perturbations of this temporal window.

To examine the potential presence of strategic behavior of the municipality in setting the base prices, Figure 1 plots the empirical distribution of the base price of public works tendered before and after the reform, with contracts grouped into 300 bins for each period. There is an evident spike below the €500,000 threshold in both periods, though it is substantially larger in the pre-reform period.<sup>12</sup> This reveals that municipalities strategically respond to the discontinuous change in procedural costs across the threshold by manipulating the base price so that it falls below it. In the pre-reform period this presumably is due to bureaucrats' reluctance to use less discretionary open procedures, while in the post-reform period such behavior may be driven by lower administrative costs of (and, possibly, marginally higher discretion in) administering negotiated procedures with five suppliers rather than ten (see Section 2). Moreover, above the threshold the publicity requirements are also higher (Coviello and Mariniello, 2014).

This empirical feature of the data poses serious threats to the application of RDD methods in our setting. Therefore, we base our analysis on DID estimations. They allow us to exploit the full range of data instead of using the observations around the cut-off and, therefore, may be less sensitive to the manipulation of treated and control units. Moreover, observations *above* the cut-off are very sparse. In fact, in Section 5.2 we show that our DID results are robust to tackling issues related to strategic manipulation of the base price around the threshold. Last, but not the least, unlike local methods which deliver local treatment effects, the DID estimates uncover average treatment effects (ATE), which may be easier to interpret from the policy making perspective.

[Figure 1 here]

## 5. Results

We discuss our results in several steps, as follows. First, in Section 5.1. we examine the impact of the reform on the use of negotiated procedures and the characteristics of the winning firm, namely its political connections and (ex-ante) labor productivity. Section 5.2 presents a sensitivity analysis. Section 5.3 aims to disentangle whether our results are driven by a variation in the selection of tender participants or by the screening process among the

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<sup>12</sup> This pattern is most prevalent among negotiated procedures, while competitive auctions are more smoothly distributed (results available upon request).

pool of participants. We then examine the heterogeneous effects of discretion across municipalities characterized by different quality of the institutional setting in Section 5.4. Finally, we examine whether increased discretion affects variables directly related to the functioning of procurement process (Section 5.5).

## **5.1 Discretionary procedures and supplier selection**

Table 2 shows the results of DID regressions, based on a linear probability model, with an indicator for contracts awarded using the negotiated procedure as dependent variable. The estimates show that the reform led to a 16 percentage points increase in the use of negotiated procedures. The coefficient is statistically significant and highly stable across specifications, starting with the most parsimonious one in column 1 to the most stringent one in column 5.

[Table 2 here]

We then examine the impact of the reform on supplier selection. First, we study whether and to what extent discretion is associated to tender contracts awarded to politically connected firms. Table 3 shows the results of DID regressions. The dependent variable is our measure of political connection (see Section 3), i.e. an indicator for whether any of the winning firm's current administrators/shareholders ever held a political office. The point estimates are positive, significant and highly stable across different specifications: they suggest that the reform leads to a 3.6 percentage points increase in the presence of politically connected firms among the winners of tender contracts. This is a sizeable effect, amounting to a roughly 45% increase with respect to the sample mean.

[Table 3 here]

Second, we examine the effects of the reform on the (ex-ante) productivity of winning firms (Table 4). The dependent variable is the firm's value added over its wage bill, measured in the year prior to the tender. Negative, statistically significant and stable point estimates imply that increasing bureaucrat discretion leads to awarding tender contracts to firms with lower labor productivity. The magnitude of such decrease accounts for around 9% of the

dependent variable's sample mean.<sup>13</sup>

[Table 4 here]

Overall, this evidence is consistent with patterns of inefficient favoritism: broader discretion in the hands of the public administrations does not only increase the share of tender contracts awarded to politically connected firms, but also induces allocative inefficiencies, as public resources flow to less productive firms.

## 5.2 Sensitivity analysis

Table 5 shows that our results are not sensitive to using alternative definitions for the main outcomes of interest.<sup>14</sup> In particular, in column 1 we use an alternative definition of political connections that allows for longer-lasting business-politics relationships: we include in the connected firms' group also these firms that had politicians on the board or among shareholders in the past. To corroborate the evidence on lower productivity, in column 2 we use a measure of total factor productivity, in lieu of labor productivity. The results are unchanged when compared to Tables 3 and 4, respectively.

[Table 5 here]

Next, we examine discretion effects on pure *localism* whereby public administrations may favor local firms, for example, in order to promote local employment. To capture localism, in column 3 we use an indicator for the winning firm being located in the same province of the tendering municipality (as in Coviello et al., 2018). The results reveal a positive and significant effect of discretion, which is line with the previous literature. Importantly, the size of the effect is substantially smaller compared to the sample mean, suggesting that localism may only capture one of a broader set of characteristics shared by

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<sup>13</sup> Alternatively, one can directly estimate the effect of the use of negotiated procedure in two-stage estimations, in which the reform is used as an instrument. The results on both political connections and productivity are confirmed. Moreover, the point estimates are significant and larger in magnitude due to the entire effect of the reform being attributed to the use of the negotiated procedures. The results are available upon request.

<sup>14</sup> In the subsequent analysis we only show estimates from the most stringent regression specification, analogous to the one in column 5 of Tables 2-4 (unless differently specified).

politically connected firms. Moreover, we check whether discretion effects on political connections can be explained by the choice of the local *and* politically connected firm. To do so, we include *Local firm* indicator as a (bad) control in regressions of political connections in column 4. The effect of the reform on the presence of the winning firm with politically connected administrators or managers is virtually unchanged with respect to the main results in Table 3 and suggests that these results cannot be accounted for by the covariance between localism and political connections.

We further distinguish between politically aligned connections (i.e., those sharing the same political leaning as the local government) and those who are not, respectively, in columns 5 and 6. As expected, the increase of the share winning firms with political connections is largely driven by political connections characterized by ideological proximity. Finally, in columns 7 and 8 we show that the results on political connections and productivity are confirmed also in stringent regressions specifications with municipality fixed effects.<sup>15</sup>

As discussed in Section 4, there is evidence that public administrations strategically alter the base price of the tender contract in order to fall below the €500,000 threshold.<sup>16</sup> We verify that our results are unaffected by base price manipulation. Similarly to the *donut RDD* approach (Barreca et al., 2011), we exclude observations close to the threshold that are potentially subject to manipulation and replicate regressions for our main dependent variables (Table 6). For easier comparison, column 1 is analogous to column 5 of Tables 3 and 4, respectively, for the variables measuring political connection and labor productivity. Columns 2-5 replicate the same regression specification in samples which exclude observations within the symmetric interval around the threshold ranging from  $\pm\text{€}10,000$  to  $\pm\text{€}25,000$ . The coefficient estimates are fairly unchanged with respect to the baseline. This suggests that the manipulation is not specifically related to qualitative characteristics of the winning suppliers and is more likely to reflect administrative reasons such as the preference of procuring agencies to use less complex and costly procedures (e.g., because of the lower minimum number of operators they are required to invite in procedures below the cut-off).

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<sup>15</sup> We note that only municipalities with multiple observations spanning both pre-reform and post-reform period contribute to the identification of the coefficient. Due to the resulting sample selection and the considerable loss of variability in the data (i.e. there are few observations for each municipality), we prefer not to use this specification as the preferred one and keep it in the sensitivity analysis.

<sup>16</sup> We also point out that manipulation away from the threshold (e.g., because local administrations split large public works in multiple smaller projects so that each single tender falls below the threshold) is unlikely in our setting. First, splitting large public works in multiple (smaller) projects is forbidden by the law. Second, the average base price does not respond to the reform (see Table 1), as one would expect in presence of manipulation. Indeed, Figure 1 shows no shifts in base price density away from the threshold.

[Table 6 here]

Next, we make sure that our results are not driven by the sample restrictions implemented to obtain a homogeneous sample (as explained in Section 3). Table 7, columns 1 to 3 replicate the analysis for the main dependent variables using the €500,000 cut-off in the extended sample of public works (i.e., with the base price ranging from €40,000 to €1mln).<sup>17</sup> The results are qualitatively unchanged. Moreover, we exploit the variation induced by the reform at the €1mln threshold which made the use of the negotiated procedures easier *below* this cut-off, while nothing changed above it. We restrict the sample to tender contracts with the base price higher than €500,000 in order to isolate changes at the latter cut-off and run regression analysis analogous to the ones in Section 5.1. The coefficient of interest is the one on the interaction term  $BELOW_i \times POST_t$ , where  $BELOW_i$  is an indicator for procedures with a base price below €1mln and  $POST_t$  is an indicator for procedures executed after the introduction of the reform. Analogous to the results in Section 5.1, column 4 shows that higher discretion lead to a more frequent use of the negotiated procedure below the €1mln cut-off. Furthermore, columns 5 and 6 confirm that the reform resulted in more tender contracts awarded to politically connected and low productivity firms also at this alternative cut-off.

[Table 7 here]

The credibility of our difference-in-differences identification strategy crucially relies on the assumption that, in absence of the treatment, the outcome variable for the treated and the control units would have followed parallel paths over time. Table 8 shows that this assumption seems to be fulfilled as there are no changes in the difference between the treated and control units in the two years before the implementation of the reform, while the difference in the main outcome variables (political connections and ex-ante productivity) start to diverge from the year of the reform onwards.

[Table 8 here]

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<sup>17</sup> We exclude tenders below the €40,000 threshold because the data for these small contracts are not gathered.

### 5.3 Selection vs. screening of participants

What is the mechanism behind the observed results? On the one hand, they may be driven by changes in the number and in the composition of tender participants, if bureaucrats use their discretion to invite more politically connected or less productive firms to tender for public works contracts (*selection of participants*). On the other hand, keeping the pool of participants unchanged, a more discretionary regime allows bureaucrats to pick the “desired” winner more easily. In this case, discretion would be used to manipulate competition among tendering firms, to the advantage of politically connected and/or less productive firms (*screening of participants*). We attempt to distinguish between the two mechanisms by analyzing data on all bidding firms.

We exploit documentation on tender awarding to build a novel dataset on the number of tender participants and their identities. Tender award documents are available in PDF format for most completed tenders. The documentation includes information on the winning firm and, possibly, on participating firms as well. We use text analysis tools to search for and extract fiscal codes of tender participants, which then are used to merge firm-level information. The participant-level dataset covers 3,750 tenders. These unique data allow us to study both quantitative and qualitative effects of the reform on firms competing for procurement. Interestingly, the average characteristics of the winning firms are similar those observed in the full sample. Moreover, these data show that winning firms are, on average, more likely to be politically connected and, at the same time, less productive than non-winning participants.

In column 1 of Table 9, we examine the effects of the reform on the total number of bidders. The coefficient is negative and statistically significant and implies that due to the reform the number of participants goes down by 13 (against the sample average of 42). This is in line with the idea that open auctions with no restrictions on participation lead to more competitive tendering than negotiated procedures.<sup>18</sup>

[Table 9 here]

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<sup>18</sup> While this effect is a mechanical short-run consequence of the change in the administrative setting, in the longer run firms may adapt their bidding strategies to changes in market conditions potentially induced by the reform. Yet, our period of observation does not allow us to study such further adjustments.

In the remaining columns of Table 9 we run firm-level regressions to examine the effects of the reform on the qualitative characteristics of participating and winning firms. The dependent variable in columns 2-4 is the indicator for politically connected winners, while in columns 5-7 the dependent variable is productivity of winning firms. We first examine the overall effect of the reform on the presence of politically connected firms among all tender participants (column 2). The point estimate is positive, yet the effect's size is only a third of that found for winners in Table 3. We then investigate the effect separately for winning and non-winning participants. Column 3 replicates the same regression for tender participants which are awarded tender contracts. The point estimate confirms the effects documented in Section 5.1 and shows that we observe a significant and large positive effect on politically connected winners also in the sub-sample of tenders for which we have information on participating firms: the estimates in column 2 associate the reform with a doubling of the share of connected winners. Column 4 replicates such regression only for tender participants which are not awarded tender contracts. The effect of the reform on the presence of connected firms among non-winning firms is virtually null. A similar pattern is present for productivity measures: our estimates show a 10% decrease in productivity of winning firms, compared to the sub-sample mean, while the productivity of non-winning participants remains unaffected. Therefore, discretion is associated to selection of more politically connected and less efficient firms from a smaller, but otherwise similar, pool of bidders, highlighting a specific distortion in the screening process.

#### **5.4 Heterogeneity analysis**

The main findings of the paper document that discretion leads, on average, to more public works contracts being awarded to politically connected and less productive firms. However, these results might be heterogeneous across different procuring agencies. Indeed, as discussed earlier, the presence of discretion makes expertise, competence and integrity of the local procuring agencies more salient for procurement performance. To study the presence of heterogeneous effects of the reform, we repeat our main empirical exercise splitting the data into subsamples according to characteristics of the local administrations.

In particular, we build a synthetic indicator that combines information from different municipality-level data sources. First, we use an indicator of corruption risk developed by



Mocetti and Orlando (2017) based on the number of reported crimes against the public administration in the period 2004-2011, on citizens' trust in local public institutions and perceptions of administrations' integrity. Second, we exploit the idea that individual characteristics of local politicians and local public officials may matter for the functioning of public administration and use their education level as a proxy of human capital and competence (e.g., on Italian local politicians see Galasso and Nannicini, 2011). Finally, we use a measure of transparency of public administration, defined as the percentage of tenders for which information on the execution stage is available in the period before the reform. We then rely on a principal component analysis to extract information from these variables. The first principal component explains about 37 percent of the total variance of the underlying variables. Moreover, the composite score is associated with expected signs with each of the input variables (Table 10).

[Table 10 here]

We classify as 'high competence' ('low competence') those procedures that are tendered in municipalities whose value of the composite indicator is above (below) the median. We then split the sample into the two groups and replicate the analysis for productivity and political connections in each subsamples in Table 11. Interestingly, we find that discretion is associated with tender contracts being awarded to politically connected and less productive firms mostly in municipalities with low competence. In other words, discretion is more strongly associated with political favoritism and less efficient choice of the winning firm in municipalities with higher risk of corruption in public sector and with lower competence of local politicians and local public bodies.

[Table 11 here]

Finally, Table 12 shows that the same pattern is confirmed when we split the sample according to each indicator separately.<sup>19</sup>

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<sup>19</sup> In unreported evidence we also distinguish between tenders administered by municipalities of different size. The underlying idea is that only larger cities typically possess specialized administrative units devoted to public procurement purchases, which are arguably better equipped with appropriate qualifications and expertise to efficiently manage such procedures. To capture this idea we consider large (small) cities those with more

[Table 12 here]

## 5.5 Procurement costs and reporting transparency

Although we document adverse discretion effects on supplier selection, it may be the case that public administrations – and the public opinion – are mostly concerned with final procurement outcomes, such as the prices paid for public works and their quality. Unfortunately, several data limitations make it difficult to fully address this issue. First, information on the quality of the procured works is not available. Second, information on the procurement costs is not clearly interpretable. In particular, our data contains information on *price rebates*, measured as the relative difference between the base price and the award price, and *cost overruns*, measured as the relative difference between the award price and the final total cost of the public work at completion. However, the interpretation of the discretion effects on price rebates may have an ambiguous interpretation: large price reductions might be good for the public administration – whenever this corresponds to more favorable price conditions – or bad – whenever this induces subsequent price renegotiations (Bajari and Tadelis, 2001; Guasch et al., 2008; Decarolis and Palumbo, 2015). Most important, measuring cost overruns does little to mitigate the situation, as numerous administrations do not report data on the execution stages (this information is available only for 42% of the tenders). Nevertheless, although caution is needed when dealing with these variables, we use these variables as outcomes in our regression analysis. Table 13 shows the results on the impact of discretion on tender prices (Panel A) and extra-costs (Panel B).

[Table 13 here]

The results indicate that the impact on price rebates and on cost overruns is virtually zero. However, we abstain from the interpretation of such results as they may reflect strategic behavior of the winning firm (in the former case) or may might suffer from severe sample selection bias due to the limited availability of the dependent variable (in the latter case). At most, these findings indicate that favorable price effects do not compensate for poorer

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(less) than 50,000 residents. In line with the previous findings, the negative effects of discretion are mostly present in smaller (i.e. presumably less competent) municipalities.

supplier selection resulting from higher bureaucrat discretion.

Next, we directly study the propensity of the procuring agency to comply with the reporting requirements for such data, which results in the above-mentioned sample selection. We define an indicator variable that is equal to 1 if information on the execution stage is available and we label it as *Transparency*. Interestingly, we find that the proportion of contracts for which public administrations report the data on the execution stages decreases significantly in reaction to the 2011 reform (Panel C). This impact is substantial from an economic point of view, as it corresponds to a decrease of nearly 7 percentage points (one sixth of the sample mean). Therefore, expanding bureaucrat discretion seemingly leads to a larger amount of information being withheld by public administrations. Although it is impossible to observe whether information on favorable or negative procurement outcomes is not being reported, this evidence at the very least hints at a decrease in compliance and transparency due to higher discretion.

## 6. Conclusions

What are the effects of discretion on supplier selection in public procurement? Using Italian data on municipal public works in the period 2009-2013, we study how a reform extending the scope of bureaucrat discretion affects the characteristics of winning firms. We find that the share of contracts awarded to politically connected firms increases, while the (ex-ante) labor productivity of the winning firm decreases, thus suggesting a potential misallocation of public resources.

To illustrate the active mechanisms, we construct a dataset on tender participants and show novel evidence on the entry stage of public tenders. We document that the pool of participant firms is smaller when discretion is higher, but remains unchanged in terms of firms' observable characteristics. Interestingly, effects on political connections and productivity are pronounced only among tender winners. This evidence highlights differential effects discretion may have on the separate stages of supplier selection.

Regulators often argue that agency costs of discretion may be alleviated through transparency, accountability and monitoring (e.g., OECD, 2016). The heterogeneity analysis uncovers evidence in support of this policy stance, by showing that the adverse effects are concentrated among municipalities characterized by less competent politicians and bureaucrats and by higher levels of corruption. Last but not least, the analysis of execution

outcomes further highlights the importance of transparency and accountability in the functioning of public administrations.

Taken together, the evidence we present highlights potential risks implied by expanding bureaucrats' discretionary powers in awarding public contracts. First, regulators aiming for efficient allocation of public resources should carefully assess the multifaceted effects of discretion, considering not just the direct effects on public procurement outcomes, but also the implied effects on the related sectors and their productivity. Second, the results on political connections indicate the presence of significant and tangible benefits for politically connected firms, and thus might be useful for refining the regulation on conflict of interests in public procurement. Third, delegation of decision making to local administration should be subject to appropriate checks and balances. These may, for example, include prerequisites in terms of competence and integrity for public administrations or transparency requirements to facilitate accountability to the regulator and the local community.

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## Tables and figures

Table 1: Descriptive statistics

	All procedures		Pre-reform, below €500k		Post-reform, below €500k		Pre-reform, above €500k		Post-reform, above €500k	
	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.
Base price (100k€)	4.07	9,079	3.22	3,375	3.22	2,995	6.38	1,369	6.38	968
Negotiated procedure	0.24	9,079	0.24	3,375	0.33	2,995	0.01	1,369	0.25	968
Connected winner	0.08	7,651	0.08	2,825	0.09	2,500	0.07	1,159	0.11	844
Generalized connection	0.09	7,651	0.09	2,825	0.10	2,500	0.07	1,159	0.12	844
Productivity	1.50	7,352	1.47	2,684	1.55	2,449	1.51	1,097	1.50	816
TFP	0.47	7,034	0.46	2,548	0.48	2,351	0.48	1,054	0.44	784
Local winner	0.47	9,079	0.48	3,375	0.49	2,995	0.39	1,369	0.45	968
No. participants	41.99	3,750	36.62	1,381	34.36	1,298	65.43	510	50.85	395
Price rebate	0.22	7,409	0.21	2,912	0.23	2,410	0.22	1,073	0.24	707
Transparency	0.42	9,079	0.43	3,375	0.42	2,995	0.44	1,369	0.37	968
Cost overruns	0.05	3,739	0.07	1,404	0.05	1,230	0.05	594	0.05	350

*Notes.* For each variable, we report the mean and the number of available observations over all procedures (columns 1 and 2); over procedures with base price smaller than €500,000, occurring before the reform (columns 3 and 4) and after the reform (columns 5 and 6); and over procedures with base price larger than €500,000 occurring before the reform (columns 7 and 8) and after the reform (columns 8 and 9). The unit of observation is procurement procedure. *Base price (100k€)* is the tender's base price. *Negotiated procedure* is a binary indicator for negotiated procedures. *Connected winner* is an indicator for whether the winning firm is politically connected through a current administrator/shareholder. *Generalized connection* is an indicator for whether the winning firm is politically connected through a current or past administrator/shareholder. *Productivity* is a measure of labor productivity, measured as the ratio between the winning firm's value added and labor costs in the year prior to the procedure. *TFP* is a measure of total factor productivity, computed as  $TFP = \log(\text{value added}) - 0.7 \log(\text{labor costs}) - 0.3 \log(\text{capital stock})$ . *Local winner* is an indicator for whether the winning firm's seat lies in the same province as the tendering municipality. *No. participants* is the number of bidders. *Price rebate* is the (absolute value) of the relative price change between the procedure's base price and the award price. *Transparency* is an indicator for whether information concerning the execution stage of the procedure was made available by the tendering municipality. *Cost overruns* is the relative variation between the final price paid by the administration and the award price.

Table 2: Discretion

Dependent variable:	Negotiated procedure				
	(1)	(2)	(3)	(4)	(5)
Post $\times$ Above	0.166*** (0.023)	0.165*** (0.023)	0.157*** (0.024)	0.156*** (0.024)	0.156*** (0.024)
Tender controls	X	X	X	X	X
Year FE	X	X	X	X	X
Province FE	X	X	X	X	X
Firm controls		X	X	X	X
Year FE $\times$ Province FE			X	X	X
Year FE $\times$ Sector FE				X	X
Municipal controls					X
Observations	7,256	7,256	7,236	7,236	7,234
Adj. R-squared	0.29	0.30	0.34	0.34	0.34

*Notes.* The dependent variable is an indicator for negotiated procedures. The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.5$ , \*\*\*  $p < 0.01$ ).



Table 3: Political connections

Dependent variable:	Winning firm with political connection				
	(1)	(2)	(3)	(4)	(5)
Post $\times$ Above	0.036** (0.015)	0.033** (0.015)	0.036** (0.015)	0.038** (0.016)	0.036** (0.015)
Tender controls	X	X	X	X	X
Year FE	X	X	X	X	X
Province FE	X	X	X	X	X
Firm controls		X	X	X	X
Year FE $\times$ Province FE			X	X	X
Year FE $\times$ Sector FE				X	X
Municipal controls					X
Observations	7,164	7,164	7,144	7,144	7,142
Adj. R-squared	0.03	0.03	0.05	0.05	0.05

*Notes.* The dependent variable is an indicator for whether the winning firm is politically connected through a current administrator/shareholder. The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.5$ , \*\*\*  $p < 0.01$ ).

Table 4: Productivity

Dependent variable:	Ratio between value added and labor costs				
	(1)	(2)	(3)	(4)	(5)
Post $\times$ Above	−0.115** (0.054)	−0.114** (0.054)	−0.134** (0.055)	−0.138** (0.054)	−0.140*** (0.054)
Tender controls	X	X	X	X	X
Year FE	X	X	X	X	X
Province FE	X	X	X	X	X
Firm controls		X	X	X	X
Year FE $\times$ Province FE			X	X	X
Year FE $\times$ Sector FE				X	X
Municipal controls					X
Observations	6,885	6,885	6,867	6,866	6,864
Adj. R-squared	0.02	0.02	0.02	0.02	0.02

*Notes.* The dependent variable is the winning firm's labor productivity, measured as the ratio between the winning firm's value added and total labor costs in the year prior to the procedure. The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.5$ , \*\*\*  $p < 0.01$ ).

Table 5: Robustness analyses

Dependent variable:	Alternative measures		Localism		Political leaning		Municipal FEs	
	Generalized connection	TFP	Local firm	Connected winner	Same political area	Different political area	Connected winner	Productivity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Above	0.035** (0.016)	−0.063** (0.028)	0.052* (0.027)	0.037** (0.015)	0.023** (0.011)	0.016 (0.011)	0.045** (0.019)	−0.213*** (0.075)
Local firm				−0.006 (0.008)				
Tender controls	X	X	X	X	X	X	X	X
Firm controls	X	X	X	X	X	X	X	X
Year FE × Province FE	X	X	X	X	X	X	X	X
Year FE × Sector FE	X	X	X	X	X	X	X	X
Municipal controls	X	X	X	X	X	X		
Municipal FE							X	X
Observations	7,142	6,557	7,234	7,142	7,099	7,099	5,804	5,549
Adj. R-squared	0.06	0.04	0.13	0.05	0.04	0.05	0.08	0.01

*Notes.* The dependent variables are: an indicator for whether the winning firm is politically connected through a current or past administrator/shareholder (column 1); a measure of total factor productivity, computed as  $TFP = \log(\text{value added}) - 0.7\log(\text{labor costs}) - 0.3\log(\text{capital stock})$  (column 2); an indicator for whether the winning firm's seat lies in the same province as the tendering municipality (column 3); an indicator for whether the winning firm is politically connected through a current administrator/shareholder (columns 4 and 7) and (at least one) such person and the tendering administration belong to the same political area (column 5; the political areas considered are: left, right, center, Movimento 5 Stelle and *lista civica*) or, contrariwise, whether the firm is politically connected but no connecting individual belongs to the same political area as the tendering administration's (column 6); the winning firm's labor productivity (column 8). The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.5$ , \*\*\*  $p < 0.01$ ).

Table 6: *Donut* difference-in-differences estimations

Panel A					
Dependent variable:	Connected winner				
Size of <i>donut</i>	0	+/- 10k	+/- 15k	+/- 20k	+/- 25k
Post × Above	0.036** (0.015)	0.040** (0.016)	0.041*** (0.016)	0.041** (0.016)	0.038** (0.016)
Observations	7,142	6,840	6,769	6,685	6,612
Adj. R-squared	0.05	0.05	0.05	0.05	0.05
Panel B					
Dependent variable:	Productivity				
Size of <i>donut</i>	0	+/- 10k	+/- 15k	+/- 20k	+/- 25k
Post × Above	−0.140*** (0.054)	−0.136** (0.057)	−0.132** (0.058)	−0.133** (0.057)	−0.134** (0.058)
Tender controls	X	X	X	X	X
Firms controls	X	X	X	X	X
Year FE × Province FE	X	X	X	X	X
Year FE × Sector FE	X	X	X	X	X
Municipal controls	X	X	X	X	X
Observations	6,864	6,573	6,505	6,423	6,354
Adj. R-squared	0.02	0.02	0.02	0.02	0.02

*Notes.* The dependent variables are an indicator for whether the winning firm is politically connected through a current administrator/shareholder (panel A) and labor productivity (measured as the ratio between the winning firm's value added and labor costs in the year prior to the procedure, panel B). Columns 1-5 report the result of an analysis which is analogous to that in column 5 of Table 3 (Panel A) and 4 (Panel B), with the exception that all observations whose base price lies in a neighborhood of the €500,000 threshold, of the size indicated above each columns, are dropped. The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).

Table 7: Alternative samples

Sample: Threshold:	From 40k€ to 1mln€ 500k€			Over 500k€ 1mln€		
Dependent variable:	Negotiated procedure	Connected winner	Productivity	Negotiated procedure	Connected winner	Productivity
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Above	0.122*** (0.021)	0.029** (0.013)	−0.107** (0.047)			
Post × Below				0.215*** (0.020)	0.056*** (0.021)	−0.338** (0.170)
Tender controls	X	X	X	X	X	X
Firm controls	X	X	X	X	X	X
Year FE × Province FE	X	X	X	X	X	X
Year FE × Sector FE	X	X	X	X	X	X
Municipal controls	X	X	X	X	X	X
Observations	10,986	10,823	10,442	4,310	4,269	4,049
Adj. R-squared	0.35	0.03	0.02	0.32	0.08	0.02

*Notes.* The dependent variables are: an indicator for negotiated procedures (columns 1 and 4); an indicator for whether the winning firm is politically connected through a current administrator/shareholder (columns 2 and 5); the winning firm's labor productivity (columns 3 and 6). Columns 1–3 repeat our baseline analysis using the same threshold and an extended sample that contains all procedures whose base price lies between 40,000 and 1mln€. Columns 4–6 use 1mln€ as threshold and all procedures whose base price exceeds 500,000€. The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Below* is an indicator for procedures with base price below €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).

Table 8: Trend analysis

Dependent variable:	Connected winner	Productivity
2010 $\times$ Above	0.009 (0.020)	−0.082 (0.080)
2011 $\times$ Above	0.046** (0.022)	−0.050 (0.084)
2012 $\times$ Above	0.038* (0.022)	−0.235*** (0.080)
2013 $\times$ Above	0.053** (0.025)	−0.216** (0.087)
Tender controls	X	X
Firm controls	X	X
Year FE $\times$ Province FE	X	X
Year FE $\times$ Sector FE	X	X
Municipal controls	X	X
Observations	7,464	7,167
Adj. R-squared	0.05	0.02

*Notes.* The dependent variables are an indicator for whether the winning firm is politically connected through a current administrator/shareholder (column 1) and labor productivity (measured as the ratio between the winning firm's value added and labor costs in the year prior to the procedure, column 2). Column 1 and 2 respectively repeat the analysis of column 5 in Tables 3 and 4, estimating yearly coefficients. The baseline year is 2009. The unit of observation is procurement procedure. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).

Table 9: Entry

Dependent variable:	Number of bidders	Connected firms			Productivity		
		All	Winners	Non-winners	All	Winners	Non-winners
Post × Above	−13.462** (6.691)	0.010* (0.005)	0.078*** (0.024)	0.003 (0.006)	−0.050 (0.039)	−0.179* (0.104)	−0.034 (0.043)
Tender controls	X	X	X	X	X	X	X
Firm controls	X	X	X	X	X	X	X
Year FE × Province FE	X	X	X	X	X	X	X
Year FE × Sector FE	X	X	X	X	X	X	X
Municipal controls	X	X	X	X	X	X	X
Observations	3,073	38,224	3,007	35,121	36,616	2,925	33,589
Adj. R-squared	0.35	0.02	0.03	0.02	0.02	0.01	0.03

*Notes.* The dependent variables are: the number of bidding firms (column 1); an indicator for whether the winning firm is politically connected through a current administrator/shareholder (columns 2-4) and labor productivity (measured as the ratio between the winning firm's value added and labor costs in the year prior to the procedure, columns 4-6). The unit of observation is procurement procedure in column 1 and participant firm elsewhere. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.5$ , \*\*\*  $p < 0.01$ ).

Table 10: Quality of the procuring agency: principal component analysis

	1st component	2nd component	3rd component	4th component
Eigenvalue	1.468	0.957	0.888	0.687
Proportion	0.367	0.239	0.222	0.172
Cumulative	0.367	0.606	0.828	1.000
	Corruption risk	Politicians' human capital	Bureaucrats' human capital	Transparency
Coeff. 1st component	−0.603	0.325	0.522	0.508

*Notes.* Results of the principal component analysis. *Corruption risk* is a composite indicator of corruption risk based on the incidence of corruption and related crimes and on perceived corruption at the local level. *Politicians' human capital* and *Bureaucrats' human capital* are measured by the share of, respectively, local politicians and local public employees holding at least a college degree. *Transparency* is a municipal-level indicator measuring the pre-reform share of contracts tendered by each municipality for which information concerning the execution stage was made available.



Table 11: Heterogeneity: aggregate index

Dependent variable:	Connected winner		Productivity	
Agency quality	Low	High	Low	High
Post $\times$ Above	0.046** (0.022)	0.033 (0.023)	-0.247*** (0.091)	-0.008 (0.073)
Observations	3,262	3,330	3,085	3,232
Adj. R-squared	0.04	0.06	-0.00	0.07
Tender controls	X	X	X	X
Firm controls	X	X	X	X
Year FE $\times$ Province FE	X	X	X	X
Year FE $\times$ Sector FE	X	X	X	X
Municipal controls	X	X	X	X

*Notes.* The dependent variables are an indicator for whether the winning firm is politically connected through a current administrator/shareholder (columns 1 and 2) and labor productivity (measured as the ratio between the winning firm's value added and labor costs in the year prior to the procedure, columns 3 and 4). The unit of observation is procurement procedure. The sample is split according to whether the tendering municipality lies above or below the overall median of the index of agency quality obtained by a principal component analysis of indicators of corruption risk, education of local politicians and public employees, and a transparency index (see Table 10). *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).

Table 12: Heterogeneity: components

Dependent variable:	Connected winner		Productivity	
	Low	High	Low	High
Panel A: Corruption risk				
Post $\times$ Above	0.031 (0.025)	0.042** (0.020)	−0.011 (0.056)	−0.223** (0.095)
Observations	3,368	3,338	3,286	3,150
Adj. R-squared	0.06	0.01	0.06	0.01
Panel B: Politicians' human capital	Low	High	Low	High
Post $\times$ Above	0.055** (0.023)	0.028 (0.023)	−0.175** (0.083)	−0.095 (0.090)
Observations	3,232	3,372	3,086	3,246
Adj. R-squared	0.03	0.08	−0.00	0.04
Panel C: Bureaucrats' human capital	Low	High	Low	High
Post $\times$ Above	0.042* (0.022)	0.031 (0.024)	−0.182** (0.087)	−0.058 (0.089)
Observations	3,273	3,345	3,103	3,229
Adj. R-squared	0.04	0.05	0.00	0.05
Panel D: Transparency	Low	High	Low	High
Post $\times$ Above	0.040* (0.021)	0.034 (0.025)	−0.190* (0.099)	−0.080 (0.070)
Observations	3,344	3,257	3,174	3,154
Adj. R-squared	0.04	0.05	−0.01	0.06
Tender controls	X	X	X	X
Firm controls	X	X	X	X
Year FE $\times$ Province FE	X	X	X	X
Year FE $\times$ Sector FE	X	X	X	X
Municipal controls	X	X	X	X

*Notes.* The dependent variables are an indicator for whether the winning firm is politically connected through a current administrator/shareholder (columns 1 and 2) and labor productivity (measured as the ratio between the winning firm's value added and labor costs in the year prior to the procedure, columns 3 and 4). The unit of observation is procurement procedure. Panels A-C split the sample according to whether the tendering municipality lies above or below the overall median of, respectively, a composite indicator of corruption risk (Panel A); the share of local politicians holding at least a college degree (Panel B); the share of public employees holding at least a college degree (Panel C); the pre-reform share of contracts for which information concerning the execution stage was made available (Panel D). *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.5$ , \*\*\*  $p < 0.01$ ).

Table 13: Procurement costs and reporting transparency

Panel A					
Dependent variable:	Price rebate				
	(1)	(2)	(3)	(4)	(5)
Post × Above	−0.008 (0.007)	−0.007 (0.007)	−0.009 (0.007)	−0.010 (0.007)	−0.008 (0.007)
Observations	5,546	5,546	5,497	5,495	5,492
Adj. R-squared	0.18	0.18	0.21	0.21	0.23
Panel B					
Dependent variable:	Cost overruns				
	(1)	(2)	(3)	(4)	(5)
Post × Above	0.016 (0.023)	0.016 (0.023)	0.009 (0.022)	0.011 (0.022)	0.011 (0.021)
Observations	2,907	2,907	2,816	2,807	2,806
Adj. R-squared	0.15	0.15	0.21	0.21	0.21
Panel C					
Dependent variable:	Transparency				
	(1)	(2)	(3)	(4)	(5)
Post × Above	−0.050* (0.028)	−0.047* (0.028)	−0.063** (0.028)	−0.065** (0.028)	−0.066** (0.028)
Observations	7,256	7,256	7,236	7,236	7,234
Adj. R-squared	0.11	0.12	0.14	0.14	0.14
Tender controls	X	X	X	X	X
Year FE	X	X	X	X	X
Province FE	X	X	X	X	X
Firm controls		X	X	X	X
Year FE × Province FE			X	X	X
Year FE × Sector FE				X	X
Municipal controls					X

*Notes.* The dependent variables are: price rebate, measured as the difference between the base price and the award price (normalized by the base price, Panel A); the cost overrun, measured as the difference between the award price and the final cost of the public work (normalized by the award price, Panel B); and an indicator for tenders for which information concerning the execution stage was made available (Panel C). The unit of observation is procurement procedure. *Post* is an indicator for procedures taking place after the reform. *Above* is an indicator for procedures with base price above €500,000. *Tender controls* include a vector of indicators for the category of public works and a 4th-degree polynomial in base price. *Firm controls* refer to the winning firm and include a sector indicator (Ateco 2-digit classification, also denoted as *Sector FE*) and a set of legal form indicators, distinguishing limited-liability firms, joint stock companies and a residual category. *Municipal controls* include population, altitude, average per capita income and share of inhabitants holding a college degree. Standard errors are clustered at the municipality level (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).

Figure 1: Contract density

