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Evidence from Procurement Auctions

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ABSTRACT

Building Political Collusion: Evidence from Procurement Auctions[*]

We investigate the relationship between the time politicians stay in office and the functioning of public procurement. To this purpose, we collect a data set on the Italian municipal governments and all the procurement auctions they administered between 2000 and 2005. Identification is achieved through the introduction of a two-term limit for the mayor in March 1993: since elections were not coordinated across cities, and previous terms were not counted in the limit, mayors appointed right before the reform could be reelected for two additional terms, while the others for one only. Our primary finding is that one extra term in office deteriorates public spending. In fact, it decreases the number of bidders and, most importantly, the winning rebate. Interestingly, we also find that the probability that the same firm is awarded more auctions, or that the winning firm is local, increases with time in office. These results are compatible with the predictions of a model of favoritism in repeated procurement auctions, where time reveals collusive types, thus increasing the value of illegal connections at the expense of higher procurement costs.

JEL Classification: D44, D72, D73, H57, H70

Keywords: procurement auction, collusion, public works, time in office

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1 Introduction

The miss-practice of using procurement contracts to strategically allocate public funds to interest groups is widespread, and it grants incumbent politicians a powerful tool for consolidating their consensus through favoritism, and eventually get bribes. Little is known, however, about the process that generates political collusion.

We tackle this issue and investigate whether the functioning of public procurement is affected by the time politicians stay in office (i.e., the political longevity) using a data set on the Italian municipal governments and all the procurement auctions for the realization of public works that they administered between 2000 and 2005. The data set is particularly suited for the analysis, as it gathers detailed information on the identity of mayors and contractors over electoral terms, and it finally allows us to compute the monetary cost of the time in office.

For identification purposes, we exploit the introduction in March 1993 of a two-term limit on the mayoral office. Since elections were not coordinated across cities, and previous terms were not counted in the term limit, mayors appointed before the reform could be reelected for two additional terms, while those elected after the reform for one only. Under the assumption that the election timing could not be manipulated, but it was the result of an idiosyncratic scheduling, we use the date of election (before or after March 1993) as an instrument for the time in office, and analyze the impact on a several outcomes characterizing the functioning of the procurement auctions. Remarkably, this quasi-experimental framework also allows us to separate the effect of political longevity from the effect of the lack of electoral accountability (see Besley and Case, 1995; Ferraz and Finan, 2010), as mayors elected after the reform faced the term limit when in the second term, while those elected before the reform faced it when in the third term or more.

To correct for the simultaneous introduction of another reform that might have affected the composition of the treated and the control group differently (the change in the mayor's electoral rule from party to individual ballot), we implement a fuzzy Regression Discontinuity Design focusing on elections that were held right before and after March 1993. It is reasonable to assume, in fact, that while the term limit applied sharply to all the mayors elected after the reform, the effect of individual ballot elections on the selec-

tion of appointed mayors was instead more resilient, because of the initial difficulty for parties to recruit candidates more suitable to the new electoral system. For this reason, mayors elected around the reform should be *ex-ante* otherwise identical in terms of both observable and unobservable characteristics.

Main results show that one extra term in office reduces the number of bidders participating in the auctions (-21.74% in the 2SLS specification) and, more importantly, the winning rebate (-12.36%). A back of the envelop calculation suggests that an average public work costs about 8,000 euros more in municipalities with a third term mayor, as opposed to municipalities with a second term mayor.[1] We also find that having the same mayor in power for an additional term increases the probability that the contract is awarded to a local firm (+2.78%, although not precisely estimated), or to the same firm repeatedly (+26.32%).

Our findings are compatible with the predictions of a stylized model of favoritism in procurement auctions (Arozamena and Weinschelbaum, 2009; Burguet and Perry, 2009), where time reduces the asymmetric information between mayors and bidders (Ghosh and Ray, 1996). Under the assumption that types (collusive or not) are not immediately observable, the model predicts that time in office increases the probability that the mayor will find a collusive bidder, thus increasing the value of preferential relations. This implies a higher probability that the same firm is awarded consecutive auctions and, if locals have lower costs of colluding, also a higher probability that the winner is a local firm. Under certain assumptions about the distribution of bidders' evaluations, the model further predicts that as mayor's longevity increases non-colluded bidders bid less aggressively and, in the presence of entry costs, the number of bidders decreases.

The rest of the paper is organized as follows. In Section 2, we review the related literature. In Section 3, we describe the Italian institutional background, and in Section 4 the data. In Section 5, we explain the identification strategy, and in Section 6 we present the main results. In Section 7 we outline the conceptual framework that we use to rationalize the evidence. We conclude with Section 8.

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[1]This calculation computed using the 2SLS estimate of the effect on the winning rebate, for a public work with an average starting value of 509,903 euros.

2 Related Literature

Our paper is closely related to a recent empirical literature showing that political connections boost firms' performance (Cingano and Pinotti, 2009; Faccio, 2006; Ferguson and Voth, 2008; Fisman, 2001; Goldman et al., 2009b) and drive the allocation of procurement contracts (Goldman et al. 2009a; Hyytinen et al., 2009). While focusing on similar collusive behaviors, we highlight the possibility that political connections may grow with time in office, as it takes time for politicians and firms to reveal their collusive intentions.

We also differ from a number of papers studying the relationship between political stability and corruption. For example, Gamboa-Cavazos et al. (2008) use firm-level data for Mexico on extra-official payments made to public authorities, to 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 cross-country data, Campante et al. (2008) find a similar U-shaped relationship between corruption and political stability. Despite the similarities, it is important to stress that, while these papers study the effect of the remaining time in office (the political horizon) on unlawful behaviors, we focus instead on the time spent in office (the political longevity). As it will become clearer in the next section, our approach has very different theoretical arguments, including the absence of non-linearities. With this respect, we are closer in the spirit to Besley and Prat (2004), who find a positive and linear correlation between political longevity and some cross-country measures of corruption.

Some authors have emphasized the importance of experience over political careers. For example, Padró i Miquel and Snyder (2006) find that productivity, as measured by surveying legislators, lobbyists, and journalists in North Carolina about the effectiveness of the members of the House of Representatives, rises sharply with tenure. More recently, Dal Bó and Rossi (2008) exploit a natural experiment in the Argentine House of Representatives, where term lengths (2 or 4 years) were assigned randomly across members of parliament, to show that longer terms enhance legislative productivity, as measured by attendance, committee activity, and the number of legislative achievements. Applying the same argument to the case of procurement auctions, it is easy to think of a new mayor who does not have any expertise in public procurement and, after election, can only endure previous practices. However, if really motivated in reducing public spending and gaining electoral

consensus, he or she might soon learn how to improve the efficiency of the procurement process. Whether there is an effect of political longevity over the functioning of public procurement remains, therefore, an empirical matter.

Finally, our paper contributes to a recent empirical literature on corruption which makes use of direct measures of shadow behaviors, like the unlawful administration of public goods, or the amount of bribes, rather than the more traditional opinion surveys.[2] Among the others, Bandiera et al. (2009) study the introduction in Italy of a centralized purchasing authority (*Consip*), and find that the waste of public funds is mostly generated by red tape rather than bribes, and that there are sizable cost reductions in centralizing the purchase of standardized goods because of the higher competition among contractors. Ferraz and Finan (2010) use audit reports from an anti-corruption program in Brazil to construct new measures of political corruption in local governments, and test whether the term limit rule affects the corruption practices of incumbent politicians.

Compared to this literature, the contribution of our paper is twofold. First, we provide novel empirical evidence about the relationship between the time politicians stay in office and the functioning of the public procurement auctions they administrated. Second, we rationalize these findings in a theoretical setting that combines two otherwise separated strands of the theoretical literature: the one on favoritism in procurement auctions, and the one on building collusive relationships.

3   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*), which endorses the policies proposed by the mayor with majority rule. The functions of a municipal administration, besides contracting for public works, include the provision of transportation, some welfare (like assistance to elderly people, nursery schools, and public housing), and utilities (like water, electricity, and gas). In 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

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[2]See Rose-Ackerman (1999) for a survey of early studies.

inhabitants).[3] The same reform also introduced a two-term limit for the mayor, which only applied to the terms elected after the reform.[4] In September 2000 the duration of the legislature was extended from four to five years, as it was before March 1993.

Municipalities are required to realize public works in outsourcing, and select the contractor through public tenders. Tenders are regulated by the *Legge 109/94* (so called *"Legge Merloni"*), and several amendments (*"Merloni-bis"* in 1995, *"Merloni-ter"* in 1998), which specify all the proceedings of the procurement process.[5] The auctions in our ample are sealed-bid and single-attribute (i.e., the technical component of the offers plays no role in the assignment, provided that the winner satisfies some minimum quality standards which are set by the contracting authority). Each auction is administered by a manager, who is directly appointed by the mayor among the bureaucrats of the municipality.[6] The manager supervises the whole procurement process, including the preparation of the preliminary project, the advertisement and the administration of the auction, the payments to the winning firm (upon initial approval by the city council), and monitors the realization of the work.

Participation can be of three types: the *Pubblico incanto*, where participation is open to any firm satisfying some minimum technical requirements; the *Licitazione privata*, which is similar to *Pubblico incanto* except that it is the contracting authority that invites to participate all the firms satisfying some technical requirements; finally, the *Trattativa privata*, where the contracting authority only invites a restricted number of firms, with a minimum of 15.[7] The choice of a particular participation mechanism depends on the starting value of the auction, plus some other technical components.[8]

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[3]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 leaded to the dissolution of the Christian Democratic Party (*Democrazia Cristiana*), which had ruled the country for over forty years, and to the end of the so called *"Prima Repubblica"* (First Republic).

[4]The term limit only applies to terms lasting for more than two years.

[5]Other legislative changes were introduced in 2006, but they did not concern our sample (2000-2005).

[6]In our sample, the manager is replaced 88% of the times that a new mayor is elected, against 33% in case the mayor is reelected.

[7]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.

[8]The terms of the procurement contract (the time of the work delivery, and the cost of the work) might be renegotiated in cases of unforeseen natural events (like storms, earthquakes, landslides, etc.).

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 (also called the reserve price). The starting value is set by an engineer employed in the municipal administration, following a price-list of the standardized cost for each type of work. Accordingly, it is plausible to assume that the starting value cannot adjusted to favor, for example, bidders with a capacity constraint.[9]

Because of a complex awarding criterion, the highest rebate is not necessarily the winning rebate. To prevent firms from over-bidding (that is, bidding a price which does not allow to recoup works' expenses) a complex mechanism is implemented (see 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 averaged-average "anomaly thresholds".[10] The fact that the work is assigned to the bid that is closest to the anomaly threshold from below is particularly important in our case, because it guarantees the presence of some competitive pressure. This is not the case, for example, in other similar auctions, like a pure average bid auction, where the winning bid is the closest to the average no matter whether from above or from below.[11]

4   The Data

We use an administrative data set about all the Italian mayoral terms elected between 1985 and 2008, 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 on the legislature, like the exact duration and the reasons of any eventual early termination,

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[9]Work-safety costs are not subject to rebate.

[10]As for illustration, 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 thresholds 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.

[11]Interestingly, in our data we find that there is a positive and statistically significant correlation between the number of bidders and the winning rebate (0.424). The proof of the properties of this awarding mechanism is beyond the scope of this paper. For a discussion, see Albano et al. (2006) and Decarolis (2008).

and the electoral results. Finally, we also have yearly information at municipality level about the size of the resident population, the total revenues and expenditure, plus some demographic characteristics as of 2005, like the disposable income per capita, the labor force participation rate, the number of productive units per capita, the elderly index, the population density, and the resident population.

We combine this mayoral information with a data set about the procurement auctions 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 the public procurement auctions for public works, with starting value greater or equal to 150,000 euros. The data set includes information at auction level about the number of bidding firms, the starting value, the identity of the winning bidder, and the typology of the work. Each procurement auction is finally matched with the corresponding mayoral term, according to the date of bids' delivery.

4.1 Descriptive Statistics

The initial sample consists of all the cities for which we observe at least one auction between 2000 and 2005, and without missing information on the most relevant variables (the number of bidders, the starting value, the winning rebate, the identity of the winning bidder, plus the time the mayor has been in office).[12] To maximize sample size, we assign the sample mean (or the mode, if a dummy variable) to other variables with missing data (namely, the budget deficit, the average income per capita, whether the mayor was born in the city/province/region, the mayor's previous job and highest education level, the number of parties in the mayor's coalition, and the fraction of seats in the mayor's coalition), and include a dummy for missing status for these variables. These procedure increases our sample size by about 8.5% and allows us to obtain more precise estimates.[13] We further excluded cities with less than 500 inhabitants to avoid limiting size effects, and cities in which there had been an early termination in the past for political reasons, to avoid endogenous electoral cycles. In Table 1 we present summary statistics for the

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[12]Of the 8,104 existing Italian municipalities, 4,279 had no auctions between 2000 and 2005.

[13]All the results are qualitatively and quantitatively robust to the exclusion of the observations with any missing data.

sample of municipalities over which we run the estimation analysis.

The final sample is made of 3,825 cities, representatively distributed across the country: 40% located in the North-West of Italy, 20% in the North-East, 14% in the Center, 22% in the South and only 4% in the Islands. The average municipality is fairly large, with 11,668 inhabitants. Only 8% of the observed mayors (5,219, see Table 2) are women, 52% were born in the same municipality they run (85% in the same province, 94% in the same region), and about 52% have a college degree, while 47% have a secondary school degree, the remaining 1% with an elementary degree only.[14] Almost 11% were not employed before being appointed (either unemployed or out of the labor force), the majority being employed in high-skilled occupations (77%, including managers, self-employed and entrepreneurs), followed by medium-skilled (9%, including clerks), and low-skilled (3%, including blue-collars).

With respect to the political characteristics, 30% of the mayors had been elected with a center-left party, only 11% with a center-right party, and all the rest with a center-wing, separatist or unidentified party (many parties were local). 58% of the mayors are in the first term, 35% in the second term, and only 7% in the third or fourth term, with 39% facing a term limit. Interestingly, the mayor's party longevity is slightly lower than the mayor's longevity, mostly because some mayors changed party between terms, or because some parties changed their name and could not be matched between terms. Mayoral coalitions are fairly homogeneous (1.31 parties) and stable (67.79% of the seats in the council), as a result of the majority premium awarded to the winning coalition (60% in cities with more than 15,000 inhabitants, 67% in small cities).

Table 3 describes the characteristics of the auctions in the sample, where we excluded outliers with none or more than 100 bidders. The total number of auctions is 27,537, with an average number of bidders equal to 21.34, and a winning rebate of 12.97%. In 12% of the cases the winner was a firm registered in the same city (52% in the same province, and 70% in the same region), and on average the highest percentage of auctions within a term awarded to the same firm is 24%. In only 9% of the cases the selection criterion was the private invitation (*Trattativa privata*), the rest being with open participation (*Pubblico incanto* or *Licitazione privata*). The average size of the public work is relatively small, with

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[14]All mayors' characteristics computed at the beginning of each observed term.

an average starting value of 540,000 euros.[15] The majority of the public works concern the construction of roads (23%), then schools (13%), public building (5%), public housing (1%), and art-related constructions (4%). It is also interesting to note that the number of auctions per year was constant over the period 2000 and 2004 (between 15% and 20% per year), although there are fewer auctions in 2005 when the sample was originally collected.

5   Identification Strategy

We want to test whether the time a mayor remains in office can affect the functioning 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:

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

where y_{im} is the outcome of the auction; T_{im} denotes the mayor's longevity in office at the time 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 composed by a mayor 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 longevity at the date of the bids' delivery and the term in office.[16]

In equation (1), 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 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 20 Italian regions, to control for time invariant characteristic at local level; an indicator for the judicial efficiency at year-region level, to control for differences in the quality of local institutions;[17] the budget percentage 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

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[15]Values reported in 2000 equivalents, using the OECD CPI index.

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

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

second order polynomial of the starting value of the auction (i.e., the reservation price of the contracting authority) in 100 thousands euros and 2000 equivalents; an indicator of whether the selection mechanism of the auction was with public participation or with private invitation; and five object 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: an indicator for whether the mayor faces a term limit; the number of parties in the mayor's coalition; the number of majority seats belonging to the mayoral coalition; two dummies for the mayor's party (center-left and center-right); the longevity in power 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 address the censoring of terms that starting before 2000 or to be concluded after 2005.

With respect to y_{im}, the data set contains a large number of outcomes that can help describing the functioning of the procurement process. 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 the maximum percentage of adjudications to the same firm per year (weighted by the number of auctions), the latter being term invariant.[18]

5.1 The Electoral Reform: Instrumental Variables

In this section we address the endogeneity of the time in office (T_{im}). More colluded mayors, in fact, might be able to survive longer if the rents produced by collusive behaviors help them to be reelected. Conversely, colluded mayors might have hard time to get reelected if voters punish their unlawful behavior in the ballot.

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[18]Since we do not observe all the auctions within a term, but only those between 2000 and 2005, we could not compute other measures of incumbency, like the probability that the winning firm had already been awarded in the past, or the number of times that the same firm had been awarded in the past.

We deal with this problem by taking advantage of an electoral reform, approved on March 27, 1993, which induced a variation in the potential time in office of a randomly chosen group of mayors. As explained in Section 3, the reform introduced a two-term limit for the mayor. Interestingly, the limit only applied to the terms elected after the reform, determining two groups of mayors: those elected for the first time before the reform (the treatment group) could stay in office for at most three terms, as the first term was not included in the computation of the term limit, while those elected for the first time after the reform (the control group) for at most two terms. In Figure 3 we graphically illustrate the potential effect of the reform on these two groups. Here, the continuous lines denote the first term around the reform, while the shaded lines the potential additional terms faced by each two group of mayors.

The institutional framework offers a unique natural experiment, because the timing of local elections is not completely synchronized neither between nor within regions (to a certain degree, any city has its own scheduling, depending on region/province/city-specific past events), which provides a source of heterogeneous variation across the country. For our identification strategy to hold, however, what really matters is that mayors could not anticipate the introduction of the term limit, in which case we could treat the potential time in office "as if randomly" assigned. 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, in search for any suspicious density jump.

As a by-product of the reform, Figure 3 also shows that some mayors happened to face the term limit when in the second term, while others when in the third term. Thus, comparing second term mayors with and without a term limit, and second term and third term mayors with a term limit, will also allows to separate the effect of the time in office from the effect of the lack of electoral accountability, which is instead a major empirical issue in many other studies (e.g., Besley and Case, 1995; Ferraz and Finan, 2010).[19]

Following the above discussion, we re-estimate equation (1) within a two-stage frame-

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[19]The same argument applies in the estimation of equation (1).

work. As an exclusion restriction in the first-stage, we use an indicator for whether the mayor was elected for the first time before March 1993, and then add the full set of available regressors considered in the baseline specification. The resulting first-stage equation looks as follows:

$$T_{im} = a + bPR_m + c_1 X_i + c_2 X_m + e_{im} \tag{2}$$

where, because of the term invariant nature of the instrument, T_{im} is the number of terms in office, and PR_m indicates whether the date of the first election was before March 27, 1993.[20] This estimate is run over the sample of mayors elected for the first time between five years before and four years after the electoral reform (i.e., between March 27, 1988 and March 27, 1997, as the duration of the legislature before and after the reform was 4 and 5 years, respectively), to be sure that no one in the sample could be reelected for a second term before the implementation of the reform. This procedure delivers a final sample of mayors in the second term (with or without a binding term limit) and in the third term.

5.2 Multidimensionality of the Policy

One threat to our identification strategy comes from the validity of the exclusion restriction. The 1993 reform, in fact, also introduced other changes in the institutional setting that might have had a direct effect on the way public procurement auctions were administered.[21] In particular, the reform changed the mayor's electoral rule from party to individual ballot. This may have induced a different selection of candidates, as the new electoral system was more competitive and because citizens could choose their most favorite candidate without parties interfering.[22] Although this is a major concern, it is worth

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[20]Other estimation strategies could have been implemented. With repeated observations per mayor, over terms and auctions, we could exploit the longitudinal structure of the data. Under the assumption that unobserved collusion is time/auction invariant, and in presence of enough within-mayor variability, the fixed-effect estimator is a powerful solution for the omission of any time/auction invariant characteristic, like the propensity to collude. However, we decided not follow this strategy for two reasons. First, because the assumption of time/auction invariance of collusion is not reasonable in our context, as unlawful behaviors may grow with time in office. Second, because in our data the within-mayor variation in the number of terms is much smaller than the between-mayor variation, which makes it difficult to deliver precise fixed-effect estimates.

[21]The reform also introduced a majority premium for the mayor's coalition of at least two-thirds of the seats in the council (see Section 3). This feature is not relevant for our analysis, except for the effect on the probability of early termination. We will discuss this point in Section 6.2.1.

[22]See Section 3 for more details.

recognizing two things. First, this selection bias is minimum within the 2SLS 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 was instead more resilient, because of the initial difficulty for parties to recruit suitable candidates for the new electoral system. If this is true, focusing on mayors elected right before and right after the 1993 reform should remove the bias due to the different electoral rule for the treated and the control group.

Following a fuzzy Regression Discontinuity Design (RDD) approach, we augment equation (1) and (2) with a function of the distance of the first election from the discontinuity threshold as follows:

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

and,

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

where $dist_m$ is the time distance of the first election from the March 1993 reform, and $f(.)$ and $g(.)$ are flexible functions. Since the running variable is not continuous, as elections are held at few points in time (see Figure 4), we specify $f(.)$ and $g(.)$ as a series of time dummies. As discussed in Lee (2008), 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. If there were nonrandom selection around the 1993 reform, we should expect some of these characteristics to differ systematically.

6   Empirical Evidence

To begin with, in Figure 2 we plot the term average of six variables that characterize the procurement process, for the case of a first term mayor who is reelected for a second term, and does not face a term limit. As for the amount of public works, we report the total number of auctions per term and the starting value per auction. As for the auction outcomes, we report the number of bidders, the winning rebate and the geographical identity of the winner per auction, plus the highest percentage of auctions awarded to the same

firm within the term.[23] Looking at the figure, we do not detect any significant variation in the number and the size of the public works over terms, except for a slightly higher number of auctions in the first term. This is evidence that the amount of construction works is independent from the electoral cycle, and simply follows the necessities of the municipality.[24] We find instead some preliminary evidence that the time in office deteriorates the functioning of the auctions, with a clear drop in the number of bidders and in the winning rebate when a mayor is elected for a second time, and a positive jump in the probability that the winning firm is local and in the highest percentage of auctions awarded to the same firm.[25] We focus therefore the empirical analysis on the auction outcomes (the number of bidders, the winning rebate, and the identity of the winner), and treat the amount and the size of public works as if exogenously pre-determined.

6.1   OLS Estimates

In Table 4 and Table 5 we report the OLS results from fitting equation (1) to the data. Estimates in columns 1 and 4 are computed considering the exact longevity in office (cumulated and consecutive) at the time of the bids' delivery. We first include only an indicator for whether the term limit is binding or not, while in columns 2 and 5 we also include the full set of observable characteristics discussed in Section 5. Finally, in columns 3 and 6 we report the same estimates, but replacing the number of years with the number of terms in office.

In Panel A and B of Table 4 we report the estimates on the number of bidders and the winning rebate (the *level of competition*). Estimates confirm the presence of a negative relationship between mayors' longevity in office and the level of competition in the procurement auctions. A one standard deviation increase in the years in office (3.24 years) is associated with a decrease in the number of bidders by about 6.6% (with respect to a sample mean of 21.33 bidders), and with a decrease in the winning rebate by 3.7% (with

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[23]The total number of auctions and the highest percentage of auctions awarded to the same bidder are computed on the mayoral terms elected between 1998 and 2003, to provide at least three observed years per term.

[24]For example, the construction of public infrastructures is usually determined in advance in accordance with the central government, which allocates the transfers.

[25]We find similar figures for the case of a mayor reelected for a second term, but facing a term limit. The only difference is that the drop in the number of bidders and in the winning rebate is less significant.

respect to a sample mean of 12.97%). Similarly, one additional term in office is associated with a decrease in the number of bidders and in the winning rebate by about 10.1% and 5.7%, respectively. The invariance of the estimates with respect to the measurement unit (years or terms) is also reassuring against the possibility that the different duration of the terms elected before and after September 2000 (4 and 5 years) could influence our results.

The coefficient on the term limit is statistically significant over the number of bidders, showing a higher participation when a mayor is about to leave the office, but with no consequences on the final adjudication price. The estimated coefficients on the resident population are all positive and statistically different from zero for both outcomes at 1% level, suggesting 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 greater the willingness of potential bidders to enter.[26] We do not find instead any effect of the mayor's party longevity on both outcomes, which makes us think that, because of the increased power of the mayor that followed the 1993 reform, political parties might have become less important in the procurement assignment. We do not find any effect also for the majority seats belonging to the mayor's coalition, but some positive effect for the number of parties in the mayor's coalition on the winning rebate, which is statistically significant at 10% level. The latter is evidence that a high level of heterogeneity within the government coalition reduces the possibility of coordination in shaping the auction process.

In Panel A and B of Table 5 we report the estimates on an indicator of whether the winning firm is registered in the same region, and the highest percentage of auctions awarded to the same firm within the term (the *nature of competition*). Even in this case the effect is both statistically and economically significant. A one standard deviation increase in the time in office is associated with an increase in the probability that the winner is a local firm by about 2.2% (with respect to a sample mean of 70.46%), and with an increase in the maximum percentage of auctions assigned to the same firm by

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[26]Interestingly, the trend is reverted when the size of the work is too high (the square term, not reported, is in fact negative and significant), probably because of some production and financial constraints. Note also that the law shapes the admission requirements as a function of the starting value of the auctions (increasing, concave, and discontinuous).

10.3% (with respect to a sample mean of 24.41%).[27] Similarly, one additional term in office is associated with an increase in the probability that the winner is local by about 3.8% and 14.7%, respectively. The estimated coefficient on the resident population is positive for the first outcome, but not for the second, while the coefficient on the starting value is always negative and statistically different from zero for both outcomes, which is compatible with the idea that the bigger the size of the public work, the highest the monitoring exerted by the other agents (either citizens or competing firms). We also find a positive and statistically significant effect of the mayor's party longevity on the maximum percentage of auctions assigned to the same firm, but not on the probability that the winner is local. The same is true for the majority seats belonging to the mayor's coalition, and for the number of parties in the mayor's coalition, which are both negative and statistically significant.

6.2 2SLS Estimates

Although the OLS estimates included a large number of observable characteristics, it could still be that the lack of competition induced by hidden collusive behaviors might help politicians to be reelected, or that informed voters might punish collusive behaviors by not granting reelection. This, of course, would severely bias the OLS estimates. To take care of the potential reverse causality between T_{im} and y_{im}, we present the results of a 2SLS estimation, as explained in Section 5, where we use the shift in political longevity induced by the March 1993 reform as an excluded instrument.

6.2.1 Validity Tests

Before presenting the 2SLS results, we argue on the quality of the instrument. We first report evidence that the election timing was independent from the reform by graphically inspecting the distribution of elections around March 1993. Figure 4 plots on the horizontal axis the time from January 1985 to December 2008, and on the vertical axis the frequency

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[27]We run the same estimation on the probability that the winning firm is registered in the same province/city. Results are quantitatively and qualitatively the same, although less statistically significant. 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. Finally, we excluded from the sample the auctions with a restricted participation procedure (*Trattativa Privata*), and did not find any difference in the results.

of elections (in light brown) and the frequency of early terminations for any political reason (in green).[28] Between 1985 and 2008 elections were held regularly, up to a certain degree of asynchronism. Early terminations, however, were more frequent before March 1993, because of the absence at that time of a majority premium for the winning coalition. To check more carefully whether there is some mass distribution of early resignations around March 1993, we focus the graphical inspection on a closer neighborhood of the reform, i.e., on the elections held between March 1992 and March 1994 only (see Figure 5). In this interval there are a few anticipated elections (red full rectangles) and also a few delayed elections (blue full rectangles). Most importantly, the majority of anticipated elections did not serve the purpose of avoiding the reform (red empty rectangles), and few of the mayors who postponed the election were then appointed for another term (blue empty rectangles).

As discussed in Section 5, another potential threat to the validity of the 1993 reform as an instrument comes from the multi-dimensionality of the reform itself, which also introduced the individual ballot election of the mayor. If so, mayors elected before and after the reform might differ in their observable and unobservable characteristics because of the different selection process. However, if the effect of the individual ballot elections was somehow resilient, because of the initial difficulty for parties to recruit candidates more suitable to the new electoral system, we should not observe significant differences between mayors elected right before and after the 1993 reform.

To address this point, in Table 6 we report the sample averages of mayors' characteristics by treatment status for the entire sample of mayors. We consider five different time windows, and test for the statistical difference of the following characteristics: gender, age, whether born in the same region, whether employed at a low occupational level, whether a college graduate, whether appointed before in any other municipal office, and the probability of being reelected for a second term.[29] These variables should meet the following

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[28]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. At 2008, we do not know whether the terms elected after 2002 terminated earlier. The variable is therefore missing after 2002.

[29]We also compared a set of dummies for whether the mayor was born in the same province/region, and for other levels of occupation/education, but results were qualitatively the same. Other city-level 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

two conditions: they should not be affected by the electoral reform, but they may depend on the same unobservable characteristics which are likely to affect the auction mechanism. Numbers in Panel A show that the differences for a one-year symmetric window (March 1992-March 1994) are never statistically different from zero. The same is true when we use a two-years symmetric window (Panel B). We do find instead that within three/four years after the reform there were systematically more females than within three/four years before the reform (see Panel C and D), mayors were more educated, more experienced, and had a higher reelection probability. In Panel E we present the same tests over the largest asymmetric window (March 1988-March 1997) that we use in the estimation of equation (4). As expected, almost all the differences are statistically significant, including the occupational level.[30] Numbers are consistent with the plots in Figure 6, where we draw a running-mean smoothing of the observed values, performed separately on either side of the 1993 reform.

Taken together, this evidence highlights a positive trend in the quality of the elected mayors, rather than a sharp change after the reform. Accordingly, we specify $f(.)$ and $g(.)$ in equation (4) as a set of year dummies, excluding the two years before and after the March 1993 reform.

6.2.2 Results

Tables 7 and 8 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, for the sample of mayors elected for the first time between five years before, and four years after the March 1993 reform.

The first column in Table 7 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, on average, 0.978 terms more than mayors elected after the reform, with the first-stage F-statistic of the excluded instrument suggesting that the instrument is relevant.

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include these two variables in all the specifications, together with all the other controls.

[30]A more accurate test would be to check the same characteristics over the sample of mayors that we use in the 2SLS estimation. However, the small estimation sample size (198 mayors in the March 1992-March 1994 window, and 335 in the March 1991-March 1995) would not deliver precise statistics. We assume therefore that, up to some small sample bias, if the balancing property is fulfilled over the whole sample of mayors, it is also fulfilled over the estimation sample. See Section 6.2.3 for a more extensive discussion.

In columns 2 and 4 of Table 7 we first report the OLS estimates over the 2SLS sample, to exclude any sample specific effect, while in columns 3 and 5 we report the second-stage estimates for the fully specified 2SLS model. We find that one term more in office causes a 21.74% decrease in the number of bidders (with respect to a sample mean of 19.70), and a 12.36% reduction in the winning rebate (with respect to a sample mean of 11.68%). In Table 8 we report evidence of the effect of the time in office on 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 causes a 26.30% increase in the maximum percentage of auctions assigned to the same firm within the term (with respect to a sample mean of 24.37%). It is also interesting to note that the 2SLS estimates are systematically higher than the OLS estimates over the same sample, both in Table 7 and in Table 8. According to the discussion in Section 5, this difference should be interpreted as evidence that the less colluded mayors are more likely to gain reelection, and therefore survive longer.[31]

6.2.3 Discussion

In this section we discuss three major concerns related to our findings.

First, as we only observe the mayors who were elected around 1993 and then survived until 2000-2005, this might introduce a sample selection bias in the estimates. In particular, mayors elected before and after the reform may systematically differ over two dimensions. On the one hand, they may have a different probability of first reelection: we show in Table 6 that both treated and control mayors have about 80% probability of being elected for a second term. On the other hand, mayors elected before the reform may be further selected in the second reelection round: we find that, within the estimation sample, all the second term mayors without a term limit were then reelected for a third term. These probabilities are also compatible with the first-stage estimate of the effect of the reform on the actual number of terms in office (0.988, see column 1 in Table 7), which,

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[31]We estimated the same 2SLS model on a sample including the mayors elected for the second, third and fourth time within five years before the 1993 reform, to gain in sample size (9,277 auctions instead of 8,801). Results were quantitatively and qualitatively the same.

if there was a sample selection bias, should be significantly lower than 1.

Second, we discuss the possibility that our finding on the winning rebate might reflect an improvement in the quality of the public works, rather than a reduction in the competitive pressure within the auctions. To rule out this different interpretation, we repeated our exercise using the data set of Bandiera et al. (2009), which contains detailed information about the quantity and the quality of a set of standardized goods and services purchased by a random sample of 68 Italian municipalities over the period 2000-2005. Despite sample size limitations, we find that the price for an average good, conditional on its quality, increases by about 16% at each additional term in office.[32] We take this evidence as a falsification exercise on an external sample where quality is a minor issue.

Finally, at the time of 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 terms. While this difference had no impact on their *ex-post* incentives, because at 2000-2005 they all knew about the term-limit, it might still be the case that the different career perspectives at the time of first election had affected their *ex-ante* decision to run for a mayoral office. Political careers, however, are not limited to the municipality office. We observe, indeed, that 14% of the mayors with a term limit at 2000-2005 later continued their career at higher offices (province, region, or national parliament). In particular, we do not find any statistical difference on this probability between mayors elected before and after the reform, which corroborates the assumption that they actually had similar political horizons.

7 Theoretical Model

In this section we develop a model to rationalize the empirical results, and argue that time in office is associated with higher political collusion. The model highlights two key characteristics of public procurement auctions: the possibility for politicians and bidders to exchange favors; and the repeated nature over time of this interaction. The model builds on the results from the literature on favoritism in procurement auctions (Arozamena and Weinschelbaum, 2009; Burguet and Perry, 2009) and on repeated auctions (Skrzypacz

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[32]We excluded the purchases made through the central purchasing authority (*CONSIP*).

and Hopenhayn, 2004), to show that time in office helps politicians to build collusive relationships with bidders.

Figure 7 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 periods/auctions. In the first stage, a new mayor starts searching for one bidder. The mayor, in exchange for a bribe, commits to reveal the distribution of the bids to the favored bidder. In the second stage, the favored bidder can adjust his original bid, if the highest bid was lower than his own private valuation, and win. A long-lived relationship happens if the mayor is matched with a collusive bidder; otherwise in the next period/auction he searches for another bidder.

In what follows we illustrate the structure of the model focusing on one generic sub-game, a snap-shot of the infinite game, and solve it backward. We then present the predictions of the model, and discuss its assumptions.

7.1 Stage 2: Procurement Auctions with Collusion

At any point in time (t), for $t = (1, 2, ...)$, a mayor is delegated by the principal (the citizens) to run one sealed-bid single-object auction, of first-price type.[33] In each auction there are N_t bidders, and entry is costless. 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. Both the bidders and the auctioneer 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. Every period/auction the N_{t-1} bidders learn t, the longevity of the mayor, and π, the proportion of collusive bidders in the population. This information is publicly known, and can be used by the bidders to derive $P_t = 1 - (1 - \pi)^t$, which is the probability that the mayor has found a collusive bidder after t independent trials. By construction, this probability is increasing in t. To avoid both explicit and tacit collusion

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

between bidders, we assume that bidders do not communicate and that the identity of the winner 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.[34]

Given this set of assumptions, the stage proceeds as follows. The colluded bidder (denoted by c) observes 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 v_c. The $N_t - 1$ non-colluded bidders are symmetric, and know about the colluded bidder only through P_t. Bidding is guaranteed by the fact that some of the $N_t - 1$ bidders in any auction may evaluate the good more than the colluded bidder.

Assuming that the expected continuation payoffs 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-colluded bidders, the per-period expected revenues of the auction, and the per-period coalition's expected utility. A non-favored bidder solves his maximization problem according to a strictly increasing inverse bidding function $\phi^c(\cdot)$:

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

where, in square brackets, there 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 take the F.O.C.'s of equation (5), and consider a symmetric equilibrium where $\nu_i = \phi^p(b)$, and the following differential equation characterizes the per-period inverse bidding function $\phi^p(b)$ with strictly increasing solution:

$$(\phi^p(b) - b) = \frac{[P_t(F(\phi^p(b))F(b) + (1 - P_t)(F(\phi^p(b))^2]}{P_t[(n-2)F(\phi^p(b)f(\phi^p(b)(\phi^{p\prime}(b)) + F(\phi^p(b))f(\phi^p(b)] + (1 - P_t)(N-1)F(\phi^p(b)f(\phi^p(b)\phi^{p\prime}(b)} \tag{6}$$

As in Arozamena and Weinschelbaum (2009), if $\alpha(\nu) = \frac{F(\nu)}{f(\nu)}$ is strictly concave, an increase in P_t implies that $\phi^{P_t}(b) < \phi^{P_{t+1}}(b)$ for all $b > \underline{\nu}$, with $0 \leq P_t < P_{t+1} \leq 1$.[35] It follows that a higher probability of collusion induces non-favored bidders to bid less

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[34]This set of assumptions is equivalent to assuming that at every auction there is a new set of bidders, for example because they rotate across municipalities.

[35]See Proposition 3, pg. 651.

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aggressively, it increases the coalition's expected utility ($V_c^b > V_{fp} > 0$, where V_c^b and V_{fp} are the expected revenues from collusion and from a standard first price auction), and it decreases the expected profit of a non-favored bidder and the expected revenues from the auction. We use these results in the collusion stage.

7.2 Stage 1: Collusion/Search Game

Collusion happens in a framework where a mayor is searching for a collusive bidder, and there are gains from collusion. We first illustrate the mayor's search problem, taking the bidder's action as exogenous. We show that the optimal search strategy is to stop searching if and only if the mayor meets a collusive bidder.

At the beginning of period t, the mayor is randomly matched with one of the N_t bidders. The mayor may reveal the distribution of the bids, or just the highest bid, in exchange for a bribe B.[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, in which case $B = 0$.[37] 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, for the mayor it is always optimal to collude. In case of a zero bribe, 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, which depends on the cost of colluding C_j. There are two types of bidders: collusive ($C_j = C_L$) and not collusive ($C_j = C_H$), with $C_H > C_L$. If the bidder is of a collusive type then $B_j = B$, otherwise $B_j = 0$. We denote with $V_c^b > V_{fp}^b > 0$ the expected revenues from collusion and from a standard first price auction, respectively. If the matched bidder is collusive, he can afford B, every period he gets $V_c^b - B > V_{fp} > 0$, and collusion is the unique strictly dominant strategy. If the matched bidder is non-collusive, he cannot afford B, every period he gets $V_{fp} > (V - B) < 0$, and non-collusion is the unique strictly

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[36]Without loss of generality, we assume that the entire bargaining power over the coalition's surplus is owned by the collusive bidder.

[37]The agreement is reached in Stage 1, but the transfer takes place in Stage 2, once the mayor observes the distribution of the bids. This game can be viewed as a commitment game where the mayor punishes a zero bribe by splitting the relationship.

dominant strategy.

7.3 Predictions

A public perfect Bayes-Nash equilibrium is defined by the mayor optimization, the favored bidder optimization, the non-favored bidders optimization, and the commonly known probability of collusion P_t. As long as P_t is increasing in t, one potential equilibrium of the model is characterized by a gradual diffusion of collusion over time/auctions ($P_{t+1} > P_t$), where in each following period/auction the non-colluded bidders learn the probability that the mayor has found a colluded bidder, and behave accordingly. The model delivers the following testable predictions:

Prediction 1 *As mayor's longevity increases, the probability that auctions are assigned to the same bidder increases ($P_{t+1} > P_t$).*

Prediction 2 *As mayor's longevity increases, non-favored bidders bid less aggressively.*

Prediction 3 *As mayor's longevity increases, the revenues of the auction decrease.*

7.4 Discussion

To leave the exposition as simpler as possible, the model was built under the assumption that procurement auctions are of a first-price type. Closer to the institutional setting regulating public procurement auctions in Italy, we should consider the case, instead, where the winner of the auction is the one who bids the highest value below the averaged-average.[38] However, as long as the bidders still have to guess a first moment of the bids' distribution, their bid will be higher than their valuation. If so, it is worthy for the mayor to communicate to the colluded bidder this particular moment of the bids' distribution, and for the colluded bidder to pay the bribe and adjust the bid.[39]

We also assumed that time was infinite, and mayors and bidders could interact for infinitely periods/auctions. In the presence of a term limit, as in the Italian case, this assumption might be unrealistic. However, as we have shown in Section 6.2.3, mayors

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[38]The averaged-average is the sum of the average of the bids and the average computed with the upper deviations from the average. In Section 3 we discuss the details of the procurement mechanism in Italy.

[39]In the collusion game at Stage 1, we also assumed that there is no competition between bidders in bribing the mayors, as in Compte et al. (2005).

actually face a continuation game, as there is a significant fraction of them who is later appointed at higher offices. Hence, 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).[40]

Another aspect we neglected in the previous analysis is the presence of entry costs. As in Menezes and Monteiro (2000), non-favored bidders enter up to the point where their expected profit is larger than the entry cost k, with $k > 0$. Since $P_{t+1} > P_t$, the entry threshold increases with t, thus reducing the participation of less efficient (and non-favored) bidders. At any period/auction t there will be some non-favored bidders with negative expected profits. When entry is costly, the model delivers another testable prediction:

Prediction 4 *As mayor's longevity increases, the number of bidders per auction decreases.*

We enrich the predictions of the model arguing that local bidders might have lower costs of bribing (or lower entry costs), and then find easier to pay the bribe to the mayor. Since types are not perfectly observed before the first interaction, the model delivers another testable prediction:

Prediction 5 *As mayor's longevity increases, the probability that the winner is local increases.*

Finally, a more sophisticated model 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 5. There, we discussed how the interaction between mayors and voters could bias our empirical analysis, and how our identification strategy could help us to take voters' behavior as exogenous.

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[40]Using the available procurement data, we find that projects are larger at provincial level (an average starting value of 650.000 euros).

8 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 too long, there is a systematic deterioration in the functioning of the auction mechanism, as we observe less participation, a higher cost of the public work, and an increase in the probability that the winner is an insider. This effect persists even after controlling for a large set of mayor, city, and electoral characteristics, as well as for the endogeneity of time in office using an instrumental variable approach.

With the aid of a stylized theoretical model of favoritism in repeated procurement auctions, we interpret these figures as evidence that, when a mayor stays in power for longer, there is a higher probability of collusion. In fact, the decline in the winning rebate suggests that it is not the most efficient bidder who is awarded a higher number of auctions, but that non-favored firms start bidding less aggressively, as every period they update the probability that there might be a favored bidder. For the same reason, the number of bidders decreases, as non-favored bidders will soon opt out and save on the entry cost, while favored bidders will be awarded a higher percentage of auctions. Lastly, under the assumption of lower entry costs (or lower costs of bribing) for local firms, they also collude with a higher probability, although this prediction receives less support in the data.

From the point of view of a regulator interested in rationalizing public spending, our findings encourage the implementation of policies favoring political turnover (for example, through the introduction of a term limit), such that political collusion could be eliminated and competition in public procurement restored. As far as the functioning of procurement auctions is sensitive to the repeated interaction between politicians and local bidders, our findings also suggest the introduction of policies aimed at limiting the power of politicians over the auction mechanism (for example, through the institution of a central purchasing authority).

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Tables and Figures

Table 1: City characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max
North-West	0.40	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	0.22	0.41	0	0	0	0	1
Islands	0.04	0.19	0	0	0	0	1
Population	11,668	63,363	504	1,807	3,845	8,412	2,733,908
N. cities: 3,825							

Notes. Cities with at least one auction between 2000-2005, and with a population greater than 500. *Population* is the number of resident inhabitants at the beginning of the first observed term.

Table 2: Mayor/Term characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max
Female	0.08	0.28	0	0	0	0	1
Age	49.88	9.15	25.30	43.40	49.62	55.82	84.28
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	1	1	1
Education:							
Secondary	0.52	0.50	0	0	1	1	1
College	0.47	0.50	0	0	0	1	1
Employment:							
Not employed	0.11	0.32	0	0	0	0	1
Low-skilled	0.03	0.18	0	0	0	0	1
Medium-skilled	0.09	0.28	0	0	0	0	1
High-skilled	0.77	0.42	0	1	1	1	1
Political party:							
Center-right	0.11	0.31	0	0	0	0	1
Center	0.06	0.23	0	0	0	0	1
Center-left	0.30	0.46	0	0	0	1	1
Separatist	0.01	0.09	0	0	0	0	1
Others	0.54	0.50	0	0	1	1	1
Political experience:							
Previous experience	0.62	0.49	0	0	1	1	1
Years in office (as mayor)	2.30	3.24	0	0	0	4.14	14.97
Term in office (as mayor) = 1	0.58	0.49	0	1	1	1	3
Term in office (as mayor) = 2	0.35	0.48	0	0	1	1	3
Term in office (as mayor) = 3	0.05	0.21	0	0	0	1	3
Term in office (as mayor) = 4	0.02	0.17	0	0	0	1	3
Term limit binding	0.39	0.49	0	0	0	1	1
Party longevity (years)	1.77	2.63	0	0	0	4.14	15.78
Party longevity (terms)	0.41	0.60	0	0	0	1	4
Mayor's coalition:							
N. parties mayor's coalition	1.31	0.99	1	1	1	1	12
Seats mayor's coalition (%)	67.79	7.52	60	66.67	66.67	66.67	100
N. seats above majority	2.89	1.08	1	2	3	3	14
				N. terms: 5,209			

Notes. Mayors with no early terminations in the past. *Secondary* includes both lower and upper secondary education. *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 the mayor cannot be reelected. *Party Longevity* is the longevity of the mayor's party in years/terms. *N. parties mayors' coalition* is the number of parties in the mayor's coalition. *N. seats above majority* is the number of seats for the mayor's coalition above the absolute majority.

Table 3: Auction characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max
Outcome:							
Number of bidders	21.34	21.12	1	5	14	31	100
Winning rebate (in %)	12.97	8.39	0	6.90	12.42	17.10	49.99
Winner in the city	0.12	0.33	0	0	0	0	1
Winner in the province	0.52	0.50	0	0	1	1	1
Winner in the region	0.70	0.46	0	0	1	1	1
Max (%) same firm	0.24	0.25	0.02	0.08	0.16	0.33	1
Selection mechanism:							
Direct negotiation	0.09	0.29	0	0	0	0	1
Characteristics of the good:							
Starting value	5.40	9.35	1.34	2.03	2.94	5.16	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	0.15	0.36	0	0	0	0	1
2001	0.20	0.40	0	0	0	0	1
2002	0.21	0.41	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: 27,537				

Notes. Auctions for works with starting value greater or equal than 150,000 euros, and no more than 100 bidders. *Winner in the city/province/region* is a dummy for whether the winning firm is registered in the same city/province/region. *Max % wins same firm* is the highest percentage of auctions assigned to the same firm within the term, and is term invariant. *Direct negotiation* 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 4: Time in office and the level of competition, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Mean outcome:	A: N. bidders = 21.33			B: Winning rebate = 12.97%		
N. years in office	-1.111***	-0.434***		-0.409***	-0.148***	
	(0.133)	(0.116)		(0.063)	(0.045)	
N. terms in office			-2.153***			-0.741***
			(0.538)			(0.218)
Term limit binding	5.199***	2.354***	2.702***	0.284	0.137	0.261
	(1.386)	(0.889)	(0.927)	(0.651)	(0.378)	(0.407)
Population		0.067***	0.067***		0.057***	0.057***
		(0.025)	(0.025)		(0.014)	(0.014)
Starting value		0.685***	0.685***		0.086***	0.087***
		(0.077)	(0.077)		(0.011)	(0.011)
Party longevity (terms)		-0.373	-0.375		-0.351	-0.351
		(0.470)	(0.471)		(0.213)	(0.214)
N. parties mayor's coalition		0.293	0.295		0.160*	0.160*
		(0.187)	(0.187)		(0.095)	(0.095)
N. seats above majority		-0.262	-0.269		0.006	0.004
		(0.191)	(0.191)		(0.087)	(0.088)
Female		-0.038	-0.028		-0.085	-0.081
		(0.817)	(0.817)		(0.295)	(0.295)
Age		0.010	0.010		0.023*	0.023*
		(0.031)	(0.031)		(0.013)	(0.013)
N. auctions	27,537	27,537	27,537	27,537	27,537	27,537
R-squared	0.008	0.215	0.215	0.015	0.444	0.444
Region 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 4,787 mayors (5,209 terms). *N. 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 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). *Party Longevity (terms)* is the longevity of the mayor's party in terms. *N. parties mayors' coalition* is the number of parties in the mayor's coalition. *N. seats above majority* is the number of seats for the mayor's coalition above the absolute majority. When denoted with "yes", regressions additionally include *Region fixed effects* (19 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (disposable income per capita in 2005; judicial efficiency at year-region level; budget deficit in percentage of the revenues at year 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 5: Time in office and the nature of competition, OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Mean outcome:	A: Winner local = 70.46			B: Max % wins same firm = 24.41%		
N. years in office	1.442***	0.486**		1.967***	0.777***	
	(0.188)	(0.200)		(0.287)	(0.287)	
N. terms in office			2.652***			3.581***
			(0.960)			(1.384)
Term limit binding	-7.100***	-1.846	-2.503	-6.947***	-2.201	-2.552
	(1.457)	(1.478)	(1.555)	(2.156)	(1.665)	(1.821)
Population		0.070***	0.070***		-0.024	-0.024
		(0.025)	(0.025)		(0.037)	(0.037)
Starting Value		-0.978***	-0.979***		-0.099***	-0.100***
		(0.075)	(0.075)		(0.028)	(0.028)
Party longevity (terms)		1.124	1.118		2.128**	2.130**
		(0.855)	(0.856)		(0.830)	(0.832)
N. parties mayor's coalition		0.470	0.469		-1.273***	-1.276***
		(0.352)	(0.351)		(0.287)	(0.288)
N. seats above majority		-0.383	-0.374		-1.350***	-1.345***
		(0.461)	(0.460)		(0.381)	(0.382)
Female		0.355	0.349		-1.087	-1.103
		(1.476)	(1.475)		(1.355)	(1.355)
Age		0.042	0.041		-0.064	-0.063
		(0.068)	(0.068)		(0.052)	(0.052)
N. auctions	27,537	27,537	27,537	23,110	23,110	23,110
R-squared	0.003	0.080	0.080	0.026	0.299	0.299
Region 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 4,787 mayors (5,209 terms) for *Winner local*. Estimates on 3,725 mayors (4,322 terms) for *Max % wins same firm* (terms elected between 1998 and 2003). *Winner local* indicates whether 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 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). *Party Longevity (terms)* is the longevity of the mayor's party in terms. *N. parties mayors' coalition* is the number of parties in the mayor's coalition. *N. seats above majority* is the number of seats for the mayor's coalition above the absolute majority. When denoted with "yes", regressions additionally include *Region fixed effects* (19 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (disposable income per capita in 2005; judicial efficiency at year-region level; budget deficit in percentage of the revenues at year 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 6: Mayors' characteristics around the March 1993 reform

	Elected before March 1993	Elected after March 1993	
	Mean	Mean	p-value diff.
A: −12/ + 12 months bandwidth			
Female	0.065	0.063	0.703
Age	44.396	43.920	0.541
Local	0.947	0.947	0.967
Empl. low-skilled	0.822	0.830	0.814
Edu. college	0.544	0.541	0.934
Previous experience	0.444	0.430	0.727
Probability of first reelection	0.831	0.780	0.338
N. mayors	65	772	
B: −24/ + 24 months bandwidth			
Female	0.063	0.066	0.818
Age	44.824	44.119	0.271
Local	0.953	0.941	0.425
Empl. low-skilled	0.813	0.820	0.756
Edu. college	0.496	0.550	0.106
Previous experience	0.398	0.424	0.433
Probability of first reelection	0.736	0.775	0.398
N. mayors	91	1,164	
C: −36/ + 36 months bandwidth			
Female	0.044	0.080	0.000
Age	44.328	44.379	0.798
Local	0.940	0.936	0.379
Empl. low-skilled	0.780	0.780	0.981
Edu. college	0.375	0.442	0.000
Previous experience	0.344	0.525	0.000
Probability of first reelection	0.789	0.807	0.137
N. mayors	1,479	3,623	
D: −48/ + 48 months bandwidth			
Female	0.043	0.080	0.000
Age	44.372	44.397	0.901
Local	0.940	0.937	0.506
Empl. low-skilled	0.780	0.780	0.934
Edu. college	0.380	0.443	0.000
Previous experience	0.328	0.527	0.000
Probability of first reelection	0.785	0.805	0.089
N. mayors	1,543	3,782	
E: −60/ + 48 months bandwidth			
Female	0.040	0.080	0.000
Age	44.657	44.397	0.155
Local	0.944	0.937	0.108
Empl. low-skilled	0.756	0.780	0.003
Edu. college	0.383	0.443	0.000
Previous experience	0.253	0.527	0.000
Probability of first reelection	0.773	0.805	0.003
N. mayors	1,992	3,782	

Notes. All mayors at first election. *Empl. low-skilled* includes blue-collars. *Local* is a dummy for being born in the same region. *Probability of first reelection* is a dummy for whether the mayor was then reelected for a second term. *Previous experience* is a dummy for whether the mayor was in the council or the executive committee before.

Table 7: Time in office and the level of competition, fuzzy-RDD

| Dependent variable:	(1) Longevity	(2) N. bidders	(3) N. bidders	(4) Winning rebate	(5) Winning rebate
Method:	OLS	OLS	2SLS	OLS	2SLS
Stage:	First		Second		Second
Mean outcome:	2.07	19.70	19.70	11.68%	11.68%
N. terms in office		-2.604***	-4.284***	-0.530	-1.444***
		(0.876)	(1.381)	(0.324)	(0.441)
Elected before March 1993	0.988***				
	(0.009)				
Term limit binding	0.832***	-0.241	1.052	-0.760	0.077
	(0.049)	(1.976)	(2.211)	(0.749)	(0.824)
Population	0.000	0.094*	0.091*	0.041***	0.041***
	(0.000)	(0.049)	(0.047)	(0.005)	(0.004)
Starting value	0.000	0.796***	0.795***	0.116***	0.116***
	(0.000)	(0.092)	(0.092)	(0.023)	(0.022)
Party longevity (terms)	0.018***	-1.089	-0.778	-0.320	-0.204
	(0.005)	(0.788)	(0.752)	(0.245)	(0.241)
N. parties mayor's coalition	0.002*	0.084	0.139	0.364***	0.381***
	(0.001)	(0.284)	(0.275)	(0.098)	(0.098)
N. seats above majority	-0.002	0.197	0.148	0.031	0.018
	(0.002)	(0.293)	(0.288)	(0.119)	(0.119)
Female	-0.009**	2.000	1.957	-0.089	-0.099
	(0.005)	(1.379)	(1.318)	(0.526)	(0.528)
Age	-0.001***	0.090*	0.085*	0.033**	0.032**
	(0.000)	(0.047)	(0.046)	(0.015)	(0.015)
N. auctions	8,801	8,801	8,801	8,801	8,801
R-squared	0.939	0.234	0.236	0.426	0.428
F-exc.-Inst	12,403				
Region 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 1,627 mayors (1,668 terms). In the interval [-24,+24], 2,012 auctions and 335 mayors. Mayors in the third (*treated*) or second (*control*) term, elected for the first time between March 27, 1988 and March 27, 1997, [-60,+48] months around the electoral reform. *Winner local* is a dummy for whether the winning firm is registered in same the region. *Max % wins same firm* is the highest percentage of auctions assigned to the same firm within the term. *Elected before March 1993* is a dummy for whether the mayor was elected for the first time before March 27, 1993. *Term limit binding* is a dummy for whether 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). *Party Longevity (terms)* is the longevity of the mayor's party in terms. *N. parties mayors' coalition* is the number of parties in the mayor's coalition. *N. seats above majority* is the number of seats for the mayor's coalition above the absolute majority. When denoted with "yes", regressions additionally include *Region fixed effects* (19 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (disposable income per capita in 2005; judicial efficiency at year-region level; budget deficit in percentage of the revenues at year 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 8: Time in office and the nature of competition, fuzzy-RDD

	(1)	(2)	(3)	(4)
Dependent variable:	Winner local	Winner local	Max % same firm	Max % wins same firm
Method:	OLS	2SLS	OLS	2SLS
Mean outcome:	70.61	70.61	24.37	24.37
N. terms in office	2.366	1.909	1.964	6.410**
	(1.761)	(2.695)	(2.169)	(2.525)
Term limit binding	6.882	4.756	-6.446	-6.580
	(4.586)	(4.975)	(9.445)	(9.444)
Population	0.087***	0.083***	-0.851***	-0.892***
	(0.023)	(0.024)	(0.131)	(0.121)
Starting value	-0.996***	-0.998***	-0.106**	-0.101**
	(0.127)	(0.126)	(0.045)	(0.045)
Party longevity (terms)	2.297*	2.410*	2.308*	1.934
	(1.351)	(1.342)	(1.359)	(1.337)
N. parties mayor's coalition	-0.216	-0.214	-1.909***	-1.933***
	(0.631)	(0.630)	(0.494)	(0.463)
N. seats above majority	-0.091	-0.119	-0.061	0.107
	(0.816)	(0.807)	(0.583)	(0.560)
Female	4.978**	4.766**	-1.710	-1.660
	(1.968)	(1.988)	(1.860)	(1.911)
Age	0.084	0.079	-0.089	-0.085
	(0.090)	(0.090)	(0.075)	(0.075)
N. auctions	8,801	8,801	7,616	7,616
R-squared	0.093	0.093	0.331	0.339
Region 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 1,627 mayors (1,668 terms) for *Winner local*, and on 1,353 mayors (1,349 terms) for *Max % wins same firm* (terms elected between 1998 and 2003). In the interval [-24,+24], 2,012 auctions and 335 mayors for *Winner local*, and 1,081 auctions and 143 mayors for *Max % wins same firm*. Mayors in the third (*treated*) or second (*control*) term, elected for the first time between March 27, 1988 and March 27, 1997, [-60,+48] months around the electoral reform. *Winner local* is a dummy for whether 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. *Term limit binding* is a dummy for whether 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). *Party Longevity (terms)* is the longevity of the mayor's party in terms. *N. parties mayors' coalition* is the number of parties in the mayor's coalition. *N. seats above majority* is the number of seats for the mayor's coalition above the absolute majority. When denoted with "yes", regressions additionally include *Region fixed effects* (19 dummies); *Year dummies* (2000-2004) refer to the year of bid delivery; *City characteristics* (disposable income per capita in 2005; judicial efficiency at year-region level; budget deficit in percentage of the revenues at year 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. First-stage estimates reported in Table 7. 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 ***.
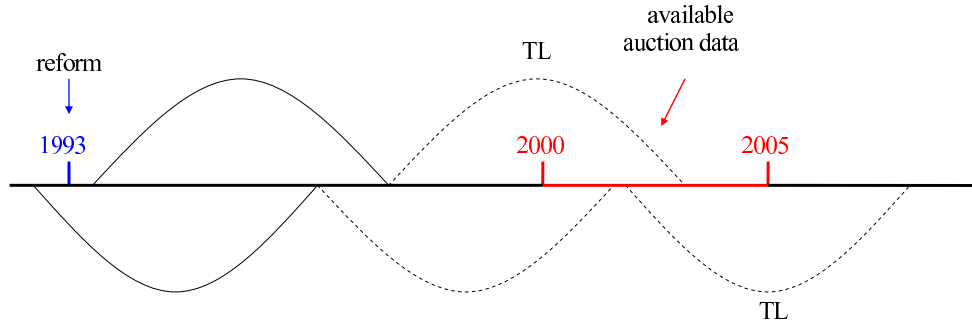
Figure 1: The awarding mechanism
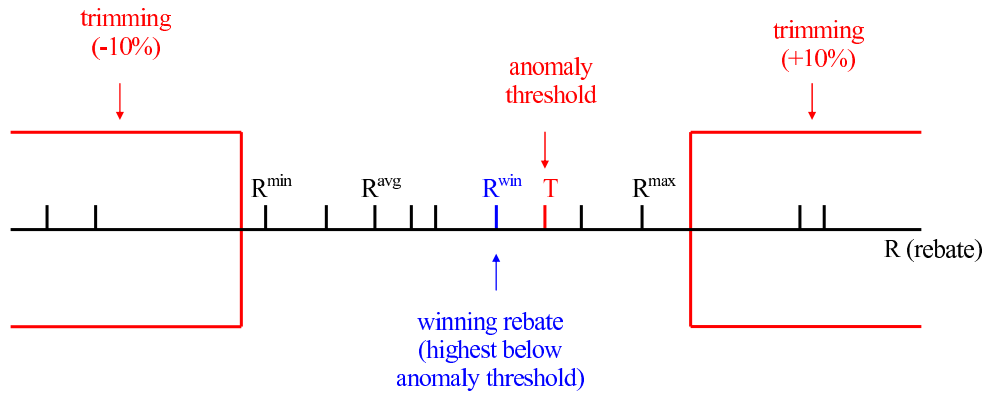
Notes. R^{avg} is the average rebate, expressed as a percentage reduction form the starting value. T, is the anomaly threshold obtained as the sum of R^{avg} and the average deviation of the bids above R^{avg}. R^{win} is the winning rebate that minimizes the distance from below T.

Figure 2: Auctions' characteristics across terms (no term limit in the second term)
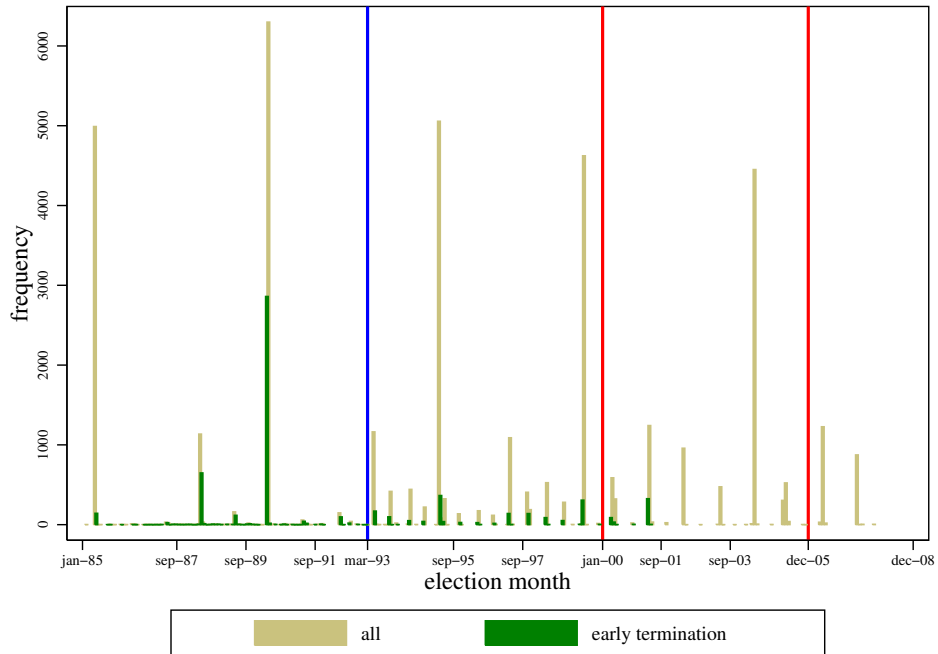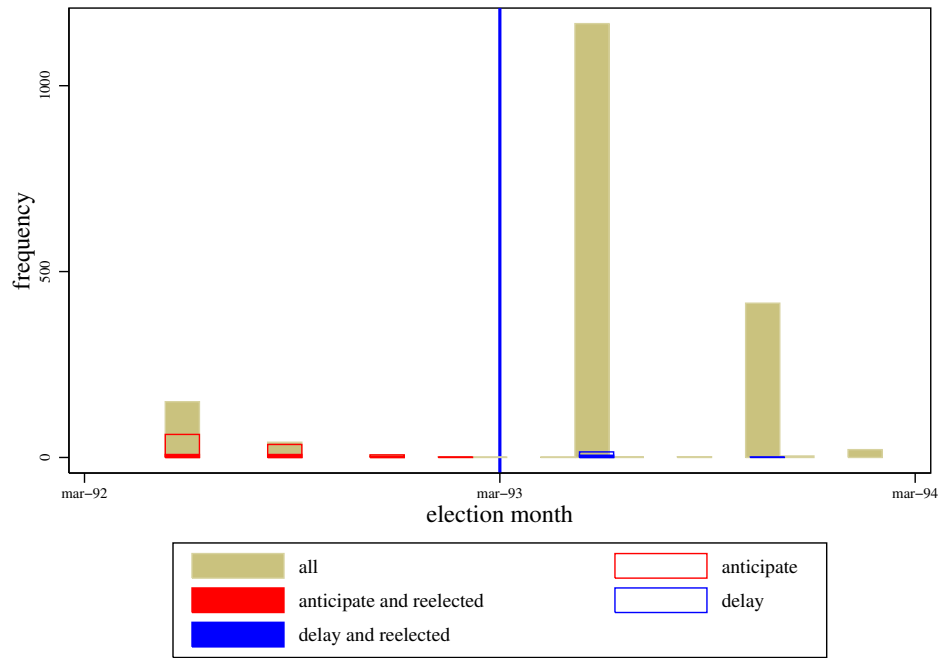
Figure 3: The 1993 electoral reform

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

## Figure 4: 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* 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* computed on terms elected before 2003 only, otherwise right censored.

Figure 5: Manipulation of the election timing around the March 1993 reform


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

Figure 6: Balancing around the 1993 electoral reform
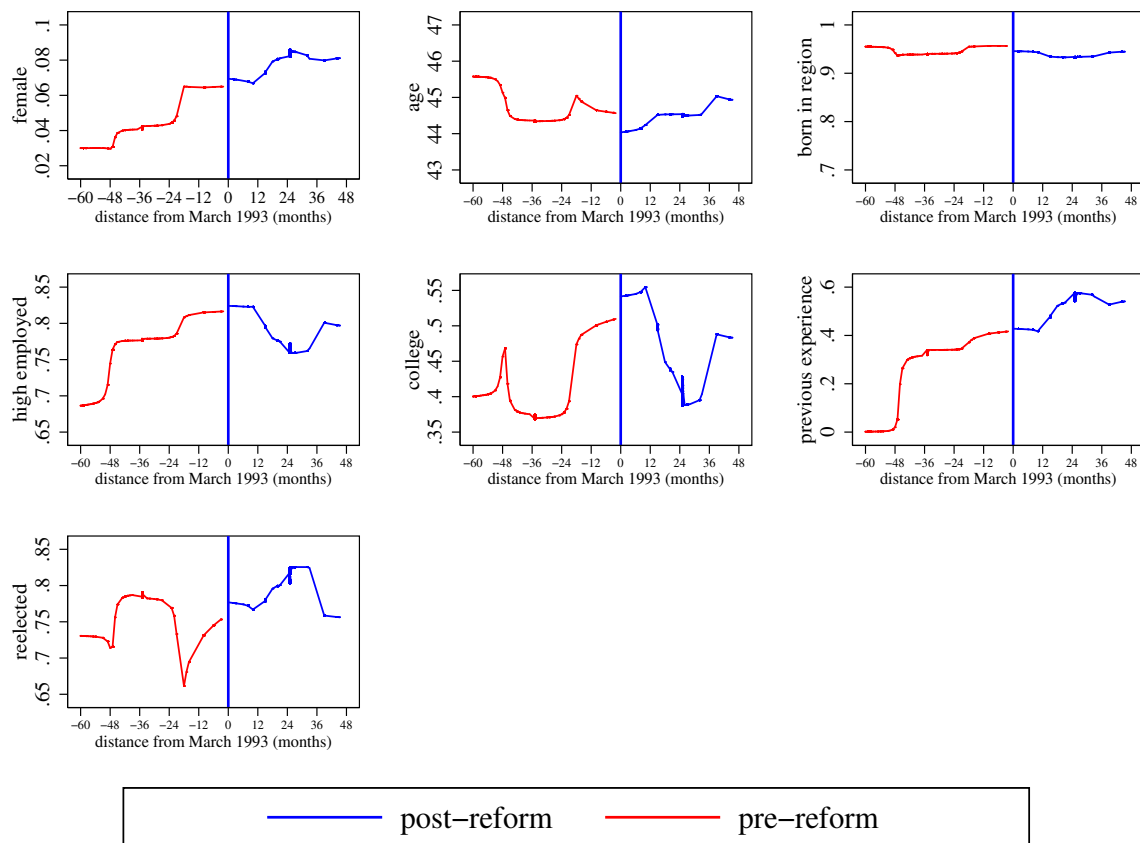
Notes. The blue vertical line denotes the electoral reform. The solid line is a running-mean smoothing of the variable on the vertical axis (with a bandwidth of 12 months), performed separately on either side of the electoral reform. *High-skilled* includes entrepreneurs and self-employed. *Local* is a dummy for being born in the region. *Probability of first reelection* is a dummy for whether the mayor was elected for a second term. *Previous experience* is and indicator for whether the mayor was in the council or the executive committee before. *Reelected* is an indicator for whether the mayor was reelected for a second term (unconditional on recandidacy).

Figure 7: The time-line of the model
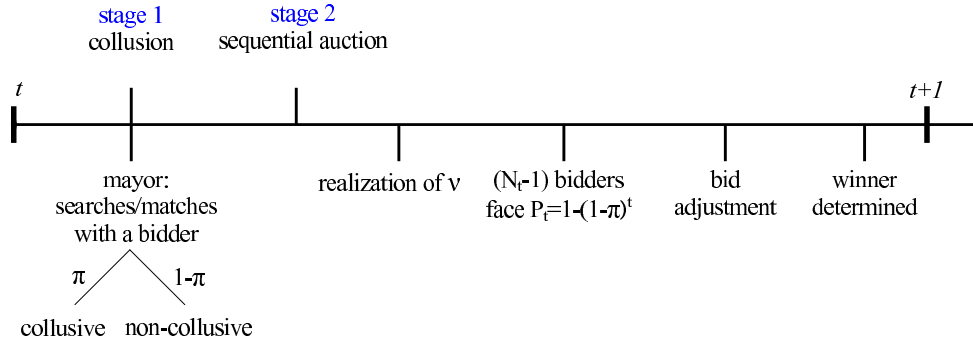
Notes. π is the propoprtion of colluded bidders in the population. ν_i is the individual evaluation.