Tenure in Office and Public Procurement*

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Abstract

We study the impact of politicians' tenure in office on the outcomes of public procurement. To this purpose, we match a data set on the politics of Italian municipal governments to a data set on the procurement auctions they administered. In order to identify a causal relation, we apply two different identification strategies. First, we implement a Regression Discontinuity Design by comparing elections where the incumbent mayor barely won another term with elections where the incumbent mayor barely lost and a new mayor took over. Second, we cross-validate these estimates using a unique quasi-experiment determined by the introduction of a two-term limit on the mayoral office in March 1993. This reform granted one potential extra term to mayors appointed right before the reform. The main result is that an increase in the mayor's tenure is associated with "worse" outcomes: fewer bidders per auction, a higher cost of procurement, a higher probability that the winner is local and that the same firm is awarded repeated auctions. Taken together, our estimates are informative of the possibility that time in office progressively leads to collusion between government officials and a few favored local bidders. Other interpretations receive less support in the data.

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1 Introduction

An overriding problem in politics is that politicians who have been in power for too long are more likely to develop a set of corrupt relations. This is a very old concern. Ancient Greeks and Romans used to impose rotation on the most important elective offices to prevent entrenchment of power. Jacksonians in the 19th century also held the view that long-term tenure in office fostered corruption (Knott and Miller, 1987).[1] Many modern democracies adhere to this view and thus inhibit apical elected officials from being in power for too long at both legislative and local level. To the best of our knowledge, there are no studies proving a negative causal effect of tenure on the behavior of elected officials.[2]

In this paper, we document the effect of mayors' tenure in office on the functioning of public procurement in Italy. Specifically, we compare the outcomes of procurement auctions for public works administered by Italian mayors between 2000 and 2005. For each municipality, we relate the mayor's tenure to several outcomes of the procurement process: the number of bidders per auction, the winning rebate, the probability that the winner is local, and the probability that the same firm is awarded repeated auctions.

To identify a causal relations, we apply two different identification strategies. First, we implement a Regression Discontinuity Design (RDD) by comparing elections where the incumbent mayor barely won another term with elections where the incumbent mayor barely lost and a new mayor took over. Mayors elected in close races are likely to be identical in terms of observable and unobservable characteristics, the only difference being their tenure. Our main results show that one additional term in office not only significantly reduces the number of bidders participating in the auctions (-11.48%) but also reduces the winning rebate (-5.7%), which means a higher cost for public works. A back-of-the-envelope calculation suggests that an average public work (540,000 euros) costs, other things being equal, about 3,426 euros more in municipalities with a second term mayor relative to municipalities with a first term mayor. Importantly, we also find that having

[1] Andrew Jackson was among the first to support the implementation of rotation in office to mitigate the corruption of long tenured bureaucrats. Prior to Jackson's stipulation, Thomas Jefferson wrote in the Resolution for Rotation of Members of Continental Congress 1 that the rotation in office is useful "..to prevent every danger which might arise to American freedom from continuing too long in office."

[2] Besley and Prat (2006) found that, in a cross-country comparison, political longevity is positively associated with higher levels of corruption.

the same mayor in power for an additional term increases the probability that the contract is awarded to a local firm (+5%), or to the same firm repeatedly (+25.6%).

Second, we cross-validate the RDD estimates using a unique quasi-experiment determined by the introduction in March 1993 of a two-term limit on the mayoral office. Since the reform was not retroactive (past terms did not count), and elections across Italian cities do not occur at the same time, the date of the first election created two groups of otherwise comparable mayors: mayors appointed before the reform could be reelected for two additional terms, while those appointed after the reform for one term only. Under the assumption that mayors elected just before or after the reform were almost identical, we use the distance of the date of the first election from March 1993 as an instrument for tenure (2SLS). These results are similar to the main RDD estimates, and provide a validity check to the regression discontinuity estimates.

Note that we could exploit the non retroactivity of the term limit to separate the effect of tenure from the effect of non-eligibility, as mayors elected for the first time before the reform would eventually face term limit in the third term or more. This is not the case in most studies, where the term limit applies to everybody with a certain tenure (e.g., the second term). In such cases, it is not clear whether the last term effect is driven by the different tenure or by the impossibility of being reelected (Besley and Case, 1995; Ferraz and Finan, 2011).[3] With this respect, the two empirical strategies we propose rely on the same variability in the application of the term limit to separate the effect of tenure from the effect of non-eligibility, although they exploit two distinct exogenous variations (close electoral races, and closeness to the 1993 reform) within the same identification sample.

It is also important to point out that the focus of our analysis is on the effect of the elapsed time in office (tenure), not of the remaining time in office (horizon). As shown in other papers, the latter is related to the possibility of future interactions, rather than to the frequency of past interactions. For example, Gamboa-Cavazos et al. (2008) use firm-level data from Mexico on extra-official payments made to public authorities and show that corruption is more intense over long and short political horizons and less intense over intermediate ones, because of a combination of "horizon" and "capture" effects. Using

[3]An important exception is Alt et al. (2011), who use the variation in the length of gubernatorial term limits across US states to separately estimate the accountability and the competence effect over taxes, spending, and borrowing cost.

cross-country data, Campante et al. (2009) find a similar U-shaped relationship between corruption and political stability. Our estimates allow us to show whether or not two politicians with different tenure in office, but the same political horizon, behave differently with respect to public procurement.

Our findings are compatible with the notion that tenure in office deteriorates the functioning of the procurement process, as it takes time for mayors and contractors to establish collusive relationships. In this sense, they seem to validate Jackson's view that time in office corrupts. Other alternative interpretations do not find support in the data. For example, one could argue that more experienced mayors are better at mastering the procurement process (Padró i Miquel and Snyder, 2006; Dal Bó and Rossi, 2011), and so they deliberately favor more expensive bidders because these are more likely to deliver works with better non-contractible characteristics. We investigate this possibility and study the delays in the delivery of the public works over a subsample of municipalities for which the data are available. We find that tenure in office actually implies higher delays, which reinforces the idea that time in office has a negative impact on the cost of procurement. A similar argument might also apply to the unobserved quality of the supplied works, which is not easily contractible. We repeated our analysis on an additional sample of goods and services purchased by the Italian municipalities. These, unlike public works, are more standardized in their quality (Bandiera et al., 2009). Still, we find that tenure in office increases procurement costs, which suggests that the effects we identify in the main sample should not not confounded by the hidden quality of public works.

We also explore possible mechanisms through which a mayor could interfere with the procurement process. First, we consider whether the size of the project, and consequently the publicity requirements of the auction, can be manipulated by mayors with longer tenure. We find that mayors' tenure in office does not affect this aspect of the auction design, which is mainly determined by engineer estimates, and therefore exogenous. Second, over a subsample of auctions for which the data are available, find that newly elected mayors are more likely to replace the bureaucrat who is in charge for the auctions (Iyer and Mani, 2012), which suggests a possible channel through which mayors can exert direct control over the procurement process.

The rest of the paper is organized as follows. In Section 2, we describe the Italian

institutional background, and in Section 3 the data. In Section 4, we explain the identification strategy, and in Section 5, we present the main results. In Section 6, we discuss the results and alternative interpretations of the main evidence. We conclude with Section 7.

2 The Institutional Background

The Italian municipal administration (*Comune*) is made of a mayor (*Sindaco*), who supervises an executive committee (*Giunta*), and a council (*Consiglio Comunale*) that endorses the policies proposed by the mayor with majority rule. In addition to contracting for public works, a municipal administration provides public transportation, some welfare programs, and utilities to the community. On March 27, 1993, the mayoral electoral system was changed from party to individual ballot, with a majority premium for the winning candidate of at least two-thirds of the seats in the council (60% in cities with more than 15,000 inhabitants).[4] The same reform also introduced a two-term limit over the mayoral office, which only applied to the terms elected after the reform (i.e., past terms in office did not count).

Municipalities are required to outsource public works and select contractors through public tenders. During our sample period, the applicable procurement law requires auctions to be sealed-bid and single-attribute (i.e., technical and quality components of the offers are not evaluated).[5] Each auction is administered by a manager, who is directly appointed by the mayor among the bureaucrats working in the municipal administration. The manager supervises the whole procurement process, which entails the following duties: preparing the preliminary project, advertising the call for tender, administering the auction, paying the winning firm, and monitoring the realization of the work.

Participation to the auctions can be of three types: the *Pubblico incanto*, where participation is open to any firm satisfying some minimum technical requirements; the *Licitazione*

[4]The reform was a response to the political crisis that originated on February 1992 from a judicial investigation (so called *"Mani Pulite"*) on the corruption of national and local administrators. This investigation led to not only the dissolution of the Christian Democratic Party (*Democrazia Cristiana*), which had ruled the country for over forty years, but also to the end of the so called "*Prima Repubblica*" (First Republic).

[5]During the period covered by our sample, Italian public administrations have to follow *"Legge Merloni"*: *Legge 109/94* and amendments (*"Merloni-bis"* in 1995, *"Merloni-ter"* in 1998, and *"Merloni-quater"* in 2002). Major legislative changes were introduced in 2006, but do not affect our sample.

privata, which is similar to *Pubblico incanto* except that the contracting authority invites all firms satisfying some technical requirements; or the *Trattativa privata*, where the contracting authority only invites a restricted number of firms, with a minimum of 15.[6] The choice of a particular participation mechanism depends on the starting value of the auction and some other technical components. The starting value of the auction represents the maximum price (i.e., the reserve price) a municipality is willing to pay a public work. The reserve price also determines the auction's publicity requirements, with auctions with a value below 500,000 euros not requiring any publicity. An engineer employed by the municipal administration sets the reserve price. The reserve price is the result of a calculation of the total costs required to realize the works computed using a price-list of the standardized costs for each type of work. Contractual conditions (e.g., the reserve price of the public administration and works' deadlines) are described in the call for tender.

Firms bid the price at which they are willing to do the work in the form of a percentage reduction (a rebate) with respect to the auction's starting value. For a given reserve price, a lower rebate represents a higher cost for the public administration. The winning bid (and the winner of the auction) is determined by an algorithm illustrated in Figure 1. After a preliminary trimming of the top/bottom 10% of the collected bids, the bids exceeding the average by more than the average deviation are further excluded, and the winning bid is the highest among the remaining bids, i.e., the one just below this "anomaly threshold".[7]

The Italian auction mechanism is somewhat unconventional, as it has some "beauty contest" features whereby the highest bidder does not necessarily win.[8] The specific features of the mechanism raise the theoretical possibility that increased participation need not result in greater competition (Decarolis, 2010). However, Conley and Decarolis (2012) also show that increased participation may indeed result in more aggressive bidding,

[6]The technical requirements for participation must be certified by an external private agency. Other formats include the *Licitazione privata semplificata*, which is substantially similar to the *Licitazione privata*, and the *Appalto concorso*, which is only used for works with a high architectural content starting from 300,000 euros.

[7]To illustrate, consider this simple example. In a hypothetical auction, after the trimming of the tails there are three participants placing the following bids (in the form of a rebate over the starting value): 10, 14 and 16. The average bid is thus 13.33. The average difference of the bids above this average bid is 1.12. Thus the "anomaly threshold" is 14.44. It turns out that in this case the winning bid is 14, which is above the average, even if 16% is the highest bidden rebate.

[8]Decarolis (2010) shows the similarities between this auction mechanism and the one used in other countries like China, Taiwan, Japan, Switzerland, and several US states.

because of competition among cartels and independent bidders. This theoretical result is consistent with Figure 2 in this paper, which documents a positive and significant relationship between the number of bidders and their rebates (i.e., their bidding strategies). Taken together, theory and the evidence suggest that, despite the fact that the auction mechanism is unconventional, lower participation is pejorative for the auctioneer just as in a conventional auction.[9]

Part of the terms of the procurement contract (the time of the work delivery, and the total cost of the work) might be (*ex-post*) renegotiated in cases of unforeseen natural events (like floods, storms, earthquakes, landslides, etc.). According to the procurement law these renegotiations are directly assessed by the auction manager under mayoral approval.[10] While the awarding of public works requires the city council approval, this is not necessary in the case of an *ex-post* renegotiation.

3 The Data

We use an administrative data set that includes all Italian mayoral terms elected between 1985 and 2010, which was provided by the Italian Ministry of Interiors (*Ministero degli Interni*). The data set contains information on the identity, gender, age, highest educational attainment, political affiliation, and previous job of the elected mayor. It also contains information about the legislature, including the exact duration of service and the reasons of any eventual early termination, and the electoral results. Finally, we also have yearly information at the municipality level about the size of the resident population, the total revenues and expenditure, plus some demographic characteristics as of 2005, such as the disposable income per capita.

We combine this mayoral information with a data set about the procurement auctions

[9]This is in line with the experimental study of Chang et al. (2014), documenting that the empirical bidding functions in the average bid mechanism are statistically indistinguishable from the empirical bidding functions in first-price auctions. This paper also shows that the average bid mechanism performs quite well at reducing the price paid by the auctioneer as in conventional first-price auctions. Our evidence is also in line with the results from Coviello and Mariniello (2014), who use the same Italian data as ours to show that an exogenous increase in publicity (i.e., the potential competition) increases the number of bidders and the winning rebates, reducing the cost of public procurement.

[10]Bajari et al. (2013) show that a) Californian engineers have heterogeneous propensity of making renegotiations of procurement contracts; b) engineers are randomly assigned across different contracts.

administered by each municipality between 2000 and 2005. This is provided by the Italian Authority for the Surveillance of Public Procurement (*Autorità per la Vigilanza sui Contratti Pubblici di Lavori, Servizi e Forniture*, *A.V.C.P.*), which collects data on all procurement auctions for public works with a starting value greater or equal to 150,000 euros. The data set includes auction-level information about the number of bidding firms, the starting value, the identity of the winning bidder, and the type of work. According to the date that the bid was delivered, each procurement auction is matched with the corresponding mayoral term.

The initial sample consists of 4,171 cities (out of the existing 8,104) for which we observe at least one auction between 2000 and 2005, and for which we have information on all the relevant variables (the number of bidders, the starting value, the winning rebate, the identity of the winning bidder, and the time the mayor has been in office). To maximize sample size, we assign the sample mean (or the mode, if a dummy variable) to other variables with missing data (namely, whether the mayor was born in the city/region, the mayor's previous job and highest education level), and include a dummy for missing status for these variables. This procedure increases our sample by about 8.5% and allows us to obtain more precise estimates.

In Table 1, we present summary statistics for the sample of municipalities over which we run the estimation analysis. The final sample is made of 3,869 cities, for a total of 5,481 mayors. Of these, 3,147 are first term mayors, 1,897 second term mayors (138 could still be reelected), 266 third term mayors (48 could still be reelected), 169 fourth term mayors (20 could still be reelected), and 2 fifth term mayors who should not be reelected. Table 2 describes the characteristics of the auctions in the sample, where we excluded few outliers with more than 100 bidders. The data include a total of 28,058 auctions, with an average of 21 bidders per auction and a mean winning rebate of 12.91%. The winner was a firm registered in the same city about 12% of the time (71% in the same region), and on average the highest percentage of auctions within a term awarded to the same firm is 25%. In only 10% of the cases the selection criterion was the private invitation (*Trattativa privata*), while the rest were with open participation (*Pubblico incanto* or *Licitazione privata*). The average size of a public work is relatively small (average starting value of 540,000 euros, in 2000 equivalents). It is also interesting to note that the number of auctions per year

was constant over the period 2000 and 2004 (between 15% and 21% per year), although there are fewer auctions in 2005 when the sample was originally collected.

4 Identification Strategy

We want to test whether a mayor's tenure affects the outcome of the procurement auctions administered in the city. We assume that the outcome of an auction i, managed by a mayor m, can be specified in the following linear form:

$$y_{im} = \alpha + \beta T_{im} + \gamma TL_{im} + \delta_1 X_i + \delta_2 X_m + \nu_{im}, \tag{1}$$

where y_{im} is the outcome of the auction; T_{im} denotes the mayor's tenure in office at the time of the bids' delivery; TL_{im} denotes whether the mayor can be reelected in the term after the date of the bids' delivery; X_i is a vector of auction characteristics; X_m is a vector of mayor and city characteristics; and ν_{im} represents the disturbance term, which includes a mayor's specific fixed effect η_m and the usual white noise component ϵ_{im}. The main coefficient of interest is β. We perform the analysis at auction level, using for T_{im} both the exact time in office at the date of the bids' delivery, and the term in office.[11]

Note that we could separate the effect of time in office (β) from the effect of electoral accountability (γ) because terms elected before 1993 were not included in the computation of the term limit. As explained Figure 3, at 2000-2005 some mayors would face term limit when in the second term (those elected for the first time after the reform), while some others would face term limit when in the third term or more (those elected for the first time before the reform). Specifically, 7.3% (138) of the second term mayors, 18% (48) of third term mayors, and 11.8% (20) of fourth term mayors could still be reelected, while the percentage of those who could not be reelected was 92.7% (1,749), 82% (218), and 88.2% (149), respectively. Furthermore, as the timing of local elections is not completely synchronized either across regions or within them (to a certain degree, any city has its own electoral schedule, depending on past events), this provides some heterogeneity across the entire country.

We specify X_i and X_m using the following sets of characteristics. To control for geographical and municipal effects we include: the resident population in the municipality at

[11] We compute cluster adjusted standard errors to allow for a generic mayor-level error component.

the beginning of the term, to proxy for the number of potential competitors and any other size effect; a full set of dummies for all the 102 Italian provinces, to control for time invariant characteristics at the local level; an indicator for the judicial efficiency at year-region level, to control for differences in the quality of local institutions;[12] the budget deficit over the total revenues, to control for the efficiency of the municipal administration; and a set of indicators for the year of the delivery of the bid, to control for possible time effects. To address the heterogeneity of the projects, we include: a second order polynomial in the starting value of the auction (i.e., the reservation price of the contracting authority) in 100 thousand Euro increments and deflated to the 2000 price level; an indicator of whether the selection mechanism of the auction was by public participation or by private invitation; and five project type dummies (road, school, building, housing, art). To control for the characteristics of the mayors, we include: gender; age; four education dummies; four previous occupation dummies; an indicator for whether the mayor had been appointed before in any other municipal elective office; and whether the mayor was born in the same region. Finally, to control for the electoral characteristics of the mayoral term, we include: two dummies for the mayor's party (center-left and center-right); the tenure in office of the mayor's party, measured in terms; and a dummy for whether the bid was delivered in the last year before the next scheduled election, to capture electoral cycles within terms, and to address the censoring of terms that started before 2000 or were concluded after 2005.

With respect to y_{im}, the data set contains a large number of outcomes that could measure how effectively the procurement process is working. For simplicity, we divide these measures in two sets: the *level of competition* and the *nature of competition*. The *level of competition* set includes the number of bidders and the final percentage rebate over the reservation price. The *nature of competition* set includes an indicator for whether the winning firm is registered in the same region of the contracting authority, and an indicator for whether the maximum percentage of works is adjudicated to the same firm per year (weighted by the number of auctions), the latter being term invariant.[13]

[12]This is computed as the ratio between settled and incoming cases for each regional administrative court (*TAR*), and for public works related disputes.

[13]As we do not observe all the auctions within a term, but only those between 2000 and 2005, we could not compute other measures of tenure in office, like the probability that the winning firm had already been awarded in the past.

The main concern when estimating the effect of time in office on the outcomes of public procurement is that time in office might be endogenous. For example, mayors who are willing to collude might be able to survive longer if the rents produced by collusive behaviors help them to be reelected. Conversely, mayors who collude might find it difficult to get reelected if voters punish their unlawful behavior on the ballot. Next, we illustrate the two strategies we use to address this problem.

4.1 Close Electoral Races

To estimate the causal effect of time in office, we implement a regression discontinuity design (RDD) on the Italian municipal elections. The probability of having a mayor reelected for a second (or more) term in office is a function of the margin of victory in the previous election (MV_{im}), and has a sharp discontinuity equal to one at the zero threshold, $MV_{im} = 0$. Incumbent mayors with a margin of victory above zero are reelected, while those below are not reelected and replaced by a new mayor.

However, the margin of victory itself may be determined by the functioning of the procurement auctions. We follow Lee's (2008) example and focus the analysis on mayors elected in closely contested races.[14] Close-race elections have the characteristics that their outcome is uncertain and the winner is typically determined by elements which are beyond the candidates' control (e.g., weather on election day, breaking news, etc.). In these races the tenure of the elected mayor is "as if" it has been randomly determined and exogenous with respect to mayor and city observable and unobservable characteristics. Then the RDD estimand of the effect of time in office is simply the difference in auction outcomes between mayors with higher tenure and mayors with lower tenure who had won by a small margin.

We parametrically implement the RDD estimating the following equation:

$$y_{im} = \alpha + \beta T_{im} + g(MV_{im}) + \gamma TL_{im} + \delta_1 X_i + \delta_2 X_m + \nu_{im}. \quad (2)$$

[14]See Imbens and Lemieux (2008) for a survey on RDD. See also Lee, Moretti and Butler (2004) and Lee (2008) for empirical studies that have exploited the assignment mechanism generated by the margin of victory in single-member plurality elections. Closer to our spirit, Ferraz and Finan (2011) use the share of districts won by a newly elected mayor in a close election against a term limited mayor, to identify the effect of lack of accountability on corruption in Brazil.

Because of the discrete change induced by the discontinuity design, T_{im} is the number of terms in office, MV_{im} denotes the margin of victory of the incumbent mayor, and $g(MV_{im})$ is a smooth function that we approximate with a third order polynomial. As discussed in Lee (2008), the RDD framework also allows us to test for the validity of the continuity assumption by comparing a set of pre-intervention characteristics for the treated and the control group. If there were nonrandom selection around the threshold, we should expect some of these characteristics to differ systematically. To this purpose, we will also estimate equation considering the pre-intervention characteristics as an outcome. To further inspect the validity of the continuity assumption, we will look at the distribution of the margin of victory around the threshold and implement the McCrary (2008) test.

4.2 The Electoral Reform

To cross-validate the RDD estimates, we further exploit the electoral reform approved on March 1993. As explained in Section 2, mayors elected for the first time before the reform could stay in office for two terms more (the treated group), while mayors elected for the first time after the reform could stay in office for one term more only (the control group). However, we could not directly implement a 2SLS estimate using the time of first election as an instrument for tenure. In fact, the 1993 reform also introduced another change in the institutional setting that might have had a direct effect on the way public procurement auctions were administered, in which case the exclusion restriction does not hold. In particular, the reform changed the mayor's electoral rule from party to individual ballot. This may have induced a different selection among candidates, because the new electoral system encouraged competition between candidates and reduced party interference with voting. Although this could be a major concern, it is worth recognizing two things. First, this selection bias is minimal within the estimation sample, as at 2000-2005 all the mayors had gone through at least one individual ballot election. Second, while the term limit applied sharply after the reform, the introduction of individual ballot elections probably had a delayed effect on candidates' selection, since it was initially difficult for parties to recruit suitable candidates for the new system. If this is true, we can reduce the bias from the changing electoral rule by focusing on mayors elected immediately before and after the 1993 reform (i.e., a fuzzy-RDD).

Following the above discussion, we re-estimate equation (1) within a two-stage least squares framework. As an exclusion restriction in the first-stage, we use an indicator for whether or not the mayor was elected for the first time before March 1993, augmented with a function of the distance of the first election from the discontinuity threshold as follows:

$$y_{im} = \alpha + \beta_1 T_{im} + \beta_2 f(dist_m) + \gamma TL_{im} + \delta_1 X_i + \delta_2 X_m + \nu_{im} \tag{3}$$

and,

$$T_{im} = a + b_1 PR_m + b_2 g(dist_m) + \gamma TL_{im} + c_1 X_i + c_2 X_m + e_{im} \tag{4}$$

where T_{im} is the number of terms in office, PR_m indicates whether or not the date of the first election was before March 27, 1993, $dist_m$ is the time distance of the first election from the reform, and $f(.)$ and $g(.)$ are flexible functions. Since the running variable is not continuous, as elections are held at few points in time, we specify $f(.)$ and $g(.)$ as a series of time dummies. To be sure that no one in the sample could be reelected for a second term before the implementation of the reform, this estimate is calculated for the sample of mayors elected for the first time between five years before and four years after the electoral reform.[15] This procedure delivers a final sample of mayors in the second term (with or without a binding term limit) and in the third term. The fuzzy-RDD framework also allows us to test for the validity of the exogeneity assumption by comparing a set of pre-intervention characteristics for the treated and the control group (Lee, 2008). If there were nonrandom selection around the 1993 reform, we should expect some of these characteristics to differ systematically.

4.3 Discussing the Two Strategies

In this section we discuss some possible caveats related to the two identification strategies we proposed (RDD and 2SLS). Before that, it is important to clarify that each strategy takes advantage of a distinct exogenous source of variation (close electoral races, and the closeness to the reform, respectively) over the same estimation sample, i.e., the sample of mayors with similar (different) tenure and different (similar) eligibility status, as determined by the non retroactivity of the term limit introduced in March 1993. With this

[15] That is, between March 27, 1988 and March 27, 1997, as the duration of a legislature before and after the reform was 4 and 5 years, respectively.

respect, the RDD estimation sample is made of 531 first term mayors, 1,553 second term mayors (22 could still be reelected), 182 third term mayors (2 could still be reelected), and 2 fourth term mayors who should not be reelected. The 2SLS estimation sample is made instead of 108 first term mayors, 1,419 second term mayors (108 could still be reelected), and 252 third term mayors (37 could still be reelected). This variability in the eligibility status is what allows us to separately identify the effect of tenure from the effect of non-eligibility.

With respect to RDD with close race elections, a major concern is that they may not be controlling for all the relevant unobserved heterogeneity. For example, incumbent candidates may still be able to sort just above the winning threshold because of larger campaign resources (Caughey and Sekhon, 2011), or because of more electoral strength.[16] Alternatively, incumbent mayors might be willing to make more electoral frauds exactly when confronted with a tight race, in which case they would be systematically different from first term mayors. We will address this potential problem when inspecting the balance of city and mayor characteristics in Section 5.2.

As in any other RDD exercise on close race elections, it is also important to recognize two things: 1) if voters are indifferent between the incumbent and the challenger, and if tenure has a significant impact on performance, then either the voters are not using all the relevant information when casting the vote (as there are typically many dimensions over which voters compare candidates), or the outcome being measured is not a sufficient statistic for voter welfare in some important way (i.e., there must be some other policy dimensions which compensate for the effect of tenure over procurement).[17] 2) estimates might have low external validity if mayors who won by a small margin behave differently from mayors who won by a large margin because, for example because they have to enter into corrupt practices to compensate for the more expensive electoral campaign.[18] More generally, there might be selection in the type of races entered by candidates with different

[16]Eggers et al. (2013) show that this problem is more severe in the U.S. House elections, where electoral competition is extremely high, but it is almost irrelevant in other countries like the UK, France and Germany.

[17]See Gagliarducci and Paserman (2012) for a more detailed discussion of the possible imbalances in candidates' characteristics within close race elections.

[18]This problem should be relatively less severe in Italy, where most of the campaign expenditure is on the parties and electoral expenses are largely subsidized.

abilities. For example, if high ability candidates are more likely to enter closely-contested races, then the RDD estimate will capture the difference in public procurement between high ability mayors with different tenure. Under the reasonable assumption that effect of ability is the same in magnitude both for the challenger and for the incumbent, the estimated difference at the discontinuity point should not be affected.

We next discuss three major concerns related to the 2SLS strategy. First, there might be a problem of sample selection, as we only observe the mayors who were elected around 1993 and then survived until 2000-2005. However, we find that both treated and control mayors have about 80% probability of being elected for a second term, and that all the second term mayors without a term limit were then reelected for a third term.

Second, at the time of the first election mayors appointed before the 1993 reform had potentially an infinite political horizon, while those elected after the reform could stay in office for at most two more terms. Two implications can derive from this observation: 1) since all the mayors were aware of the term limit, this knowledge had no impact on their *ex-post* incentives; 2) since mayors had different career prospectives at the first election, this may have affected their *ex-ante* decision to run for a mayoral office. Many political careers, however, do not terminate after the mayoral office, as almost 57% of the mayors in our sample who face a term limit are then elected either in the same administration (in another office) or in another administration (another municipality, or in a province/region/national administration). In particular, we do not find any statistical difference between mayors elected before and after the reform on this probability, which corroborates the assumption that they actually had similar political horizons. We will also return on this point when comparing mayor characteristics around the reform in Section 5.3.

Finally, for the 2SLS identification strategy to hold, it also matters that mayors did not anticipate the introduction of the term limit. Since the bill of the reform was first submitted to the national parliament on July 4, 1992, and finally approved on March 27, 1993, we can confidently assume that the reform was indeed unexpected. To rule out the possibility that some mayors systematically resigned before the natural termination of the term to take advantage of a potential extra term, we will further inspect the frequency distribution of the election timing around March 1993 and look for any suspicious density jump.

5 Empirical Evidence

5.1 OLS Estimates

In Tables 3 and 4, we report the OLS results from fitting equation (1) to the data. In columns 1, 2, 4, and 5 we use the exact time in office (cumulative and consecutive) at the time of the bids' delivery. We first include only an indicator of whether the term limit is binding or not, while in columns 2, 3, 4, and 5 we also include the full set of observable characteristics discussed in Section 4. In columns 3 and 6, we replace the number of years with the number of terms in office.

In Table 3, we report estimates of the effect of tenure on the number of bidders and the winning rebate. Estimates confirm the presence of a negative relation between mayors' tenure and the level of competition in the procurement auctions. A one standard deviation increase in the years in office (3.76 years) is associated with a decrease in the number of bidders by about 7.34% (with respect to a sample mean of 21.18 bidders), and a decrease in the winning rebate by 3.2% (with respect to a sample mean of 12.91%). Similarly, one additional term in office is associated with a decrease in the number of bidders and in the winning rebate by about 9% and 4%, respectively. The invariance of the estimates to the measurement unit (years or terms) is also reassuring, since it was possible that the different duration of the terms elected before and after September 2000 (4 and 5 years, respectively) could affect our results.

Regarding the other coefficients, we find that the coefficient on the term limit is statistically significant over the number of bidders (+10%), which shows higher participation when a mayor is about to leave office but has no effects on the final adjudication price. The coefficients on the resident population are all positive and statistically different from zero for both outcomes at the 1% level, which suggests remarkable size effects: the bigger the market, the higher the number of potential competitors. The coefficient on the starting value is also positive and statistically different from zero for both outcomes, which is evidence that the bigger the size of the public work, the more potential bidders are willing to enter.[19] We do not find any effect of the gender of the mayor, but we do find

[19]The trend is reverted when the size of the work is particularly large (the square term, not reported, is in fact negative and significant), probably because of some production and financial constraints. Also note that, the law shapes the admission requirements as a function of the starting value of the auctions

some positive effect for the age of the mayor on the winning rebate, which is statistically significant at the 5% level. It is interesting to note that we find a negative effect of the mayor's party tenure on the winning rebate. One additional term in office is associated with a decrease in the winning rebate by about 2.3%.[20]

In Table 4, we report estimates when the dependent variable is an indicator of whether the winning firm is registered in the same region or the highest percentage of auctions awarded to the same firm within the term. In both of these regressions, the effect of time in office is both statistically and economically significant. A one standard deviation increase in time in office is associated with an increase in the probability that the winner is a local firm by about 3.1% (with respect to a sample mean of 70.58%), and with an increase in the maximum percentage of auctions assigned to the same firm by 15% (with respect to a sample mean of 22.86%).[21] Similarly, one additional term in office is associated with an increase in the probability that the winner is local and with an increase in the maximum percentage of auctions assigned to the same firm by about 4.7% and 22.6%, respectively.

The coefficient on the term limit is negative and statistically significant for both outcomes, which shows that local contractors win less frequently when a mayor is about to leave the office. Together with the result on the number of bidders, these findings highlight an overall positive but not always statistically significant effect of term limits on the functioning of public procurement. The coefficient on the resident population is negative and statistically significant for the second outcome, but not for the first. The coefficient on the starting value is always negative and statistically significant for both outcomes, which is compatible with the idea that other agents (either citizens or competing firms) are more likely to closely monitor large public projects. We also find a positive and statistically significant effect of the mayor's party's tenure on the maximum percentage of auctions assigned to the same firm and on the probability that the winner is local. We do not find any effect of the gender of the mayor, but we do find some negative effect for the age of the mayor on the the highest percentage of auctions awarded to the same

(increasing, concave, and discontinuous).

[20] We tried to exclude from the sample the auctions with a restricted participation procedure (*Trattativa Privata*), and did not find any difference in the results. We also included in all the estimates a quadratic term for the time in office to capture any eventual non-linearity, but this was never statistically significant.

[21] We ran similar estimates on the probability that the winning firm is registered in the same province/city. Results are quantitatively and qualitatively the same, but less statistically significant.

firm within the term, which is statistically significant at the 1% level. As it is the case for the mayoral tenure, we find a positive effect of the mayor's party tenure on the highest percentage of auctions awarded to the same firm within the term. One additional term in office is associated with an increase in the probability that the most frequent winner wins repeated auctions by about 9.5%.

It is interesting to note that our empirical evidence suggests that mayors facing a term limit have better procurement outcomes (more entry, higher rebates, less local winners), which goes against the evidence presented in other works in the literature (Besley and Case, 1995; Ferraz and Finan, 2011; Alt et al., 2011). As we highlighted in the previous section, a possible explanation is that in Italy municipal politics represents an entry level, as the majority of the mayors in our sample who face a term limit are then elected either in the same administration (in another office) or in another administration (another municipality, or in a province/region/national administration), i.e., they still have career concerns.[22] More generally, our results on the term limit seem to speak to the predictions of models where politicians pander to voters (see Maskin and Tirole, 2004), rather than models where the lack of accountability induces politicians to perform in a worse manner. However, given that our estimates do not represent causal estimates of the effect of term limits, and are not statistically significant in some specifications, we refrain from taking these numbers as conclusive evidence of the effects of term limits.

5.2 RDD Estimates

In this section, we present the results of the RDD analysis as outlined in equation 2. We consider a sub-sample of 12,687 auctions managed by 2,195 mayors elected in non open elections (i.e., the incumbent mayor is running for reelection) with at least one rival. The sample is similar to the original sample of all auctions in terms of city, mayor and auction characteristics.

Figure 4 reports the running-mean smoothing estimates of the four auction outcomes. For values of MV_{im} smaller than zero, the elected mayor is at the first term, while for values above zero the elected mayor is at the second term or more. MV_{im} is measured

[22] We also estimated the separate effect of tenure and term limit, and found that the results on tenure do not change much depending on the inclusion of term limit, while the results on the term limit alone are mixed (sometimes not significant, sometimes with the opposite sign), like in the main estimates.

as the difference between the percentage votes of the two best candidates in the decisive electoral round. The jump in the outcomes is visible for the number of bidders and for the highest percentage of auctions awarded to the same firm within the term. However, we do not find a visible jump in the winning rebate, and in the indicator of whether the winning firm is registered in the same region.

Tables 5 and 6 report RDD estimates of the effects of tenure in office on auctions' outcomes. To provide comparison with Tables 3 and 4, in columns 1 and 3 we also present OLS estimates over the RDD sample. Table 5 reports the effects of tenure on the number of bidders and the winning rebate. Compared to the main sample, OLS estimates do not deliver substantially different regression results, the effect of tenure on the number of bidders and the winning rebate being negative, statistically significant, and of roughly the same magnitude (-12.55% and -7%, respectively). The RDD estimates of the effect of tenure on the number of bidders and the winning rebate are -11.48% and -5.7%, respectively. A back-of-the-envelope calculation suggests that the average public work costs, other things being equal, about 3,426 euros more in municipalities with a tenured mayor relative to municipalities with a first term mayor.

In Table 6, we report the effects of tenure on the other two auction outcomes (the *nature of competition*). Even in this case, OLS estimates in the subsample do not deliver substantially different regression results. The RDD estimates of the effect of tenure on whether the winning firm is registered in the same region or the highest percentage of auctions awarded to the same firm within the term are positive and statistically significant (5%, and 25.6%, respectively).[23] Although we do not have any direct evidence of misbehavior on the part of mayors, we find the last two estimates quite informative about

[23]In Table A.1 in the Appendix we try different alternative specifications of the RDD model: 1) controlling for term limit and pre-treatment variables only; 2) excluding any control; 3) interacting the 3^{th} order polynomial in the margin of victory with the tenure indicator 4) using a fourth-order polynomial in the margin of victory; 5); using a third-order polynomial in the margin of victory within the optimal bandwidth (estimated with the Imbens and Kalyanaraman (2013) procedure); using a local linear regression with optimal bandwidth. In Table A.2 in the Appendix, we also run placebo tests at two simulated thresholds for the model discussed in section 4. The first one considers elections with $MV_{im} > 0$ and threshold at the median of this subsample, while the second one considers elections with $MV_{im} < 0$ and threshold at the median of this subsample, both including and excluding the set of controls discussed in Section 4. The evidence is that estimates are fairly robust to different models specification and sample selection, and that at the two simulated thresholds there are no effects of tenure on auctions' outcomes, except on the highest percentage of auctions awarded to the same firm within the term.

the possible mechanism that is driving the deterioration of the procurement process described in Table 5. In particular, the result on the geographical origin of the winning firm seems fairly compatible with the possibility that, when a mayor stays in power for longer, there is a higher probability that he might distribute favors to local bidders. This is either because geographical proximity enhances personal relationships, or because local bidders represent an easier target for electoral exchange.

One important validity test for our RDD estimates is to check whether the density of the running variable (MV) is continuous around the threshold (Imbens and Lemieux, 2008). Estimates presented in Figure 5 suggest that the density of MV is smooth and well behaved around the threshold (up to some small sample noise). A formal density test (McCrary, 2008) rejects the presence of a statistically significant jump (the estimated log-difference is -0.18, with a standard error of 0.13).

We further test the validity of the RDD estimates analyzing the behavior of the available pre-treatment covariates in the neighborhood of the threshold. In Table 7, we estimate a simplified version of equation (2) without mayor and city covariates, considering the pre-treatment covariates as dependent variables. When we compare first term mayors to tenured mayors, we find that most of the municipality characteristics are well balanced, although the probability of an incumbent to win seems higher in the North-West and lower in the Center of Italy. Figure 6 shows that as the electoral race becomes tight the observable characteristics of municipalities tend to equalize, which is not always the case for less contested races. This is compelling evidence in support of the randomization induced by tight electoral competitions. We also do not find significant differences between tenured and untenured mayors, except for the former being on average older (see also Figure 7).[24] In particular, all the politically relevant variables (previous political experience within the same administration, whether the previous mayor was from the same party) are well balanced, which is additional evidence against the possibility that more powerful incumbents might be able to sort just above the threshold.[25]

[24]One possible interpretation for this difference is that voters trade-off more experienced candidates with new and younger candidates (see the discussion in Section 4.3). Similar figures could be obtained comparing the subsample of mayors without term limit, and the subsample of mayors with term limit, although in the later also city extension and college education were not balanced.

[25]We also regressed first term procurement outcomes over the margin of victory in the next election (only if the incumbent mayor is running for reelection), to check whether incumbents' behavior may have

5.3 Fuzzy-RDD Estimates

In this section, we present the results of the 2SLS estimation as outlined in equation 3. Before presenting the 2SLS results, we discuss the quality of the instrument. We first report evidence that the election timing was independent from the reform by inspecting the distribution of elections around March 1993. Between 1985 and 2008, elections were held fairly regularly, up to a certain degree of asynchronism, although early terminations were more frequent before March 1993 because the winning coalition did not receive a majority premium at that time.[26] When we focus on the four years around the March 1993 reform (see Figure 9), we find that there were some elections that anticipated the reform (148 over 2,435) and very few that were delayed after the reform (46 out of 304), but the majority of anticipated elections did not allow the incumbent mayor to gain one potential extra term, with only 29 being reelected.[27]

In Tables 8 and 9 we report the 2SLS estimates on the number of bidders, the winning rebate, the probability that the winning firm is local, and the maximum percentage of auctions assigned to the same firm within the term. The functions $f(.)$ and $g(.)$ are specified as a set of year dummies, while we exclude the two years before and after the March 1993 reform. The first column in Table 8 reports the first-stage estimate of the effect of the reform on the actual time in office. Mayors elected for the first time before the reform accumulate an average of 0.970 terms more than mayors elected after the reform.[28] Moreover, the first-stage F-statistic of the excluded instrument suggests that the instrument is relevant. In order to exclude any sample specific effect, in columns 2 and 4 of Table 8, we first report the OLS estimates over the 2SLS sample, while in columns 3 and 5, we report the second-stage estimates for the fully specified 2SLS model. We find that one additional term in office causes a 16.7% decrease in the number of bidders (with respect

an impact on the probability of having a close race in the following election. We could not detect any specific pattern around close races, if not the opposite: the number of bidders and the final rebate are unaffected, while the probability that the winner is local, and the max % wins to the same bidder grow with the margin of victory.

[26] An early termination is any anticipated conclusion of the term for one of the following reasons: a) the resignation of the mayor; or b) the resignation of the majority of the council or a no-confidence vote in the council. The variable is, therefore, missing after 2002. See Figure A.1 in the Appendix.

[27] We could not detect any significant difference in the observable characteristics of mayors who anticipated the election and mayors who did not, except for the former being on average slightly older.

[28] This is additional evidence against the presence of a severe sample selection bias (see the discussion in Section 4.3), otherwise the coefficient should have been significantly lower than 1.

to a sample mean of 19.36), and a 9.9% reduction in the winning rebate (with respect to a sample mean of 11.57%). Finally, in Table 9, we report evidence of a relation between the time in office and the probability that the winning firms is local, and for the maximum percentage of auctions assigned to the same firm within the term. Estimated coefficients in columns 2 and 4 are positive for both outcomes, but not statistically different from zero for the probability that the winning firm is local. In particular, a one term increase in the time in office implies a 36.7% increase in the maximum percentage of auctions assigned to the same firm within the term (with respect to a sample mean of 24.35%).

As discussed in Section 4.2, we now test the assumption that mayors elected right before and after the reform were actually similar. To this purpose, in Table 10 we estimate a simplified version of the first-stage equation (4) without city and mayor covariates, and using the mayor characteristics as dependent variable.[29] Numbers show that most of the differences at the discontinuity point are not statistically different from zero, although mayors elected right after the reform (324 out of a total of 1,470 elected after the reform) were slightly younger and more educated than those elected right before the reform (228 out of a total of 251 elected before the reform). However, most of the other characteristics are well balanced, and in particular the percentage of mayors who had any appointment in the same municipality before, which is evidence that parties had some initial difficulties in recruiting new candidates more suited to the individual-ballot electoral system (see also Figure 8).[30]

6 Interpretation of the Evidence

The analysis up to this point has shown fairly robust evidence that tenure in office affects the functioning of public procurement: it reduces the number of bidders participating in the auctions and the winning rebate, and it increases the probability that the contract is awarded to a local firm, or to the same firm repeatedly. This evidence suggests that tenured mayors do pay more for public goods, which is the cost of dealing with local

[29] City characteristics, like the resident population or the geographical location, would not be balanced if the election timing was to a certain degree coordinated, as it actually was, across regions. Accordingly, we include these two variables in every specification along with the other controls.

[30] Similar figures could be obtained when comparing the subsample of mayors without term limit, and the subsample of mayors with term limit.

contractors that win repeated auctions. In what follows we consider a number of possible explanations for this result.

Before doing that, it is interesting to note that most of the RDD and 2SLS estimates are larger in magnitude than the baseline OLS estimates. According to the discussion in Section 4, this difference should be interpreted as evidence that mayors who are better at running the procurement process are also more likely to gain reelection, and therefore survive longer. It is also important to note that the causal effect of tenure is obtained under the two different strategies, which are similar in size and statistical significance. This allows us to provide external validity to our findings, as we estimate the same effects over two differently selected samples with two different sets of identification assumptions.

6.1 Tenure in Office and Collusion

A natural interpretation of our results is that tenure in office increases the likelihood of collusion between mayors and local contractors, as it takes time for contractors to establish a preferential relationship with the mayor. With this respect, our evidence seems at odds with the possibility that connections could be set up instantaneously at the beginning of each electoral term, or that candidates already had established acquaintances upon election, in which case the level of collusion should remain stable throughout the elective office.

This hypothesis builds on two key characteristics of public procurement auctions. First, politicians can help preferred bidders in exchange of a bribe, and bidders may benefit from such exchange. Second, politicians and contractors have repeated interactions over time. Such characteristics have been highlighted in the literature on favoritism in procurement auctions (Arozamena and Weinschelbaum, 2009; Burguet and Perry, 2009) and on repeated auctions (Skrzypacz and Hopenhayn, 2004).

In Appendix B, we lay out a simplified model of collusion where time in office helps politicians and contractors to build collusive relationships. The model assumes that types (collusive or not) are predetermined and *ex-ante* unknown, and at each point in time (term) a collusive mayor is randomly matched with a bidder. If the bidder is also collusive, then the mayor, in exchange for a bribe, will allow the bidder to adjust the rebate and win. If the bidder is not collusive, then the auction will be held regularly. Under these assumptions,

the probability of a collusive match is increasing with mayors' tenure in office.

The model has the following four predictions, which resemble our main empirical results. First, as the mayor's tenure in office increases, the probability that auctions are assigned to the same bidder increases. Second, as the mayor's tenure in office increases, the revenues from the auction decrease. Third, in presence of entry costs, as the mayor's tenure in office increases, the number of bidders per auction decreases. Fourth, if local bidders have lower costs of bribing (i.e., they find it easier to pay the bribe to the mayor) and types (local or not) are not perfectly observed before the first interaction, as the mayor's tenure in office increases, the probability that the winner is local increases.

6.2 Tenure in Office and Learning

The most likely alternative explanation to our results is that, as tenure increases, mayors acquire more skills in designing and mastering the procurement mechanism. If this is the case, more tenured mayors could be more likely to deliver better public works. Several authors, in fact, have emphasized the effect of experience on general measures of political productivity. For example, Padró i Miquel and Snyder (2006) find that productivity, measured by surveying legislators, lobbyists, and journalists in North Carolina about the effectiveness of legislators in the House of Representatives, rises sharply with tenure. More recently, Dal Bó and Rossi (2011) exploit a natural experiment in the Argentine House of Representatives, where term lengths (two or four years) were randomly assigned across members of parliament, to show that longer terms enhance legislative productivity, as measured by attendance, committee activity, and the number of legislative achievements. While these results have a different, somewhat opposite, flavor, they do not contradict ours as they pertain to different outcomes and different elective offices.

On the one hand, this learning hypothesis would be compatible with our evidence if our main outcomes were still missing some important dimensions of the procurement process, like the *ex-post* renegotiations and the unobserved quality of the works. For example, it could be that more experienced mayors are willing to favor more expensive bidders because in the past they have been delivering public works with better quality and with less delays, whereas unexperienced mayors do not. Therefore, although it is true that tenured mayors are paying a higher price, they also do better in favoring contractors that systematically

deliver better works. On the other hand, the OECD (2005) and Ferraz and Finan (2010) associate the over-use of *ex-post* renegotiations to corruption practices. This is the case, for example, if public officials protect contractors that use low quality construction materials, or tollerate excessive delays in the delivery of the works without reporting contractors to public officials.[31] We can test this hypothesis by studying the effect of tenure in office on two additional sources of data.

First, we analyze the delays in the delivery of the public works, which represent a measure of *ex-post* renegotiation of the original deadline of the contract. In the subsample of municipalities for which we have the data (5,218 auctions for 1,160 mayors in the RDD sample), almost 90% of the works were not delivered on time, with an average of 178 days of delay. In Table 11, we report the OLS, RDD, and 2SLS estimates of our equations of interest. Our evidence suggest that tenure in office actually raises the number of days of delay in the delivery of the public work by about 1 month (13-22%) per term. This evidence, together with the evidence on the reduction in the winning rebate, suggests that the extra cost of procurement is not offset by faster delivery.

Second, we look at the price of goods and services purchased by the Italian municipalities. As discussed in Bandiera et al. (2009), goods and services are more standardized in their quality compared to public works. For instance, the purchase of paper for photocopy machine should be a standard activity, and the price should not be affected by the tenure of the mayor. To test this hypothesis, we repeat our analysis on a sample of all the municipal procurement auctions for the purchase of goods and services that we could recover for the period 2000-2010.[32] As in Bandiera et al. (2009), our estimates control for unobservable quality characteristics by including 93 fixed effects for the typology of the good or service. Looking at Table 12, in all specifications but one (2SLS), we find that conditional on quality the price of an average good increases by about 9-16% at each additional term in office (compared to an average winning rebate of 17%). This evidence suggests that screening for quality cannot be the only reason why we observe procurement prices of goods and service increasing with the mayor's tenure. These results are also in

[31] Olken (2007) shows that there are large discrepancies between the official cost and an independent engineers estimate of the cost of road projects in Indonesia, and that these discrepancies are sensitive to anti-corruption audits.

[32] Data provided by *Telemat S.p.A.*, an information-provider leader in the Italian market for reselling information on public contracts.

line with the description of municipal corruption in Ferraz and Finan (2010), which show that corruption in Brazilian municipalities is often associated with over-invoicing of goods and services.

6.3 Tenure in Office and the Design of the Auction

In this section we analyze more in detail the design of the auctions to highlight a possible mechanism that a mayor could use to interfere with the procurement process. Specifically, we inspect the size of the reserve price and the identity of the manager of the auctions. As discussed in Section 2, these are two critical characteristics of the auction design that can affect the functioning of the procurement mechanism.

First, with respect to the reserve price of the auction, it could be that more tenured mayors are also more willing to split projects into several small works, as small projects (below 500,000 euros) are subject to less publicity requirements, and therefore less participation (see Coviello and Mariniello, 2014). We test this possibility by repeating our analysis using as a dependent variable the starting value of the auction. In columns 1-3 of Table 13 we find that there is no effect of tenure in office on the size of the projects. This evidence suggests that the reserve price of the auctions is independent of the tenure of the mayor, as it is a result of the engineer estimates of the size of projects. In columns 4-6 of Table 13, we consider as dependent variable the probability that the starting value of the auction is set up just below 500,000 euros. While we detect some manipulation in the OLS estimates, we do not find instead any effect of tenure in office on the size of the projects in the RDD and in the 2SLS specifications.

Finally, we inspect whether tenure in office affects the identity of the manager of the auctions. In testing this hypothesis, we follow a similar argument to Iyer and Mani (2012), who show that a change in the identity of Indian state politicians results in a significant increase in the probability of bureaucrat reassignments. In the Italian set-up, the turnover of local bureaucrats across different posts within the same municipality can be interpreted as a form of control from the mayors over the bureaucrats actions. This is especially the case if mayors care about having control over bureaucrats actions, for example in order to favor local contractors, and have the power to assign bureaucrats to specific tasks. Bureaucrats, in turn, might care about the prestige and importance of the posts they

are assigned to, or they can also benefit from getting close repeated interactions with local contractors (for example, to share part of the bribes). We test this hypothesis in the subsample of municipalities for which we have data on the identity of the managers (10,795 auctions for 1,789 mayors in the RDD sample). Looking at Table 14, we find that the highest percentage of auctions managed by the same manager increases by about 19-21% (compared to an average of 60%) at each additional term in office, which highlights a possible channel through which mayors can exert direct control over the procurement process.

7 Conclusions

In this paper, we used a matched mayor-auction data set to provide novel empirical evidence on the extent to which politicians can influence public procurement. Our main result is that, when politicians stay in power for a longer period of time, there is a systematic deterioration in the functioning of the auction mechanism: we observe less participation, a higher cost of public works, and an increase in the probability that the winner is an insider and that the same firm wins more often. These effects persist even after controlling for the endogeneity of time in office using close race elections and an instrumental variable approach. With the aid of more data on the *ex-post* executions of the works, and the purchases of standardized goods and services, we interpret these findings as evidence that, when a mayor stays in power for a longer period there is a higher probability of collusion. Alternative explanations, like mayors learning the quality of the bidders, do not find support in the data.

From the point of view of a regulator interested in rationalizing public spending, our empirical findings encourage the implementation of policies favoring political turnover (for example, through a term limit), such that competition in public procurement can be restored. Our findings also suggest that the local economy might benefit from the introduction of policies aimed at limiting the power that politicians can exercise through public procurement (for example, through the institution of a central purchasing authority), but only when the functioning of procurement auctions is sensitive to the repeated interaction between politicians and local bidders.

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Tables and Figures

Table 1: City, mayor, and term characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max
	City characteristics. N. cities: 3,869						
Outcome:							
North-West	0.41	0.49	0	0	0	1	1
North-East	0.20	0.40	0	0	0	0	1
Center	0.14	0.35	0	0	0	0	1
South	0.21	0.41	0	0	0	0	1
Islands	0.04	0.19	0	0	0	0	1
Population	9977	56914	49	1490	3445	7813	2,733,908
Budged balance deficit	0.02	0.05	-0.45	-0.01	0.01	0.03	0.64
Efficiency of the judiciary	100.65	62.4	30.20	55.30	94.10	126.60	462.50
	Mayor/term characteristics. N. terms: 5,481						
Female	0.08	0.28	0	0	0	0	1
Age	49.84	9.21	25.30	43.35	49.61	55.74	85.61
Born in the city	0.52	0.50	0	0	1	1	1
Born in the province	0.85	0.36	0	1	1	1	1
Born in the region	0.94	0.24	0	1	10	1	
Education:							
Secondary	0.53	0.50	0	0	1	1	1
College	0.45	0.50	0	0	0	1	1
Employment:							
Not employed	0.11	0.32	0	0	0	0	1
Low-skilled	0.04	0.19	0	0	0	0	1
Medium-skilled	0.09	0.29	0	0	0	0	1
High-skilled	0.76	0.43	0	1	1	1	1
Political experience:							
Previous experience	0.62	0.49	0	0	1	1	1
Years in office (as mayor)	4.74	3.76	0.00	1.84	3.92	6.81	20.22
Term in office (as mayor) = 1	0.57	0.49	0	0	1	1	1
Term in office (as mayor) = 2	0.35	0.48	0	0	1	1	1
Term in office (as mayor) = 3	0.05	0.21	0	0	0	1	1
Term in office (as mayor) = 4	0.03	0.17	0	0	0	1	1
Term limit binding	0.39	0.49	0	0	0	1	1
Center-right party	0.10	0.30	0	0	0	0	1
Center party	0.06	0.23	0	0	0	0	1
Center-left party	0.28	0.45	0	0	0	1	1
N. terms in office (party)	0.42	0.61	0	0	0	1	4

Notes. Cities with at least one auction between 2000-2005. *Population* is the number of resident inhabitants at the beginning of the first observed term. *Budget balance deficit* is the municipal budget deficit over the total revenues. *Efficiency of the judiciary* is the ratio between settled and incoming cases for each regional administrative court (*TAR*), and for public works related disputes. Mayors with no early terminations in the past. *Low-skilled* includes blue-collars, *Medium-skilled* clerks, and *High-skilled* entrepreneurs and self-employed. *Previous experience* is a dummy for whether the mayor was in the council or in the executive committee before. *Years/terms in office (as mayor)* without interruption. *Term limit binding* is a dummy for whether or not the mayor cannot be reelected. *Party tenure* is the tenure of the mayor's party in years/terms.

Table 2: Auction characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max
Outcome:							
Number of bidders	21.18	21.08	1.00	5.00	14.00	31.00	100
Winning rebate (in %)	12.91	8.39	0	6.78	12.36	17.05	49.99
Winner in the city (%)	0.12	0.33	0	0	0	0	1
Winner in the region (%)	0.71	0.46	0	0	1	1	1
Max % wins same firm	0.25	0.26	0.02	0.08	0.17	0.33	1
Selection mechanism:							
Restricted auction	0.10	0.29	0	0	0	0	1
Characteristics of the good:							
Starting value	5.39	9.31	1.34	2.03	2.94	5.15	190.83
Road	0.23	0.42	0	0	0	0	1
School	0.13	0.33	0	0	0	0	1
Building	0.05	0.22	0	0	0	0	1
Housing	0.01	0.11	0	0	0	0	1
Art	0.04	0.19	0	0	0	0	1
Others	0.54	0.50	0	0	1	1	1
Year bid delivery:							
2000	0.16	0.36	0	0	0	0	1
2001	0.20	0.40	0	0	0	0	1
2002	0.21	0.40	0	0	0	0	1
2003	0.20	0.40	0	0	0	0	1
2004	0.15	0.36	0	0	0	0	1
2005	0.09	0.29	0	0	0	0	1
			N. auctions: 28,058				

Notes. Auctions for works with starting value greater than or equal to 150,000 euros, and no more than 100 bidders. *Winner in the city/region* is a dummy for whether or not the winning firm is registered in the same city/region of the contracting authority. *Max % wins same firm* is the highest percentage of auctions assigned to the same firm within the term, and is term invariant. *Restricted auction* is a dummy for the selection mechanism being a *Trattativa privata*. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents).

Table 3: Tenure in office and the *level of competition*, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	N. of bidders	N. of bidders	N. of bidders	Winning rebate	Winning rebate	Winning rebate
Mean outcome:	21.18	21.18	21.18	12.91%	12.91%	12.91%
N. years in office	-0.871***	-0.414***		-0.287***	-0.107***	
	(0.118)	(0.118)		(0.043)	(0.037)	
N. terms in office			-1.910***			-0.695***
			(0.475)			(0.203)
Term limit binding	4.296***	2.022**	2.130***	-0.179	0.024	0.274
	(1.216)	(0.855)	(0.826)	(0.679)	(0.290)	(0.313)
Population		0.061***	0.061***		0.046***	0.046***
		(0.019)	(0.019)		(0.009)	(0.009)
Starting value		0.687***	0.687***		0.084***	0.084***
		(0.076)	(0.076)		(0.012)	(0.012)
Female		-0.489	-0.446		-0.151	-0.143
		(0.709)	(0.713)		(0.237)	(0.237)
Age		0.026	0.019		0.021**	0.020**
		(0.024)	(0.025)		(0.009)	(0.009)
N. terms in office (party)		-0.673	-0.465		-0.365**	-0.303*
		(0.425)	(0.443)		(0.156)	(0.162)
N. auctions	28,058	28,058	28,058	28,058	28,058	28,058
R-squared	0.009	0.234	0.233	0.014	0.483	0.483
Province fixed effects	no	yes	yes	no	yes	yes
Year dummies	no	yes	yes	no	yes	yes
City characteristics	no	yes	yes	no	yes	yes
Auction characteristics	no	yes	yes	no	yes	yes
Mayor characteristics	no	yes	yes	no	yes	yes
Electoral characteristics	no	yes	yes	no	yes	yes

Notes. Estimates on 5,481 terms. *N. of bidders* is the number of firms that submitted a bid. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Term limit binding* is a dummy for whether or not the mayor cannot be reelected. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 4: Tenure in office and the *nature of competition*, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Winner local	Winner local	Winner local	Max % wins same firm	Max % wins same firm	Max % wins same firm
Mean outcome:	70.58%	70.58%	70.46%	22.86 %	22.86 %	22.86 %
N. years in office	1.241***	0.588***		1.392***	0.916***	
	(0.142)	(0.158)		(0.194)	(0.215)	
N. terms in office			3.346***			5.165***
			(0.930)			(1.311)
Term limit binding	-6.467***	-2.993**	-3.850***	-4.667**	-2.722**	-3.960**
	(1.314)	(1.211)	(1.414)	(2.034)	(1.351)	(1.657)
Population		0.025	0.025		-0.128***	-0.133***
		(0.015)	(0.015)		(0.033)	(0.032)
Starting Value		-0.986***	-0.986***		-0.156***	-0.156***
		(0.072)	(0.072)		(0.030)	(0.030)
Female		-0.655	-0.705		-1.677	-1.687
		(1.252)	(1.253)		(1.535)	(1.518)
Age		-0.008	-0.001		-0.185***	-0.175***
		(0.050)	(0.050)		(0.051)	(0.051)
N. terms in office (party)		1.466*	1.146		2.486***	2.183***
		(0.749)	(0.750)		(0.844)	(0.833)
N. auctions	28,058	28,058	28,058	23,523	23,523	23,523
R-squared	0.004	0.098	0.098	0.020	0.295	0.295
Province fixed effects	no	yes	yes	no	yes	yes
Year dummies	no	yes	yes	no	yes	yes
City characteristics	no	yes	yes	no	yes	yes
Auction characteristics	no	yes	yes	no	yes	yes
Mayor characteristics	no	yes	yes	no	yes	yes
Electoral characteristics	no	yes	yes	no	yes	yes

Notes. Estimates on 5,481 terms for *Winner local*, and on 3,995 terms for *Max % wins same firm* (terms elected between 1998 and 2003). *Winner local* indicates whether or not the winning firm is registered in the same region. *Max % wins same firm* is the highest percentage of auctions assigned to the same firm within the term, and is term invariant. *Term limit binding* is a dummy for whether or not the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 5: Tenure in office and the *level of competition*, RDD

	(1)	(2)	(3)	(4)
Dependent variable:	N. of bidders	N. of bidders	Winning rebate	Winning rebate
Method:	OLS	RDD	OLS	RDD
Mean outcome:	21.52	21.52	12.26%	12.26%
N. terms in office	-2.724***	-2.469***	-0.860***	-0.705**
	(0.935)	(0.930)	(0.320)	(0.308)
Term limit binding	2.721**	3.740**	1.020**	1.181**
	(1.243)	(1.715)	(0.413)	(0.499)
Population	0.090***	0.090***	0.031***	0.031***
	(0.025)	(0.025)	(0.004)	(0.004)
Starting Value	0.745***	0.746***	0.104***	0.104***
	(0.093)	(0.093)	(0.017)	(0.017)
Female	0.149	0.006	0.227	0.146
	(0.850)	(0.845)	(0.318)	(0.309)
Age	0.047	0.035	0.030***	0.025**
	(0.032)	(0.030)	(0.010)	(0.010)
N. terms in office (party)	-0.960	-0.885	-0.129	-0.103
	(0.587)	(0.583)	(0.195)	(0.192)
N. auctions	12,687	12,687	12,687	12,687
R-squared	0.254	0.255	0.462	0.464
Margin of victory	no	yes	no	yes
Province fixed effects	yes	yes	yes	yes
City characteristics	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Auction characteristics	yes	yes	yes	yes
Mayor characteristics	yes	yes	yes	yes
Electoral characteristics	yes	yes	yes	yes

Notes. Estimates on 2,268 terms. *N. of bidders* is the number of firms that submitted a bid. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Margin of victory* (3^{rd} order polynomial in the margin of victory); *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 6: Tenure in office and the *nature of competition*, RDD

	(1)	(2)	(3)	(4)
Dependent variable:	Winner local	Winner local	Max % wins same firm	Max % wins same firm
Method:	OLS	RDD	OLS	RDD
Mean outcome:	70.20%	70.20%	22.37 %	22.37 %
N. terms in office	3.359	3.458	6.358***	5.729***
	(2.141)	(2.173)	(2.216)	(2.189)
Term limit binding	-3.476	-1.604	-3.121	-2.491
	(2.875)	(3.325)	(2.673)	(2.837)
Population	0.002	0.003	-0.109**	-0.108**
	(0.015)	(0.015)	(0.044)	(0.044)
Starting Value	-0.995***	-0.992***	-0.161***	-0.157***
	(0.105)	(0.105)	(0.037)	(0.036)
Female	2.961*	3.035*	-5.071***	-4.637**
	(1.733)	(1.730)	(1.854)	(1.841)
Age	-0.082	-0.078	-0.245***	-0.222***
	(0.073)	(0.075)	(0.066)	(0.067)
N. terms in office (party)	0.598	0.552	1.466	1.367
	(1.325)	(1.335)	(1.149)	(1.146)
N. auctions	12,687	12,687	11,099	11,099
R-squared	0.100	0.100	0.304	0.309
Margin of victory	no	yes	no	yes
Province fixed effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
City characteristics	yes	yes	yes	yes
Auction characteristics	yes	yes	yes	yes
Mayor characteristics	yes	yes	yes	yes
Electoral characteristics	yes	yes	yes	yes

Notes. Estimates on 2,268 terms for *Winner local*, and on 1,825 terms for *Max % wins same firm* (terms elected between 1998 and 2003). *Winner local* indicates whether or not the winning firm is registered in the same region. *Max % wins same firm* is the highest percentage of auctions assigned to the same firm within the term, and is term invariant. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Margin of victory* (3^{rd} order polynomial in the margin of victory); *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 7: Balancing tests, RDD

	Coefficient on N. terms in office at the discontinuity point
	(1)
City characteristics:	
North-West	0.069*
	(0.04)
North-East	-0.002
	(0.03)
Center	-0.089***
	(0.03)
South	0.02
	(0.04)
Islands	0.002
	(0.016)
Population	-1520.97
	(5284.21)
Altitude	-3.255
	(22.241)
Extension	-3.362
	(4.458)
Mayor's characteristics:	
Female	-0.015
	(0.022)
Age	2.634***
	(0.767)
Local	0.009
	(0.021)
Education: College	0.044
	(0.04)
Employment: Not employed	0.010
	(0.026)
Employment: High-skilled	0.021
	(0.035)
Previous experience	-0.050
	(0.041)
Incumbent party	-0.007
	(0.040)
N. mayors	2,195

Notes. All cities/mayors in the RDD estimation sample. *Altitude* is the citys altitude above sea-level. *Extension* is the geographical extension of the city administrative territory. *Population* is the Census population as of 1991. *Local* is a dummy for being born in the same region. *High-skilled* includes entrepreneurs and self-employed. *Previous experience* is a dummy for whether the mayor was in the council or in the executive committee before. *Incumbent party* is a dummy for whether the mayor belongs to the incumbent party. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 8: Tenure in office and the *level of competition*, fuzzy-RDD

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	N. terms in office	N. of bidders	N. of bidders	Winning rebate	Winning rebate
Method:	OLS	OLS	2SLS	OLS	2SLS
Mean outcome:	2.075	19.36	19.36	11.57%	11.57%
N. terms in office		-2.035***	-3.231***	-0.498*	-1.143***
		(0.717)	(1.154)	(0.258)	(0.376)
Elected before March 1993	0.970***				
	(0.079)				
Term limit binding	0.821***	0.428	0.846	-0.113	0.591
	(0.041)	(1.766)	(1.956)	(0.538)	(0.605)
Population	-0.000	0.114***	0.110***	0.046***	0.045***
	(0.000)	(0.039)	(0.037)	(0.005)	(0.005)
Starting value	0.000	0.782***	0.780***	0.119***	0.119***
	(0.000)	(0.088)	(0.087)	(0.023)	(0.022)
Female	-0.009	1.077	1.035	0.135	0.154
	(0.006)	(1.047)	(1.034)	(0.370)	(0.368)
Age	-0.000	0.069**	0.063*	0.026**	0.026**
	(0.001)	(0.033)	(0.033)	(0.011)	(0.011)
N. terms in office (party)	0.051**	-1.289**	-1.057*	0.069	0.130
	(0.021)	(0.575)	(0.559)	(0.177)	(0.179)
N. auctions	9,016	9,016	9,016	9,016	9,016
R-squared	0.892	0.263	0.264	0.471	0.472
F-exc.-Inst	150.5				
Province fixed effects	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes
City characteristics	yes	yes	yes	yes	yes
Auction characteristics	yes	yes	yes	yes	yes
Mayor characteristics	yes	yes	yes	yes	yes
Electoral characteristics	yes	yes	yes	yes	yes

Notes. Estimates on 1,783 terms. *N. of bidders* is the number of firms that submitted a bid. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Elected before March 1993* is a dummy for whether or not the mayor was elected for the first time before March 27, 1993. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 9: Tenure in office and the *nature of competition*, fuzzy-RDD

	(1)	(2)	(3)	(4)
Dependent variable:	Winner local	Winner local	Max % wins same firm	Max % wins same firm
Method:	OLS	2SLS	OLS	2SLS
Mean outcome:	70.97 %	70.97 %	24.35 %	24.35 %
N. terms in office	4.141**	4.342	2.894	8.934***
	(1.721)	(2.721)	(2.012)	(2.789)
Term limit binding	5.415	4.370	-1.059	0.498
	(4.471)	(4.712)	(8.448)	(8.380)
Population	-0.003	-0.002	-1.559***	-1.502***
	(0.023)	(0.024)	(0.159)	(0.152)
Starting value	-0.938***	-0.937***	-0.067	-0.061
	(0.121)	(0.120)	(0.044)	(0.043)
Female	3.167*	3.077*	0.760	0.449
	(1.854)	(1.846)	(1.765)	(1.742)
Age	0.024	0.027	-0.085	-0.094
	(0.079)	(0.079)	(0.071)	(0.069)
N. terms in office (party)	1.542	1.540	1.533	1.367
	(1.316)	(1.300)	(1.271)	(1.285)
N. auctions	9,016	9,016	7,834	7,834
R-squared	0.115	0.115	0.387	0.395
Province fixed effects	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
City characteristics	yes	yes	yes	yes
Auction characteristics	yes	yes	yes	yes
Mayor characteristics	yes	yes	yes	yes
Electoral characteristics	yes	yes	yes	yes

Notes. Estimates on 1,783 terms for *Winner local*, and on 1,443 terms for *Max % wins same firm* (terms elected between 1998 and 2003). *Winner local* is a dummy for whether or not the winning firm is registered in the same region. *Max % wins same firm* is the highest percentage of public tenders assigned to the same firm within the term and it is term invariant. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics as at the beginning of the term. Standard errors robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 10: Balancing tests, fuzzy-RDD

	Coefficient on being elected before March 1993
	(1)
Female	-0.027
	(0.020)
Age	-1.867**
	(0.756)
Local	0.008
	(0.020)
Education: College	-0.227***
	(0.041)
Employment: Not employed	-0.024
	(0.019)
Employment: High-skilled	-0.054
	(0.034)
Previous experience	-0.048
	(0.043)
Incumbent party	0.010
	(0.040)
N. mayors	1,722

Notes. All mayors in the fuzzy-RDD estimation sample. *Local* is a dummy for being born in the same region. *High-skilled* includes entrepreneurs and self-employed. *Previous experience* is a dummy for whether the mayor was in the council or in the executive committee before. *Incumbent party* is a dummy for whether the mayor belongs to the incumbent party. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 11: Tenure in office and the delay in the delivery of the works

	(1)	(2)	(3)
Dependent variable:		Days of delay	
Method:	OLS	RDD	2SLS
Mean outcome:	182	178.1	186.8
N. terms in office	23.953***	30.888**	41.803**
	(5.706)	(15.106)	(18.609)
Term limit binding	-25.248***	-36.913*	-23.552
	(7.442)	(19.853)	(24.914)
Population	-0.434***	-0.413***	-0.487***
	(0.091)	(0.102)	(0.165)
Starting value	9.874***	9.962***	10.670***
	(0.669)	(0.870)	(0.901)
Female	4.374	-6.060	-13.606
	(6.470)	(8.737)	(10.508)
Age	-0.318	-0.356	-1.235***
	(0.240)	(0.383)	(0.427)
N. terms in office (party)	7.102*	1.193	7.416
	(4.292)	(7.098)	(9.175)
N. auctions	12,118	5,218	4,048
R-squared	0.155	0.148	0.182
Margin of victory	no	yes	no
Province fixed effects	yes	yes	yes
Year dummies	yes	yes	yes
City characteristics	yes	yes	yes
Auction characteristics	yes	yes	yes
Mayor characteristics	yes	yes	yes
Electoral characteristics	yes	yes	yes

Notes. Estimates on 2,889, 1,186, and 991 terms for the OLS, RDD, and 2SLS estimates, respectively. *Days of delay* represent the days of delay in the delivery of the works. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Margin of victory* (3^{rd} order polynomial in the margin of victory); *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 12: Tenure in office and the purchase of standardized goods and services

	(1)	(2)	(3)
Dependent variable:		Winning rebate (%)	
Method:	FE	RDD-FE	IV-FE
Mean outcome:	17.34	16.85	17.91
N. terms in office	-1.529**	-2.696**	-2.189
	(0.643)	(1.076)	(1.975)
Term limit binding	1.456*	1.106	-2.435
	(0.835)	(1.373)	(2.605)
Population	0.037***	0.039**	0.004
	(0.012)	(0.016)	(0.025)
Starting value	-0.076*	-0.078	-0.397***
	(0.040)	(0.088)	(0.126)
Female	-0.034	-0.594	1.437
	(0.858)	(0.994)	(2.134)
Age	0.050**	0.148***	0.086
	(0.024)	(0.034)	(0.074)
N. terms in office (party)	-0.083	0.159	1.552
	(0.375)	(0.394)	(1.285)
N. auctions	9,257	3,640	1,165
R-squared	0.216	0.278	0.295
Margin of victory	no	yes	no
Goods fixed effects	yes	yes	yes
Province fixed effects	yes	yes	yes
Year dummies	yes	yes	yes
City characteristics	yes	yes	yes
Auction characteristics	yes	yes	yes
Mayor characteristics	yes	yes	yes
Electoral characteristics	yes	yes	yes

Notes. Estimates on 2,978, 1,315, and 412 terms for the OLS, RDD, and 2SLS estimates, respectively. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Margin of victory* (3^{rd} order polynomial in the margin of victory); *Goods fixed effects* (93 good or service characteristics dummies); *Province fixed effects* (102 dummies); *Year dummies* (2000-2010 and an indicator for purchases after the introduction of CONSIP) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value,1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 13: Tenure in office and the design of the auction

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Starting value			No publicity		
Method:	OLS	RDD	2SLS	OLS	RDD	2SLS
Mean outcome:	5.387	5.395	5.113	0.740	0.741	0.755
N. terms in office	-0.175	-0.190	-0.185	0.015*	0.006	0.028
	(0.129)	(0.224)	(0.326)	(0.009)	(0.019)	(0.026)
Term limit binding	-0.031	-0.829*	-0.108	-0.008	0.036	0.011
	(0.206)	(0.465)	(0.503)	(0.012)	(0.028)	(0.041)
Population	0.040***	0.038***	0.024***	-0.002***	-0.002***	-0.001***
	(0.005)	(0.006)	(0.003)	(0.000)	(0.000)	(0.000)
Female	-0.151	0.086	0.675	0.020*	0.016	-0.011
	(0.225)	(0.372)	(0.470)	(0.012)	(0.020)	(0.024)
Age	0.018**	0.025***	0.020*	-0.001**	-0.002***	-0.001
	(0.008)	(0.010)	(0.012)	(0.000)	(0.001)	(0.001)
N. terms in office (party)	-0.202*	-0.107	0.154	0.021***	0.026**	0.013
	(0.108)	(0.167)	(0.204)	(0.006)	(0.011)	(0.012)
N. auctions	28,058	12,688	9,016	28,058	12,688	9,016
R-squared	0.041	0.054	0.039	0.058	0.076	0.053
Margin of victory	no	yes	no	no	yes	no
Province fixed effects	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
City characteristics	yes	yes	yes	yes	yes	yes
Auction characteristics	yes	yes	yes	yes	yes	yes
Mayor characteristics	yes	yes	yes	yes	yes	yes
Electoral characteristics	yes	yes	yes	yes	yes	yes

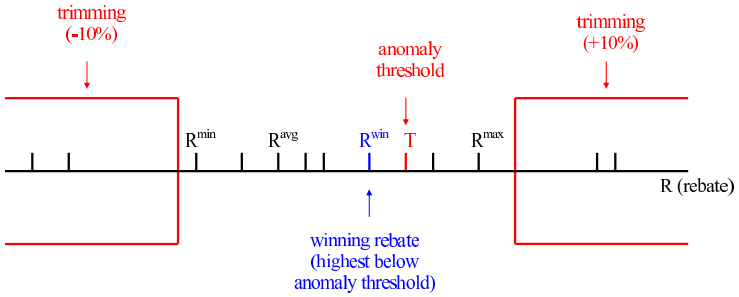
Notes. Estimates on 5,481, 2,269, and 1,783 terms for the OLS, RDD, and 2SLS estimates, respectively. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *No publicity* is a dummy for whether or not an auction, by the law, need not to be published because with a starting value below the 500,000 euros publicity threshold. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Margin of victory* (3^{rd} order polynomial in the margin of victory); *Province fixed effects* (102 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (5 object characteristics dummies, 1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 14: Tenure in office and the manager of the auctions

	(1)	(2)	(3)
Dependent variable:	% Auctions with the same manager		
Method:	OLS	RDD	2SLS
Mean outcome:	59.04	60.97	64.24
N. terms in office	12.747***	11.878***	13.521***
	(2.350)	(2.387)	(3.506)
Term limit binding	-10.781***	-8.074**	-13.375*
	(3.143)	(3.911)	(7.112)
Population	-0.436***	-0.504***	-2.705***
	(0.068)	(0.078)	(0.234)
Starting value	-0.246***	-0.268***	-0.227***
	(0.048)	(0.058)	(0.060)
Female	-2.172	-8.029**	-2.135
	(2.653)	(3.594)	(3.348)
Age	-0.435***	-0.519***	-0.256**
	(0.091)	(0.126)	(0.124)
N. terms in office (party)	2.528*	0.506	0.409
	(1.422)	(1.772)	(1.923)
N. auctions	20,551	10,795	6,893
R-squared	0.469	0.485	0.546
Margin of victory	no	yes	no
Goods fixed effects	yes	yes	yes
Province fixed effects	yes	yes	yes
Year dummies	yes	yes	yes
City characteristics	yes	yes	yes
Auction characteristics	yes	yes	yes
Mayor characteristics	yes	yes	yes
Electoral characteristics	yes	yes	yes

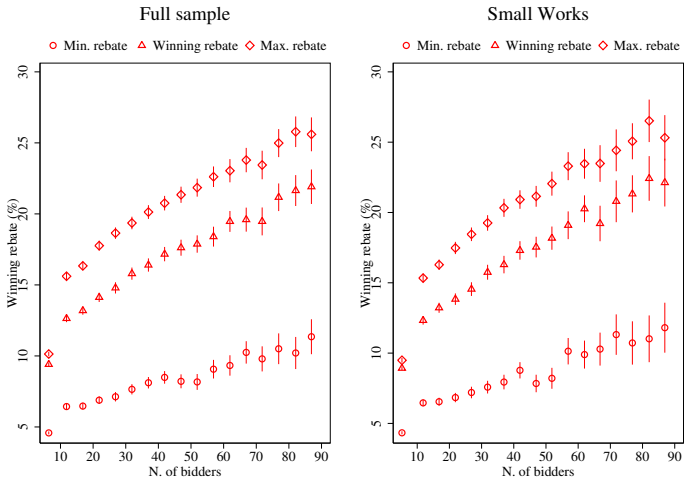
Notes. Estimates on 3,397, 1,791, and 1,256 terms (terms elected between 1998 and 2003) for the OLS, RDD, and 2SLS estimates, respectively. *% auctions with the same manager* is the highest percentage of public tenders administrated by to the same manager within the term, and it is term invariant. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Term limit binding* is a dummy for whether the mayor can be reelected or not. *Population* is the number of resident inhabitants at the beginning of the term, in 10,000. *Starting value* is the reserve price set by the contracting authority, in 100,000 euros (2000 equivalents). *N. terms in office (party)* is the tenure of the mayor's party in terms. When denoted with "yes", regressions additionally include *Margin of victory* (3^{rd} order polynomial in the margin of victory); *Goods fixed effects* (91 good or service characteristics dummies); *Province fixed effects* (102 dummies); *Year dummies* (2000-2010 and an indicator for purchases after the introduction of CONSIP) refer to the year of bid delivery; *City characteristics* (the budget balance deficit in percentage of the revenues at year level, judiciary efficiency at year-regional level); *Auction characteristics* (squared term of the starting value,1 selection mechanism dummy); *Mayor characteristics* (2 education dummies, 3 previous occupation dummies, a dummy for being born in the region); *Electoral characteristics* (a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee). All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Figure 1: The Awarding Mechanism



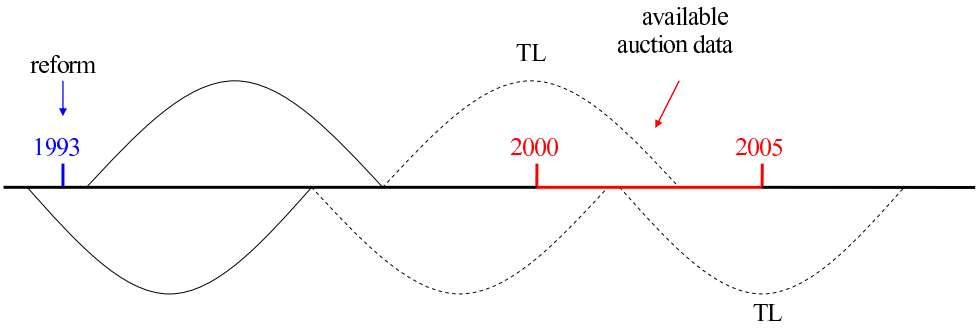
Notes. R^{avg} is the average rebate expressed as a percentage reduction from the starting value. T, is the anomaly threshold obtained as the sum of R^{avg} and the average deviation of the bids above R^{avg}. R^{win} is the winning rebate that minimizes the distance from below T.

Figure 2: Correlation between N. of bidders and Winning Rebate



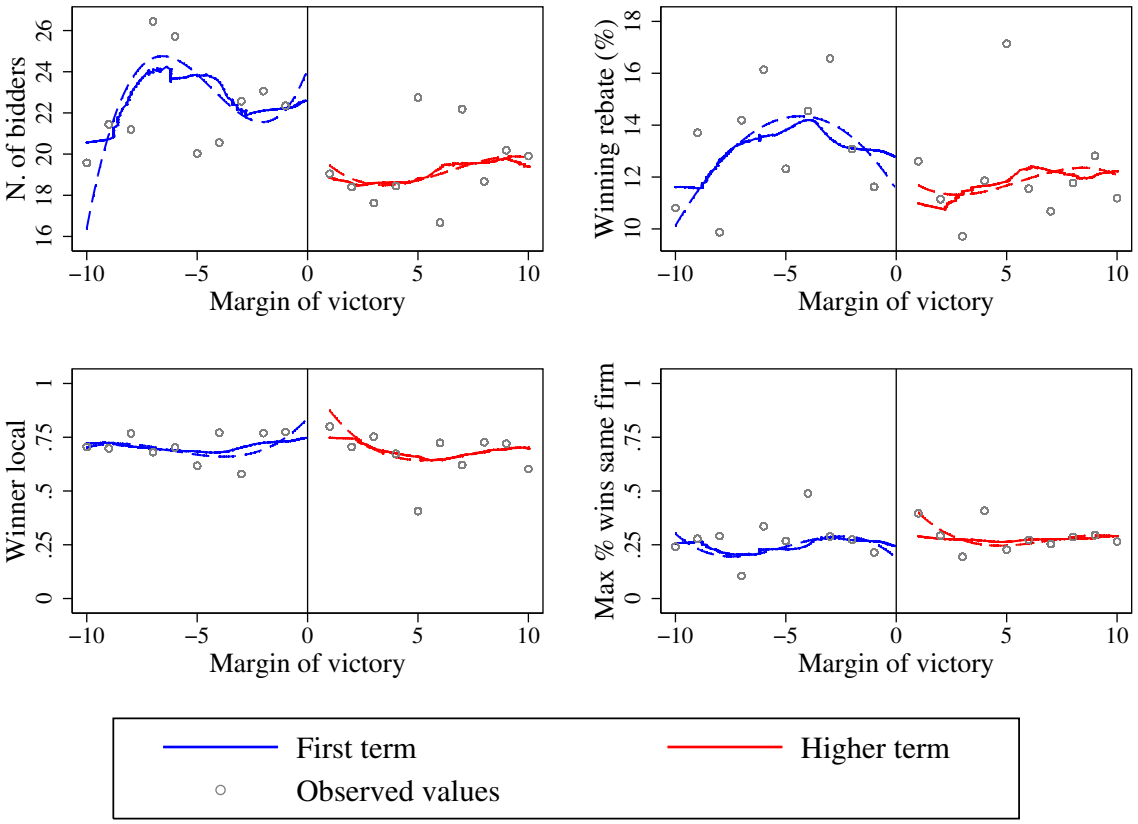
Notes. Distribution of the Winning rebate (%) conditional on the N. of bidders. Circles denote the minimum rebate; triangles the winning rebate; diamonds the maximum rebate. Vertical lines denote the 95% confidence intervals. *Small works* are projects with starting value below 500,000 euros.

Figure 3: The Introduction of the Term Limit



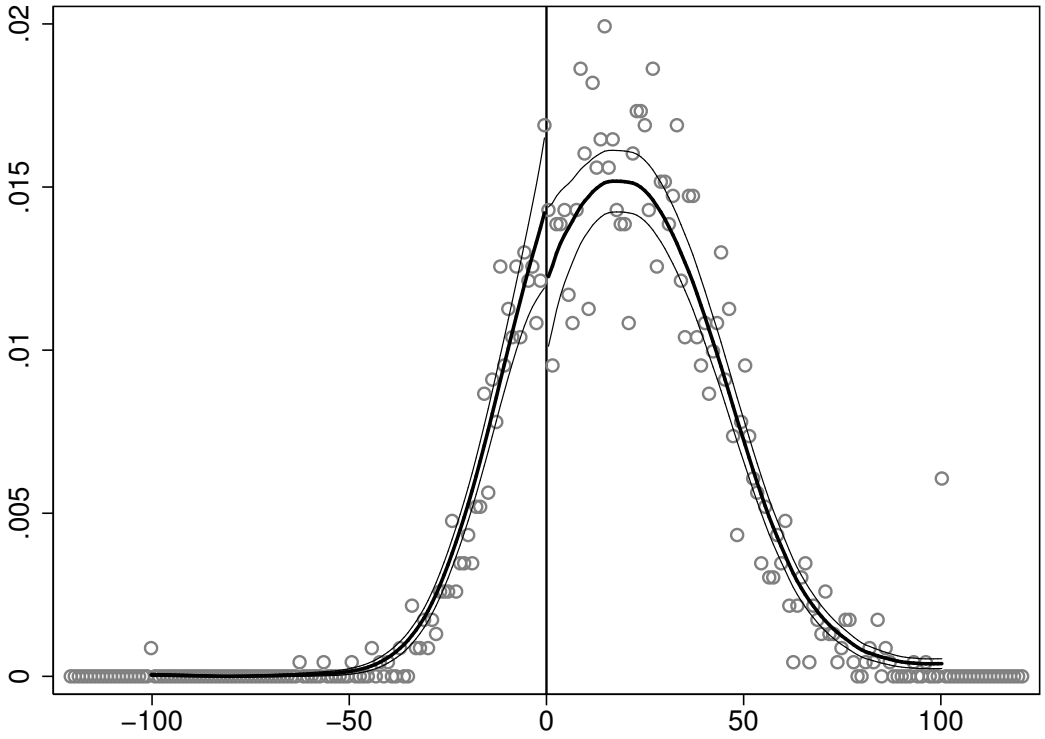
Notes. *TL* means that the term limit is binding. Dash lines indicates potential terms.

Figure 4: Outcomes, RDD



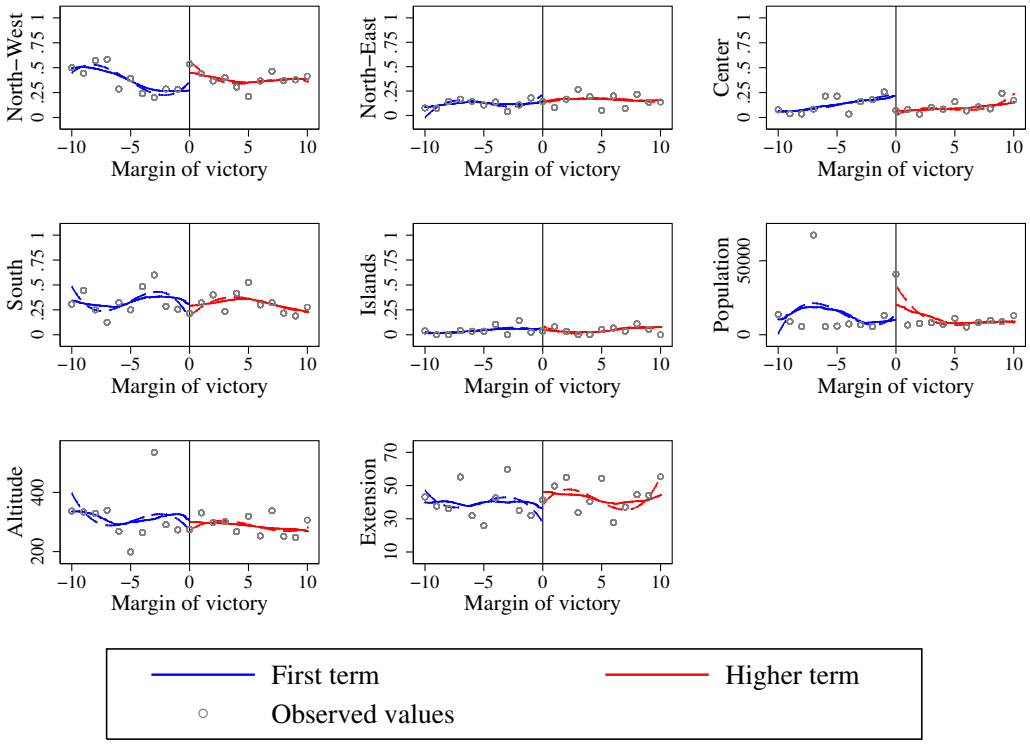
Notes. For values of MV smaller than zero, the mayor is at the first term, while for values above zero the mayor is at the second term or more. The solid line is a running-mean smoothing (least squares), separate on either side of the threshold; the dash line is a third-order polynomial fit, separate on either side of the threshold.

Figure 5: Distribution of the Margin of Victory, RDD



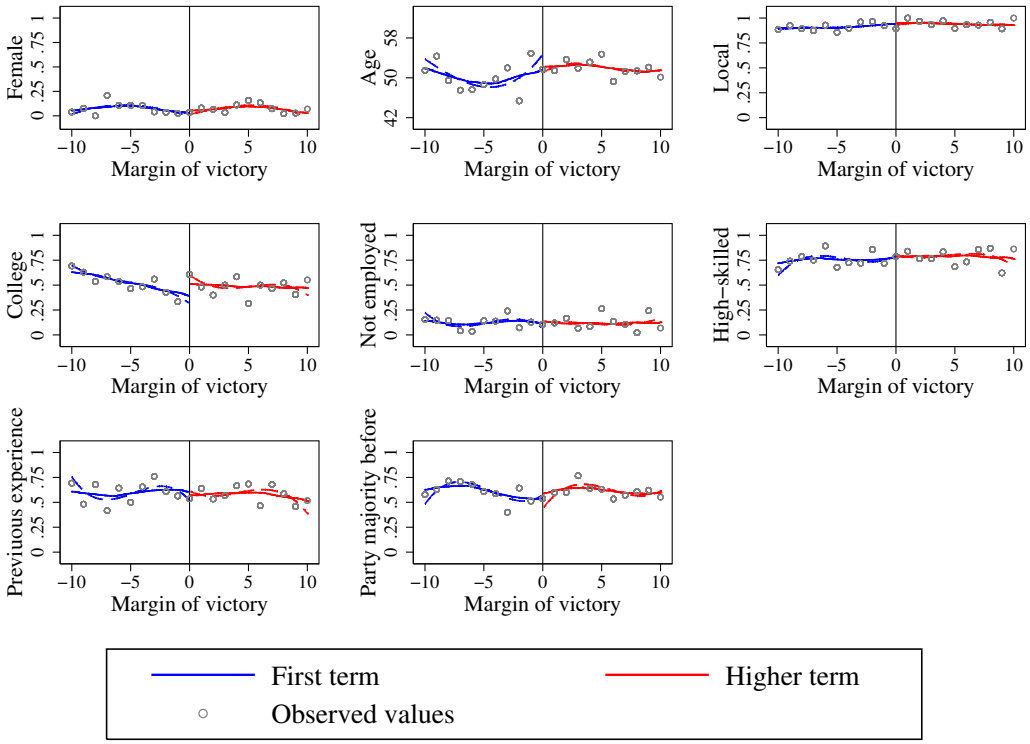
Notes. For values of MV smaller than zero, the mayor is at the first term, while for values above zero the mayor is at the second term or more. Circles are average observed values, the bold solid line is a kernel estimate (see McCrary, 2008), and the two thin lines are 5% confidence intervals.

Figure 6: Pre-determined City Characteristics, RDD



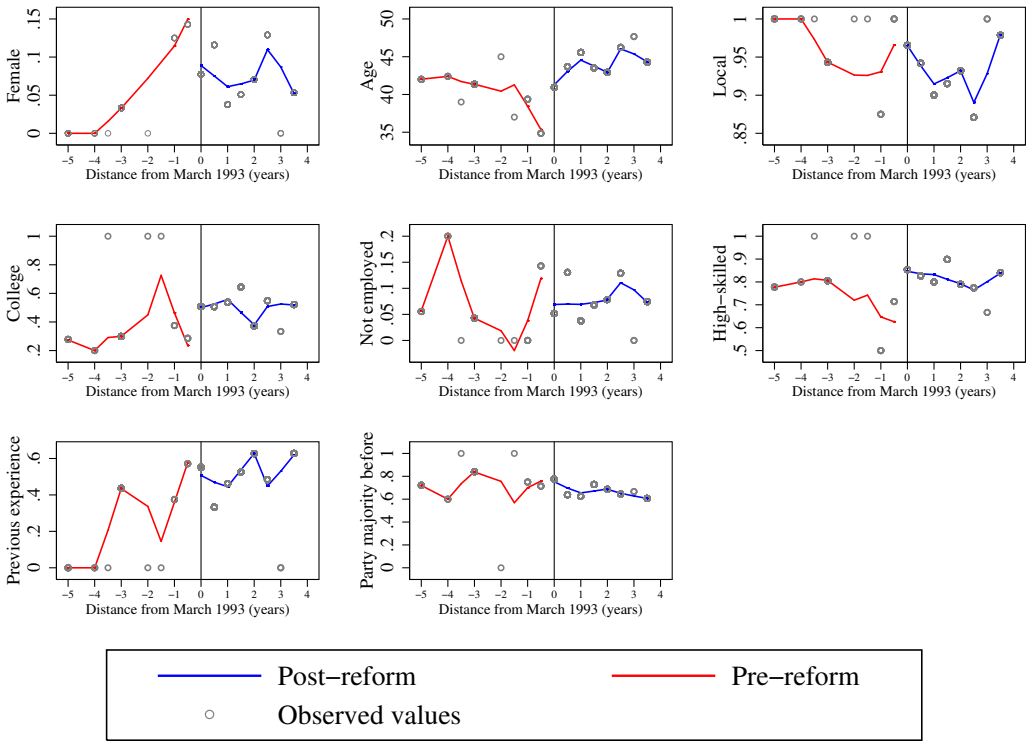
Notes. For values of MV smaller than zero, the mayor is at the first term, while for values above zero the mayor is at the second term or more. The solid line is a running-mean smoothing (least squares), separate on either side of the threshold; the dash line is a third-order polynomial fit, separate on either side of the threshold. *Altitude* is the city's altitude above sea-level. *Extension* is the geographical extension of the city administrative territory. *Population* is the Census population as of 1991.

Figure 7: Pre-determined Mayor Characteristics, RDD



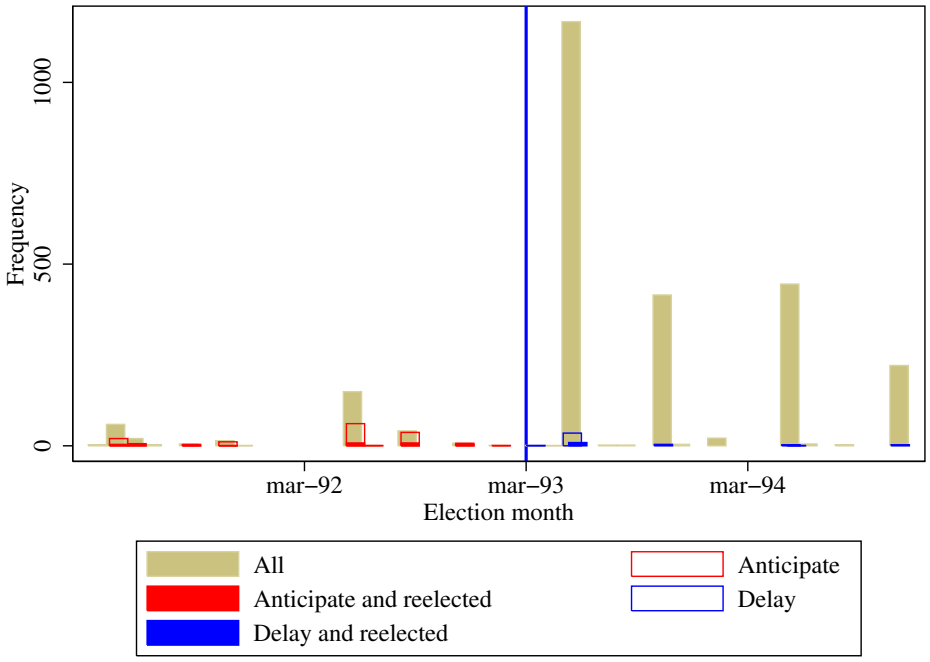
Notes. For values of MV smaller than zero, the mayor is at the first term, while for values above zero the mayor is at the second term or more. The solid line is a running-mean smoothing (least squares), separate on either side of the threshold; the dash line is a third-order polynomial fit, separate on either side of the threshold. *Local* is a dummy for being born in the same region. *High-skilled* includes entrepreneurs and self-employed. *Previous experience* is a dummy for whether the mayor was in the council or in the executive committee before. *Incumbent party* is a dummy for whether the incumbent party was majority in the previous term.

Figure 8: Mayor Characteristics Around the March 1993 Reform



Notes. The solid line is a running-mean smoothing least squares estimates, separate on either side of the threshold. All mayors in the fuzzy-RDD estimation sample. *High-skilled* includes entrepreneurs and self-employed. *Local* is a dummy for being born in the same region. *Previous experience* is a dummy for whether or not the mayor was in the council or the executive committee before. *Incumbent party* is a dummy for whether the incumbent party was majority in the previous term.

Figure 9: Manipulation of the Election Timing Around the March 1993 Reform



Notes. The blue vertical line denotes the time of the electoral reform.

Appendix A: Extra Tables and Figures

Table A.1: RDD Robustness: Model Specification and Sample Selection

	(1)	(2)	(3)	(4)
Dependent variable:	N. of bidders	Winning rebate	Winner local	Max % wins same firm
Pre-treatments	-2.606***	-0.643	4.408**	4.570*
	(1.009)	(0.422)	(2.082)	(2.730)
No controls	-4.709***	-1.581**	6.546***	10.696***
	(1.355)	(0.664)	(2.253)	(2.926)
Asymmetric	-1.977	-1.625***	0.549	7.579**
	(1.778)	(0.607)	(3.419)	(3.492)
4^{th} order polynomial	-2.448***	-0.761**	3.901*	5.230**
	(0.937)	(0.309)	(2.169)	(2.219)
3^{th} order polynomial OB	-2.257**	-0.728**	3.868*	7.524**
	(0.955)	(0.334)	(2.289)	(3.394)
Local Linear OB	-1.297	-0.724	-1.079	7.389*
	(1.357)	(0.454)	(3.310)	(3.948)

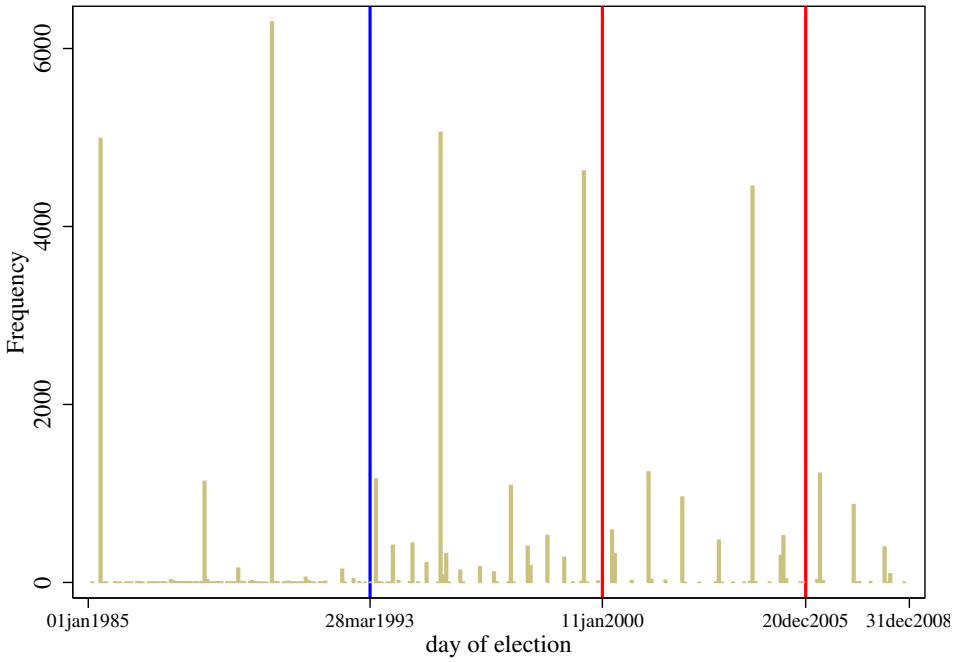
Notes. Coefficients on the number of terms in office at the discontinuity point. *N. of bidders* is the number of firms that submitted a bid. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Winner local* is a dummy for whether or not the winning firm is registered in the same region. *Max % wins same firm* is the highest percentage of public tenders assigned to the same firm within the term and is term invariant. Each of the rows indicates a different specification of the empirical model: *Pre-treatments* (5 macro-area dummies, the number of resident inhabitants at the beginning of the term; the citys altitude above sea-level; the geographical extension of the city administrative territory; an indicator of mayors born in the same region of the municipality; 2 education dummies, 3 previous occupation dummies, a dummy for being born in the region are included in the baseline specification); *No controls* (only a dummy for whether or not the mayor can be reelected); *Asymmetric* (the interaction of the 3^{th} order polynomial in the margin of victory with the tenure indicator is included in the baseline specification) 4^{th} *order polynomial* (the 4^{th} order polynomial in the margin of victory and a dummy for whether or not the mayor can be reelected are included in the baseline specification); 3^{th} *order polynomial OB* (the baseline specification is estimated in the optimal bandwidth sample selected with the Imbens and Kalyanaraman (2013) procedure); *Local Linear OB* (an interaction of the tenure indicator and the margin of victory is included in the baseline specification and it is estimated in the optimal bandwidth sample selected with the Imbens and Kalyanaraman (2013) procedure). Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table A.2: RDD Robustness: Placebo Tests

	(1)	(2)	(3)	(4)
Dependent variable:	N. of bidders	Winning rebate	Winner local	Max % wins same firm
	A: No controls			
$MV > 0$	2.736	1.725	-3.002	-13.467***
	(6.166)	(1.675)	(3.770)	(4.848)
$MV < 0$	2.592	3.410	-6.935	20.714**
	(4.616)	(2.689)	(8.288)	(9.261)
	B: Controls			
$MV > 0$	-1.158	0.282	-0.185	-2.007
	(1.822)	(0.364)	(2.366)	(2.269)
$MV < 0$	3.215	-1.680*	-9.581	14.194**
	(2.938)	(1.013)	(7.224)	(6.824)

Notes. Coefficients of the simulated number of terms in office at the discontinuity point. *N. of bidders* is the number of firms that submitted a bid. *Winning Rebate* is expressed as a percentage discount from the the starting value. *Winner local* is a dummy for whether or not the winning firm is registered in the same region. *Max % wins same firm* is the highest percentage of public tenders assigned to the same firm within the term and is term invariant. In Panel A, regressions include a dummy for whether the mayor can be reelected or not; and the 3^{rd} order polynomial in the margin of victory. In Panel B, the number of resident inhabitants at the beginning of the term, in 10,000; the reserve price is set by the contracting authority, in 100,000 euros (2000 equivalents); the tenure of the mayor's party in terms; the 3^{rd} order polynomial in the margin of victory; 102 province fixed effects dummies); year dummies; the budget balance deficit in percentage of the revenues at year level, and the judiciary efficiency at year-regional level; the squared term of the starting value, 5 object characteristics dummies, 1 selection mechanism dummy; 2 mayors' education dummies, 3 previous occupation dummies, a dummy for being born in the region; a dummy for being in the last year before the next election, 2 political party dummies, a dummy for previous experience in council or executive committee. All mayoral and electoral characteristics are at the beginning of the term. Standard errors are robust to clustering at the mayor level in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Figure A.1: Election Timing



Notes. The blue vertical line denotes the time of the electoral reform. Between red lines: the period over which we have auction data. *Early termination* is before the beginning of the last year in office because of: mayor's resignation, vote of no confidence by 50% of either the council or the executive committee. *Early termination* is computed on terms elected before 2003 only, otherwise right censored.

Appendix B: Conceptual Framework

In this section we illustrate a simple theoretical model that we use to rationalize the evidence on the effects of tenure in office on procurement outcomes. Figure B.1 describes the time-line of the model for a generic period/auction t. Collusion takes place in a sequence of two hypothetical stages, over infinitely many first-price auctions.[33] In the first stage, a new mayor searches for a collusive bidder. The mayor, in exchange for a bribe, commits to reveal the highest bid and to allow the collusive bidder to adjust his bid. In the second stage, the favored bidder can adjust his original bid and win, if the highest bid was lower than his own private valuation. In this case, he earns the difference between his valuation and the highest bid, minus the bribe. A long-lived relationship is settled if the mayor is matched with a collusive bidder; otherwise in the next period/auction he searches for another bidder. We illustrate the model by focusing on one generic sub-game (t) and discuss the main assumptions. We then present the predictions of the model and its implications.

2.1 Stage 1: Collusion/Search Game

At any point in time (t), for $t = (1, 2, ...)$, a mayor is delegated by the principal (the citizens) to run one sealed-bid first price auction.[34] In each auction there are N_t bidders, and entry is costless. The mayor is randomly matched with one of the N_t bidders. In exchange for the promise of a bribe $B > 0$, he commits to reveal the highest bid and to let the bidder adjust the bid after the auction takes place, as well as every future auction.[35] The bribe is assumed to be fixed and exogenously determined.[36] The mayor has no costs of revealing the information, and can test only one bidder per auction. With probability π he is matched with a collusive bidder, i.e., a bidder who is willing to pay a bribe; otherwise he is matched with a non-collusive bidder who is not willing to pay the bribe. In this simplified setup, the mayor's per-period expected revenues from collusion are strictly positive and larger than the revenues from non collusion, as $V_c^m = \pi B + (1 - \pi)0 > V_{nc}^m = 0$. Hence,

[33] As we have shown in Section 4.3, while mayors have term limits, still a significant fraction of them (57%) is later appointed at higher offices or within the same administration (but a different office). It is then plausible to assume that they actually face a continuation game. Moreover, if the payoffs in the continuation game are large enough, collusion is still an equilibrium even when the continuation probability is small (Mailath and Samuelson, 2006). Using the available political and procurement data, we find that projects administered by provincial governments are larger (an average starting value of 650,000 euros).

[34] From now on, we will refer to a generic ascending auction, which is equivalent in its functioning to a descending procurement auction.

[35] The agreement is reached in Stage 1, but the transfer in Stage 2 after the auction takes place.

[36] We do not have direct evidence of favoritism (bids adjustments, envelopes substitutions, or fake bids submissions) and bribes' exchanges as for example in Ferraz and Finan (2010), Ingraham (2005) and Tran (2010). However, the cases of kickbacks in Italian procurement auctions, reported by newspapers, share the same dynamics discussed in the literature.

it is always optimal for the mayor to collude. If no collusion occurs then at the beginning of period $t+1$ the mayor searches for another bidder.

The bidder's decision problem is to choose whether to pay or not the bribe B. The amount of the bribe is assumed to be fixed and exogenously determined. This decision depends on the exogenous costs of collusion C_j: collusive bidders have low cost of collusion C_L, while non-collusive C_H, with $C_H > C_L$. If the matched bidder is of a collusive type, $V_c^b > V_{nc}^b > 0$ and paying B is always optimal (where V_c^b and V_{nc}^b are the expected revenues from collusion and from a standard first price auction). If the matched bidder is non-collusive, $V_{nc}^b > (V_c^b - B) < 0$ and he will never pay the bribe B.

2.2 Stage 2: Procurement Auctions with Collusion

At the beginning of each Stage 2, bidders' valuations of the good ν_i are identically and independently drawn from the c.d.f. $F(\nu)$, with support over the interval $[\underline{\nu}, \overline{\nu}]$ within the independent private value framework. $F(\nu)$ is assumed log concave, hence the ratio $\alpha(\nu_i) = \frac{F(\nu_i)}{f(\nu_i)}$ is increasing and bidders are risk neutral. There is no reserve price, and the bidder with the highest bid is awarded the auction.

The core of this setup is the information structure. We denote by $h(t)$ the public history of the game. At the beginning of every period/auction, the $N_t - 1$ non-favored bidders learn t, the time the mayor has been in office. This information is publicly known, likewise the proportion of collusive bidders in the population π. Bidders use this information to compute $P_t = 1 - (1-\pi)^t$, the probability that the mayor has found a collusive bidder after t independent trials, which is increasing in t. The auction, therefore, is asymmetric: with probability P_t there is one favored bidder, and with $1 - P_t$ there are $N_t - 1$ non-favored bidders. To avoid both explicit and tacit collusion between bidders, we assume that bidders do not communicate and that the identity of present and past winners is not immediately observed (Skrzypacz and Hopenhayn, 2004). We also restrict the attention to equilibria where players' bids depend only on their current valuation and the public history of the game. This is equivalent to assume that at every auction there is a new set of non-collusive bidders replaced, for example because they rotate across municipalities.[37]

The auction proceeds as follows. A favored bidder (denoted by c) is allowed to observe the highest bid b_h, and may opt to adjust his original bid and set $b_c = b_h + \varepsilon$ if this is lower than his valuation, v_c. The $N_t - 1$ other bidders are all symmetric, and their beliefs about the collusive bidder are reflected in P_t. Bidding is guaranteed by the fact that some of the $N_t - 1$ bidders in any auction may value the good more than the colluded bidder.

Assuming that the expected continuation payoffs of winning or losing the auction

[37] This assumption is compatible with the requirements of the procurement law that prescribes contractors to submit financial guarantees before bidding. Depending on their assets, contractors, might then be limited in the possibility of participating in succeeding auctions.

for the non-collusive bidders are the same as in a one-shot game, we describe the per-period bidding behavior of the $N_t - 1$ non-favored bidders. A non-favored bidder solves a maximization problem according to a strictly increasing inverse bidding function $\phi(\cdot)$:[38]

$$\max_b (\nu_i - b) \left[P_t (F(\phi(b))^{(N-2)} F(b) + (1 - P_t)(F(\phi(b))^{(N-1)} \right] \tag{5}$$

where the term in square brackets is the probability that a non-favored bidder i wins the auction by bidding b, $F(\cdot)^{(N-2)}$ is the probability that a non-favored bidder defeats the $N-2$ honest rivals, and $F(b)$ is the probability of defeating the favored bidder.

We consider a symmetric equilibrium where $\nu_i = \phi(b)$ for all the non-favored bidders. Given the information structure, we can consider each auction as independent and use the results from Arozamena and Weinschelbaum (2009). If $\alpha(\nu) = \frac{F(\nu)}{f(\nu)}$ is strictly concave, then $\phi_t(b) < \phi_{t+1}(b)$, as $\phi_t(b)$ is strictly increasing in t for all $b > \underline{\nu}$, and the per-period expected revenues of the auction (the per-period coalition's expected utility) are decreasing (increasing) when $0 \leq P_t < P_{t+1} \leq 1$.

After the auction is concluded, with some exogenous probability the term ends, and with the complementary probability the mayor continues in office and runs one more auction in the next period.

This simplified model only considers the case in which the mayor reciprocates the bribe by showing the highest bid to the colluded bidder, then allowing that bidder to adjust his price. Other equivalent mechanisms could be considered, though. For example, the mayor could grant the collusive bidder *ex-post* favorable renegotiations relative to the original contract, both in terms of time to delivery and costs. In this way, the colluded bidder can bid more aggressively, even above its valuation, and win the auction with a higher probability than if all firms were equally competitive.

2.3 Predictions

In this model an equilibrium is defined by the mayor, the favored bidder, and the non-favored bidders optimization problems, plus the commonly known probability of collusion P_t. A public perfect Bayes-Nash equilibrium exists because: it is always optimal for the mayor to ask for a bribe; ii) it is optimal for the collusive bidder to pay the bribe; iii) the equilibrium bidding function of non-favored bidders maximizes equation (5) in a perfect Bayes-Nash Equilibrium; (iv) it is optimal for non-collusive bidders not to pay the bribe. As long as P_t is increasing in t, one potential equilibrium of the model is characterized by a gradual diffusion of collusion over periods/auctions, where in each following period/auction non-colluded bidders learn the probability that the mayor has found a colluded bidder,

[38] For the average bid auction framework, this assumption is supported by the experimental evidence of Chang et al. (2014).

and behave accordingly.[39] The model delivers the following predictions:

Prediction 1 *As the mayor's tenure in office increases, the probability that auctions are assigned to the same bidder increases.*

Proof. By construction of P_t, if $0 < \pi < 1$ then $P_{t+1} > P_t$.

Prediction 2 *As the mayor's tenure in office increases, the revenues from the auction decrease.*

Proof. This follows from the results of Proposition 3, pg. 651 of Arozamena and Weinschelbaum (2009) as in our setup each auction can be treated as independent and the increase in P_t exogenously determined by the time in office of the mayor.

In presence of entry costs, the number of bidders may also depend on the mayor's tenure in office. The main intuition is that non-favored bidders will enter up to the point where their expected profit is larger than the entry cost k, with $k > 0$ (Menezes and Monteiro, 2000). Since $P_{t+1} > P_t$, the expected profits of non-colluded bidders should also decrease with t, thus reducing the participation of less efficient bidders. Therefore, when entry is costly we expect that:

Prediction 3 *As the mayor's tenure in office increases, the number of bidders per auction decreases.*

We also enrich the model by arguing that local bidders might have lower costs of bribing (or lower entry costs), i.e., they find easier to pay the bribe to the mayor (Garicano et al., 2005). If types (local or not) are not perfectly observed before the first interaction, it follows that:

Prediction 4 *As the mayor's tenure in office increases, the probability that the winner is local increases.*

Finally, we extend the model and consider the effect of a policy that removes the mayor from politics at the end of every period (a one period term limit in politics). Since in this new scenario the structure of the game is the same, we can focus on the probability of collusion computed by the non-favored bidders ($P_t = 1 - (1 - \pi)^t$). Accordingly, every period non-favored bidders know that the mayor is new mayor ($t = 1$) and matches with a collusive bidder with probability (π), so the model predicts:

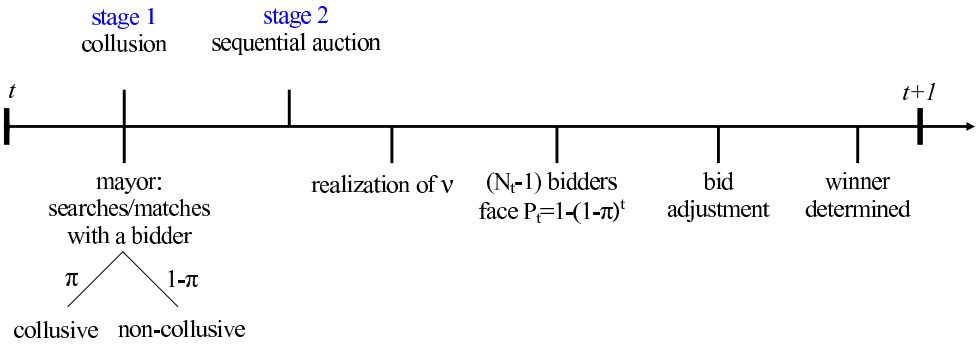
[39] A more sophisticated equilibrium should consider the role of citizens/voters (the principal) in disciplining mayors (the agent) granting or not reelection. This would clearly enrich the dynamics of the model and the number of testable predictions, at the price of complicating the analysis of collusive dynamics. We leave this extension to further research, while addressing its empirical implications in Section 4. There, we discussed how the interaction between mayors and voters could bias our empirical analysis, and how our identification strategy allows us to take voters' behavior as exogenous.

Prediction 5 *A policy that rotates the mayor every period delivers a constant level of collusion, and the outcomes of the auctions are constant over time.*

Proof. It is a sequence of one shot games with $P_t = P_1 = \pi$, which is constant $\forall\ t$.

As a concluding remark, notice that the model considered the possibility of favoritism as in first-price auctions, while to be more coherent with the Italian institutional setting the model should consider that the winner of the auction is the one who bids the highest value below the *averaged-average* (see Section 2). However, even in this set-up non-favored bidders will compete against a favored bidder, who eventually observes a particular moment of the distribution of the bids (the averaged-average bid, instead of the highest bid), and may adjust and win. For this reason, we believe that a more complicated model would not give qualitatively different predictions from the one we propose.

Figure B.1: The Time-line of the Model



Notes. π is the proportion of colluded bidders in the population. ν_i is the individual evaluation.

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