

Building Political Collusion: Evidence from Procurement Auctions in Italy*

Decio Coviello[†]

University of Rome Tor Vergata

Stefano Gagliarducci[‡]

University of Rome Tor Vergata, and IZA

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Abstract

This paper studies the relationship between the time politicians stay in office and the functioning of public procurement auctions. 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 term limit in March 1993: since the reform was not retroactive, 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 winning firm is local, or that the same firm is awarded more auctions, increases with time in office. These results are compatible with a model where the repeated interaction between politicians and local contractors increases the value of illegal connections at the expense of higher procurement costs, as time reveals collusive types.

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[†]E-mail: decio.coviello@uniroma2.it.

[‡]E-mail: stefano.gagliarducci@uniroma2.it.

1 Introduction

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

In this paper we address this issue and investigate how the procurement process 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 they administered between 2000 and 2005. The environment is particularly suited for the analysis, because of the close and repeated interactions between mayors and local contractors, and the possibility to compute the monetary cost of time in office.

For identification purposes, we exploit the introduction of a term limit on March 1993. Since the limit applied to the terms elected after the reform only, 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 timing of election could not be manipulated, but it was the result of an idiosyncratic scheduling, we use the time 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, the quasi-experimental nature of the institutional framework also allows us to separate the effect of political longevity from the effect of the lack of electoral accountability (e.g., 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 or more.

To correct for the simultaneous introduction of another reform – the change in the election of the mayor from party to individual ballot – that might have affected the quality of the treated and the control group differently, we implement a fuzzy Regression Discontinuity Design focusing on the elections that were held right before and after March 1993. It is plausible to assume, in fact, that while the term limit applied sharply after the reform, the implementation of individual ballot elections was instead more resilient, because of the initial difficulty for parties to recruit candidates more suitable to the new electoral system.

Main results show that, at any additional term in office, there is a progressive reduction in the number of bidders participating in the auctions (-8.85 and -23.18 percent in the OLS and 2SLS specification, respectively) and, more importantly, a reduction in the winning rebate (-5.91 and -12.68 percent). A back of the envelop calculation suggests that an average public work costs about 8,000 euros more in municipalities with a second term mayor, as opposed to municipalities with a first term mayor.¹ At the same time, we find that having the same mayor in power for an additional term increases the probability that the contract will be awarded to a local firm (+3.6 and +3.2 percent, although the 2SLS estimate is not precisely estimated), or to the same firm repeatedly (+14.79 and +25.52 percent).

The results may be rationalized within a stylized model of favoritism in procurement auctions (Arozamena and Weinschelbaum, 2009; Burguet and Perry, 2009), when the repetition of the same game over time affects the degree of cooperation between the players (Ghosh and Ray, 1996; Kranton, 1996). Under the assumption of asymmetric information on the types of players (collusive or not), the model predicts that the probability of collusion between the mayor and the favored bidders should increase throughout repeated interactions as time reveals collusive types, thus increasing the value of the preferential relation. This will result in an increase in the probability that the same firm is awarded consecutive auctions and, if the threat of future retaliation from non colluding is higher for firms operating in the same market of pro-local mayors, also in a higher probability that the winner is local. Under certain assumptions about the distribution of bidders' evaluations, the model further predicts that non-colluded bidders will then bid less and less aggressively, and, in the presence of entry costs, that the number of bidders will decrease as long as the same politician remains in power.

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

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

2 Related Literature

There is a recent empirical literature showing that political connections boost firms' performance (Cingano and Pinotti, 2009; Dombrovsky, 2008; Faccio, 2006; Ferguson and Voth, 2008; Fisman, 2001; Goldman et al. 2007b) and drive the allocation of procurement contracts (Goldman et al. 2009a), even in the case of competitive auctions (Hyytinen et al. 2007). With respect to this literature, we highlight the possibility that political connections are built over time, as it takes time for politicians and firms to reveal their collusive intentions.

With this respect, we differ from a number of recent 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 the political clout exerted on a state government affects corruption in a non-linear manner: they find 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. In the first, politicians prey more intensely on firms as their window of opportunity shortens, and thus command large corruption payments. In the second, entrepreneurs tend to bribe government officials over long and feasible policy horizons. 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, this approach has very different theoretical implications, including the absence of non-linearities. As a matter of fact, our paper is probably closer in the spirit to Besley and Prat (2004), who find a positive and linear correlation between political longevity and some measures of corruption using a cross-country cross-sectional data set.

Alternatively, some authors highlighted 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 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. With respect 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, could only endure some of the previous practices. However, if really motivated in reducing public spending and gaining electoral consensus, he or she might soon take control and learn how to improve the overall efficiency of the procurement process. Whether there is an effect of political longevity over the functioning of public procurement remains, therefore, an empirical matter.

Our paper also 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. (2008) 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 contractors compete in an environment with higher potential competition. 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. They find that mayors with reelection incentives misappropriate fewer resources than mayors without reelection incentives.³

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

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

³See also Di Tella and Schargrodsky (2003).

3 Conceptual Framework

In this section we develop a model of building political collusion in the framework of repeated first-price procurement auctions. We will use this model to drive the interpretation of the empirical analysis. The model highlights two key characteristics of public procurement auctions: politicians may exchange favors with some contractors; and the repeated nature of this game may boost collusive relationships over time. The model draws from the results of both the literature on favoritism in procurement auctions (Arozamena and Weinschelbaum, 2009; Burguet and Perry, 2009), and the literature on building cooperation in communities (Ghosh and Ray, 1996; Kranton, 1996).

Figure 1 presents the time line of the model. Collusion happens in a sequence of two hypothetical stages. In the first stage, a pair of randomly matched mayor-contractor may reach a collusive agreement. Collusion can only happen between non-myopic players, i.e., those with a positive discount factor who weigh the possible foregone earnings from not achieving a collusive agreement. The mayor, in exchange of a bribe or political support will reveal to the favored bidder some information about the distribution of the bids, and allow to adjust the original bid. The probability of collusion is a function of the transfers between the two players. At the beginning of the second stage, bidders' evaluations are realized, and non-favored bidders will form beliefs about the probability that the auctioneer has reached an agreement with another bidder. In case of collusion, the favored bidder will adjust the original bid, if the winning bid was lower than his own private valuation, and win; otherwise the auction is adjudicated to highest initial bid. At the end of each period, both mayor and bidder face the decision to continue the collusive relation. If non-myopic players decide to split, they enter the pool of unmatched players and face the risk of a matching with non-collusive myopic players in the following game. The same two-stage is repeated infinitely many times.

In what follows we illustrate the main structure of the model focusing on one generic sub-game, a snap-shot of the infinite game, and present it backward. We then present the predictions of the model, and discuss its assumptions.⁴

⁴We leave to the Appendix the mathematical details of the model, as well as the characterization of the equilibrium.

3.1 Stage 2: Procurement Auctions with Collusion

In this section we extend the model of auctions with a favored bidder (Arozama and Weinschelbaum, 2009; Burguet and Perry, 2009) to a simplified repeated auctions environment (Jofre-Bonet and Pesendorfer, 2003). At any point in time (t) for $t = (1, 2, \dots)$, a mayor is delegated by the principal (the citizens) to run one auction.⁵ In each auction there are N bidders. 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 $[\underline{\nu}, \bar{\nu}]$ 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. Each auction is a sealed bid first-price, for a single-object, and with no reserve price. Because of the i.i.d. assumption, bidders do not learn from the past strategies of the other players. In each auction they take for given the probability p of collusion, which that is common knowledge.

With probability p , the colluded bidder (denoted by d) observes the highest bid b^h , and may opt to set $b_d = b^h + \varepsilon$ such to win the auction. He will compare his own valuation v_d with b^h , and eventually adjust the original bid. The $N-1$ non-colluded bidders are symmetric. All the bidders know about the colluded bidder through p (which is inferred from not having been approached by the mayor), and compete not against the colluded rival bid, but his own valuation. Bidding is guaranteed by the fact that some of the $N - 1$ bidders in any auction may evaluate the good more than the colluded bidder, and may therefore win the auction if they bid above the valuation of the colluded bidder.

The i.i.d. assumption simplifies the dynamics of the repeated game, and allows us to use the setup of Burguet and Perry (2009) and Arozamena and Weinschelbaum (2009) to describe the per-period bidding behavior of the $N - 1$ non-colluded bidders, the per-period expected revenues of the auction, and the per-period coalition's expected utility. In particular, in order to understand the collusive behavior between the mayor and the colluded bidder, we exploit the result of Proposition 3 in Arozamena and Weinschelbaum (2009), which proves that the coalition's expected utility is strictly increasing in the probability of collusion. We will use this result in the following section to analyze the strategic

⁵From now on, we will refer to a generic ascending auction, which is equivalent in its functioning to a descending procurement auction.

interaction between mayors and bidders.

3.2 Stage 1: Building Collusion

In this section we define a simple model in which there are gains from colluding with another agent. In each period, a mayor and a bidder play a symmetric collusion game. They simultaneously choose a level of transfer, $p \in (0, \hat{p})$, of a non-storable endowment of one unit of good to give to his opponent. Mayors may transfer a fraction of the information they have about the other players' bids (e.g., whether the bid is the highest, a confidence interval or the exact value of the highest bid), while the bidder may transfer a fraction of some non storable endowment, a bribe. Either information or bribes are costly—e.g., being caught—but higher transfers increase utility and correspond to higher levels of collusion.⁶

We represent with $u(p^i, p^j) \equiv \frac{1}{2}[(1 - p^i)^\alpha + (p^j)^\alpha]$ players' per-period utility when the specified transfer is p^i , and p^j for $i \neq j$. If we consider a symmetric situation in which $p^i = p^j = p$, utility increases in the level of collusion p .⁷ This representation of the utility function simplifies the analysis and the payoffs of the bidder and the mayor, and it is based on the results of Stage 2 where the coalition's expected utility was strictly increasing in the level of collusion. Nonetheless, in such a simplified non-cooperative setup non-collusion ($p = 0$), is a Nash equilibrium of this prisoner dilemma's type game.

Instead of a one-shot interaction, we consider the possibility of repeating the collusion game infinite many times and that players discount future with a common and positive discount factor.⁸ Players give each other a transfer p_t in period t , as long as both have given

⁶The agreement is reached in Stage 1, but the transfer only happens in Stage 2, once the Mayor observes the distribution of the bids. This game can be viewed as a commitment game where renegotiations are punished as it is punished non-collusion.

⁷We multiply the utility by $\frac{1}{2}$, assuming that players equally share the gains from collusion. As in Halac (2009), we do not specify the bargaining process over the surplus and assume that the mayor and the bidder will split it in a Nash Bargaining fashion with $\lambda = \frac{1}{2}$. The parameter $\alpha \in (0, 1)$ represents the substitutability between p^i and p^j . As $\alpha \rightarrow 0$, the goods become less substitutable, and exchange becomes more valuable.

⁸In the infinite collusion game, a term limit represents a possible end of the repeated game. At time T , unless mayors have a political career, future punishments are non-credible threats. Non-collusion is therefore the equilibrium outcome of the sub-game at time T , and by backward induction of the entire game. We assume that there is a probability that the game between a mayor and a bidder continues after his last term in office. The continuation probability, τ , generates a game with random continuation where the threats of future retaliation may induce collusion. This assumption generates a more realistic model and it is standard in the literature of repeated games. In section 3.4 we discuss its validity in the Italian political context.

the specified transfer in the past. We define a transfer profile, \mathbf{p} , as the time-ordered vector of transfers, that is, $\mathbf{p} \equiv (p_0, p_1, \dots, p, \dots)$. A transfer profile is called *collusive* if players reciprocate at least once a strictly positive transfer in at least one period. Contrarily to the one-period game, it is possible to show that, for enough patient players, $\mathbf{p} = \frac{1}{2}$ is the first-best equilibrium of this infinitely repeated game. This because, following a grim trigger strategy, the short-run payoff from non reciprocating is lower than the long-run payoff from colluding (see Appendix A).

In order to obtain a smooth diffusion of collusion between mayors and bidders – i.e., low collusion/transfers followed by high collusion/transfers – we follow a setup as in Gosh and Ray (1996), and the application in Kranton (1996). At the end of each period players have the possibility to continue an ongoing relationship and play the same game with the old player. In case they split, players return in the pool of the unmatched and are exposed again to a randomized matching with new players, Ellison (1994). A fraction π of the players, equally distributed between mayors and bidders, is non-myopic (i.e., they have positive discount factor), while a fraction $1 - \pi$ is myopic (i.e., their discount factor is equal to zero). π is assumed to be stationary over time. The information on other players' type is not known in the society and it is not observed until the first interaction between two randomly matched players.

Collusion can happen only between players with a positive discount factor (non-myopic players), as they discount the benefit from future collusive interactions. In the first random match, a non-myopic player offers a testing level of collusion to check other's type ($0 < p < \frac{1}{2}$). If the other player is myopic, he does not reciprocate. Myopic players are not affected by the threat of future retaliations and for them non-collusion is always the optimal strategy. A match between myopic and non-myopic players systematically splits at the end of the period, and both players return in the pool of the unmatched. If instead the other player is also non-myopic, he reciprocates the testing level of collusion and the game between the two players is repeated again.

The testing phase guarantees for the non-myopic players a lower loss in terms of foregone transfers from not being reciprocated. After discovering each other's type, non-myopic players decide to play again after the testing phase, and will both offer the highest

level of collusion ($p = \frac{1}{2}$) from this period on.⁹ This dynamics guarantees that the value of the collusive relation is increasing in the number of past interactions.

3.3 Predictions

One potential equilibrium of the model is characterized by a gradual diffusion of collusion over time/auctions ($p_{t+1} > p_t$), and at each time/auction non-colluded bidders learn the probability of collusion between the mayor and the colluded bidder, and behave accordingly (see Appendix A for a proof). The model delivers the following testable predictions:

Prediction 1 *As far as the mayor remains in office, there is a higher probability that the auctions are assigned to the same bidder (see the discussion above).*

Prediction 2 *As far as the mayor remains in office, non-favored bidders bid less aggressively, if $\alpha(\nu_i)$ is strictly concave (see Appendix A for a proof).¹⁰*

Prediction 3 *As far as the mayor remains in office, the lower are the revenues of the auction, if $\alpha(\nu_i)$ is strictly concave (see Appendix A for a proof).*

3.4 Discussion of the Assumptions and Extensions

- 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*.¹¹ As long as the bidders still have to guess a first moment of the distribution of the bids, their bid will be higher than their valuation. If so, it is still 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.¹²

⁹In the Appendix we report the mathematical formulation and conditions such that this profile is a subgame perfect equilibrium of the infinitely repeated game.

¹⁰For example if valuations are distributed with c.d.f. $F(\nu) = [\frac{e^{-\lambda}}{1-e^{-\lambda}}](e^{\lambda\nu} - 1)$, with support $[0, 1]$

¹¹The *averaged-average* is the sum of the average of the bids and the average computed with the upper deviations from the average. In Section 4 we discuss the details of the procurement mechanism in Italy.

¹²In the collusion game at Stage 1, we also assumed that there is no competition between bidders in bribing the mayors, as for instance in Compte et al. (2005). The case of both vertical and horizontal

- We assumed that at a generic time T there is a probability τ that the collusion game is repeated. As in Mailath and Samuelson (2006), our setup could be rewritten to allow for a random termination of the game. In this case the discount factor would be the product between the true discount factor and the continuation probability, and the predictions of our model would remain substantially unchanged. In the presence of a term limit, as it is in the Italian case, this assumption might be unrealistic. However, we find that 5.7% of the mayors with a binding term limit actually face a continuation game, as within two years from the end of the mayoral office they are then appointed in the provincial, regional or national parliament. It is also possible to prove that, if the payoffs in the continuation game are larger, the probability of continuation can be very small and collusion path still an equilibrium.¹³
- To enrich the predictions of the model, we could further introduce two additional types of players: pro-local mayors and local bidders. As in Jofre-Bonet and Pendorfer (2003), we assume that this particular subgroup has a higher discount factor than other players. Local bidders, might care more about continuing to work in the city of origin if there exists a cost of moving to work in other cities, while pro-local mayors might want to discriminate in favor of local bidders if the latter can grant a larger political consensus (Vagstad, 1995). Under the assumption that types – being local or non-myopic – are not perfectly observed before the first interaction, the model delivers another testable prediction:

Prediction 4 *As far as the mayor remains in office, there is a higher probability that collusion will happen with local bidders.*

- Another important issue in public procurement is the presence of entry costs. If a collusive agreement can be reached before the bidders decide to participate (which cost c), a favored bidder would face a more favorable situation than his rivals. As in Menezes and Monteiro (2000), non-favored bidders will enter up to the point in which their expected utility is larger than the entry cost c . This implies that, if $0 \leq p_t < p_{t+1} \leq 1$, then $N_{t+1} \leq N_t$. An increase in the probability of collusion is therefore

collusion is left for further research.

¹³Using the available procurement data, we find that projects are larger (average of 650.000 euros) at provincial level, and with higher frequency (10 per term).

detrimental for efficiency because non-favored bidders will reduce participation, and at the same time will bid less aggressively. Under the assumption that submitting a bid is costly, the model delivers another testable prediction:

Prediction 5 *As far as the mayor remains in office, the number of bidders decreases.*

- Finally, a more sophisticated extension of the model should discuss the role of citizens/voters (the principal) in disciplining mayors (the agent) through elections. 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 will come back on this point in Section 4: Identification, where we discuss how the interplay between mayors and voters could bias our empirical analysis.

4 The Institutional Background

The Italian municipal administration (*Comune*) is headed by a Mayor (*Sindaco*), who supervises the 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 public transportation, some welfare (like assistance to elderly people, nursery schools, and public housing), and managing public utilities (like water, electricity, and gas). In 1993 the mayoral electoral system was changed from party to individual ballot, and a two terms limit was introduced.¹⁴ 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 administer public tenders both for the purchase of goods and services, and for the realization of public works. Tenders in our sample are regulated by the *Legge 109/94*, and several amendments (“*Merloni-bis, -ter*”, as they were called), which coordinate all the proceedings of the procurement process including the awarding

¹⁴We will discuss more extensively the term limit regulation in Section 6.

mechanism.¹⁵ For the sake of this exercise, we focus on procurement auctions for the realization of public works, as we only have data for these. Auctions are sealed-bid, and multi-attribute or single-attribute depending on the size and the complexity of the public work. During the period 2000-2005, we only observe single-attribute auctions, i.e., auctions for which 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. Firms bid the price at which they are willing to do the works, 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 by the municipal administration, following a price-list of the standardized cost for each type of work. For this reason, it is plausible to assume that the starting value cannot be adjusted to favor bidders with a capacity constraint.¹⁶

Because of the 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 2). After a preliminary trimming of the top/bottom 10 percent of the collected bids, the bids which exceed 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".¹⁷ Note that, 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 leaves some competitive pressure for increasing the rebate. This is not the case, for example, in other similar auction mechanisms, like a pure average bid auction, where the winning bid is the closest to the average no matter whether from above or from below.¹⁸

¹⁵In the late 1990's the national government introduced a central procurement agency for the purchase of goods and services, *Consip*, although municipalities could still choose to run their own procurement auctions.

¹⁶Work-safety costs cannot be subject to rebate.

¹⁷As 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 percent is the highest bidden rebate.

¹⁸The proof of the properties of this awarding mechanism are beyond the scope of this paper. For a discussion, see Albano et al. (2006) and Decarolis (2008).

Each auction is administered by a manager, who is appointed by the mayor among the bureaucrats employed in the municipal administration.¹⁹ 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 in the auction can be of three types: in the *Pubblico incanto* participation is open to any firm satisfying some technical requirements; in the *Licitazione privata* the contracting authority invites a discretionary number of firms to participate, provided a minimum number and some technical requirements; finally, in the *Trattativa privata*, the contracting authority only invites a restricted number of firms.²⁰ The law prescribes the cases under which each invitation mechanism can be used, although the municipal authority still retains some discretion in the final tailoring of the format.²¹

5 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. 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, 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.

¹⁹In our sample, 88 percent of the times the manager is replaced when a new mayor is elected, against 33 percent in case the mayor is reelected.

²⁰Other formats include the *Licitazione privata semplificata*, which is very 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.

²¹The law also specifies the cases in which the terms of the procurement contract (the time of the work delivery, and the cost of the work) can be renegotiated. In particular, renegotiations are admitted only in cases of unforeseen natural events (like storms, earthquakes, landslides, etc.), and are discretionally granted by the auction manager without the further approval of the city council.

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 mayoral term which overlaps with the date of bids’ delivery, although the realization of the public work might sometimes go beyond that term.²²

5.1 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).²³ 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 attained, 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 percent and allows us to obtain more precise estimates.²⁴ 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 to avoid irregular electoral cycles. In Table 1 we present summary statistics for the sample of municipalities over which we run the estimation analysis.

The final sample is made of 3,826 cities, 40 percent located in the North-West of Italy, 20 percent in the North-East, 14 percent in the Center, 22 percent in the South and only

²²We also tried to match auctions and mayoral terms on the basis of the date of assignment, but results do not change.

²³Of the 8,104 existing Italian municipalities, 4,278 had no auctions between 2000 and 2005.

²⁴All the results are qualitatively and quantitatively robust to the exclusion of all observations with any missing data.

4 percent in the Islands. The average municipality has 11,668 inhabitants, and the total number of mayoral terms is 5,210 (see Table 2). Only 8 percent of the observed mayors are women, 52 percent were born in the same city they run (85 percent in the same province where the city belongs, 94 percent to the same region), the average age is 50, the average number of previous years in office as mayor is 2.30 (0.53 terms), and 39 percent of the mayors face a term limit. About 52 percent have a college degree, while 47 percent have a secondary school degree, the remaining 1 percent with an elementary degree only. Almost 12 percent were not employed before being appointed (either unemployed or out of the labor force), the majority being employed in high-skilled occupations (77 percent, including managers, self-employed and entrepreneurs), followed by high-skilled occupations (9 percent, including clerks), and low-skilled (3 percent, including blue-collars). Finally, 30 percent had been elected with a center-left party, only 11 percent with a center-right party, and all the rest with a center-wing, separatist or unidentified party (many parties were only local).²⁵

Table 3 describes the average characteristics of the auctions in the sample, where we excluded auctions with none or more than 100 bidders to avoid extreme cases. The total number of auctions is 27,538. The average number of bidders per auction is 21.34, with an average winning rebate of 12.97 percentage points. In 12 percent of the cases the winner was a firm registered in the same city (52 percent in the same province, and 70 percent in the same region), and on average the highest percentage of auctions within a term awarded to the same firm is 24 percent. In 9 percent 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 an average value of 540,000 euros.²⁶ The majority of the public works concern the construction of roads (23 percent), then schools (13 percent), public building (5 percent), public housing (1 percent), and art-related constructions (4 percent). The number of auctions per year is constant between 2000 and 2004 (between 15 and 20 percent), although there are fewer auctions in 2005, probably because of the timing in the collection of the original sample.

²⁵All mayors' characteristics computed at the beginning of each observed term.

²⁶Values reported in 2000 equivalents, using the OECD CPI index.

6 Identification Strategy

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

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

where y_{im} is the outcome of the auction; T_{im} denotes number of terms 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 bid delivery and the term in office.²⁷

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 to account for 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;²⁸ 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 control for the heterogeneity of the projects, we include: a 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; 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

²⁷We compute cluster adjusted standard errors to allow for a generic mayor-level error component.

²⁸This is computed as the ratio between settled and incoming cases for each regional administrative court (*TAR*), and for public works related disputes.

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 any issue related to the censoring of terms starting before 2000 or to be concluded after 2005.²⁹

With respect to y_{im} , the data set contains a large number of outcomes that can help describing the functioning of the procurement process and, indirectly, the possible collusion between the bidders and the mayor. 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 number of adjudications to the same firm per term, weighted by the number of auctions, which is by construction term invariant.³⁰ We are aware that some of these measures do not represent a direct indicator for the presence of collusion. To this purpose, we will make use of the theoretical predictions outlined in Section 3 to provide some insights about the way that political longevity can affect the correct functioning of public procurement contracts.

6.1 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 manage reelection more easily, and thus 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 or inefficient behavior in the ballot.

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

²⁹Figure 3 shows that there is homogeneity in the timing of the procurement auctions within each term. This is reassuring against the sampling censoring being a relevant issue in our data.

³⁰We could have used other measure of incumbency, like for example the probability that the winning firm had already been awarded in the past, or the number of times the same firm has been awarded in the past. Since we do not observe all the auctions administered by a mayor, but only those between 2000 and 2005, we could not compute these auction specific measures.

chosen group of mayors. Among other things, the reform introduced a term limit, which 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 4 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.

This institutional framework offers a unique natural experiment, because the timing of local elections is not completely synchronized neither between regions nor between provinces (to a certain degree, any city has its own scheduling, depending on city-specific past events), which provides a source of heterogeneous variation across the country. For our identification strategy to hold, however, it is important that mayors could not anticipate the introduction of the term limit and went to election following each city’s scheduled timing, in which case we could treat the potential time in office “as if randomly” assigned among mayors. Since the bill containing 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.³¹ To completely 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.

Note that, as a by-product of the reform, Figure 4 also shows that some mayors happened to face a binding term limit when they were in the second term, while others when they were 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,

³¹The reform was a response to the political crisis that originated on February 1992 from a judicial investigation (so called “*Mani Pulite*”) on the corruption of national and local administrators. This investigation led to 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).

1995; Ferraz and Finan, 2010).³²

Following the above discussion, we re-estimate Equation (1) within a two-stage framework. As an exclusion restriction in the first stage, we use an indicator for whether the mayor was elected before March 1993, and then we add the full set of available regressors considered in the baseline specification. The resulting first stage equation is as follows:

$$T_{im} = a + bPR_m + c_1X_i + c_2X_m + \varepsilon_{im} \quad (2)$$

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, 1993.³³ 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), to be sure that no one in the sample could be reelected for a second term before the implementation of the reform.

6.2 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.³⁴ Specifically, the reform changed the electoral system from party to individual ballot. This may have led to the selection of better candidates, as the electoral competition was fiercer and citizens could select their most favorite candidate without parties interfering.³⁵ In principle, within the 2SLS sample (mayors at the second or third term as

³²The same argument holds in Equation 1.

³³Other estimation strategies could have been implemented. With repeated observation per mayor, over terms and auctions, we could use 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-effects 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 we think that the assumption of time/auction invariance of collusion is not reasonable in our context, exactly because unlawful behaviors may grow when time in office increases. 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-effects estimates.

³⁴The reform also introduced a majority premium guaranteeing at least two-thirds of the seats of the council to the mayor's coalition. This feature is not relevant for our analysis, except for its consequences on the probability of early termination. We will discuss this point in Section 7.2.1.

³⁵See Section 4 for more details.

of 2000-2005) this selection bias is minimum, as all the mayors had gone through at least one individual ballot election. No matter what was the selection effect of the new electoral system, we might assume, however, that 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 quickly recruit, at local level, suitable candidates for the new electoral system. If so, focusing on mayors elected right before and right after the 1993 reform should remove any additional bias due to the different electoral mechanism for the treated and the control group.³⁶

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:

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

and,

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

where $dist_m$ denotes the time distance of first election from the March 1993 reform, and $f(.)$ and $g(.)$ are flexible functions. Since the running variable is not continuous, because elections are held at few points in time (see Figure 5), 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.

A final threat to our identification strategy is that we can run the analysis on mayors who survived until the year 2000, as we observe auction data for the period 2000-2005 only. A different survival rate between the treated and the control group might then introduce a sample selection bias. To tackle with this issue, we consider the survival probability of

³⁶One possible additional concern is that mayors elected for the first time right after and before the reform were facing a different political horizon (two instead of infinite terms, and four instead of five years per term, respectively), and this might have influenced their decision to run for a mayoral office. Under the assumption that potentially collusive candidates might have preferred to run when there was the possibility to stay in office longer, one should interpret our 2SLS estimates as an upper bound of the true parameter.

mayors at the first reelection and treat it as a pre-determined characteristics. We argue that, in case of equalization between mayors elected before and after March 1993, sample selection is a minor issue. We will specifically address this issue in Section 7.2.1.

7 Empirical Evidence

To begin with, in Figure 3 we plot the yearly averages of five variables which characterize the procurement process, for the case in which a first term mayor is reelected for a second term, but does not face a term limit.³⁷ This variables are: the total number of auctions, the average starting value per auction, the average number of bidders per auction, and the average winning rebate per auction.³⁸ Looking at the figure, we do not detect any significant jump in the number and the size of the public works within and 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.³⁹ 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, and a positive jump in the probability that the winning firm is local when a mayor is elected for a second time.⁴⁰ We focus therefore the empirical analysis on the auction outcomes (the number of bidders, the winning rebate, the identity of the winner), and treat the amount of public works as if exogenously pre-determined.

7.1 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

³⁷The Figure is computed over the pooled sample of all first term mayors, and all second term mayors without a term limit binding.

³⁸We did not include the highest percentage of auctions awarded to the same because it is term invariant

³⁹As a matter of fact, the construction of large public infrastructures is usually determined well in advance, as the result of a bargaining process between the central government, which allocates the transfers of public funds, and local municipalities.

⁴⁰Similar figures, available upon request, hold when we consider the case of a mayor reelected for a second term, but facing a term limit. The only difference in this case is that the drop in the number of bidders and in the winning rebate is less significant.

(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 6. 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 respectively (the *level of competition*). Estimates confirm the graphical evidence of a negative relationship between mayors' longevity and both the number of bidders and the winning rebate, that we observed in Figure 3. The effects appear to be both statistically and economically significant. Depending on the set of controls, a one standard deviation increase in the time in office (3.24 years) is associated with a decrease in the number of bidders by about 6.2-16.8 percent with respect to the sample mean (21.33 bidders), and with a decrease in the winning rebate by 3.9-10.3 percent with respect to the sample mean (12.97 percent). Similarly, one additional term in office is associated with a decrease in the number of bidders and in the winning rebate by about 8.8 percent and 5.9 respectively. The coefficient on the term limit is statistically significant over the number of bidders only, indicating an increase in the participation when a mayor is about to leave. The estimated coefficients on the resident population are instead all positive and statistically different from zero for both outcomes at 1 percent level, suggesting remarkable size effects: the bigger the potential market, the higher the number of firms willing to compete. 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. Interestingly, this 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.⁴¹ We do not find instead any effect of the mayor's party longevity on both outcomes, which makes us think that, exactly because of the increased power of the mayor following the 1993 reform, political parties might have become less important in the procurement assignment. We do not find instead any effect for the majority seats belonging to the mayor's coalition,

⁴¹The law mentioned in Section 4 shapes the admission requirements as a function of the starting value of the auctions (increasing, concave, and discontinuous).

but some positive effect for the number of parties in the mayor’s coalition on the winning rebate, which is statistically significant at 10 percent level. The latter is evidence that a high level of competition within heterogeneous governments prevents the members of the mayoral coalition from coordinating in shaping the auction process.

In Panel A and B of Table 5 we report the estimates on the identity of the winning bidder, i.e., 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*).⁴² Even in this case the effects appear to be both statistically and economically significant. Depending on the set of controls, 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 2.1-6.6 percent with respect to the sample mean (70.46 percent), and with an increase in the maximum percentage of auctions assigned to the same firm by 10.4-26.1 percent with respect to the sample mean (24.41 percent). Similarly, one additional term in office is associated with an increase in the probability that the winner is a local firm by about 3.6 percent and 14.8 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 in this case have both a negative and statistically significant.

7.2 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 consolidate political consensus through favoritism and then being reelected,

⁴²Estimates on the highest percentage of auctions awarded to the same bidder within the term are computed on the mayoral terms elected between 1998 and 2003, to provide at least three observed years per term.

or that informed voters penalize collusive behaviors by not granting reelection. This, of course, would severely bias the estimates, as the exogeneity assumption of T_{im} underlying the OLS estimates would not hold anymore. To take care of this potential reverse causality between T_{im} and the set of y_{im} , we present the results from a two-stage least squares (2SLS) estimation, as explained in Section 6, where we use the shift in political longevity induced by the March 1993 reform as an excluded instrument.

7.2.1 Validity Tests

Before presenting the 2SLS estimation results, we argue on the quality of the instrument. We first report evidence on the non-testable assumption that the election timing was orthogonal to the introduction of the reform, by graphically inspecting the frequency distribution of elections around March 1993. Figure 5 plots on the horizontal axis the time from January 1985 to December 2008, and on the vertical axis the frequency of the elections (in light brown) and the frequency of early terminations for any political reason (in green).⁴³ The figure highlights the main five election events between 1985 and 2008. At first view, it provides support to the assumption that elections were held with regular cycle, up to a certain degree of unscheduling determined by idiosyncratic events only, although early terminations seem more frequent before March 1993, probably 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 that might threaten the identification strategy, we focus the graphical inspection on a closer neighborhood of the reform. Figure 6 plots the frequency of elections between 1992 and 1994 only. There are actually a few elections which were held right before the reform because of an early termination (red full rectangles) and also a few elections which were held right after the reform because of a delayed termination (blue full rectangles). Most importantly, the large majority of early terminations did not serve the purpose of anticipating the election to avoid the application of the reform (red empty rectangles), and few of the mayors who postponed the election in order to be elected under the new system gained reelection (blue empty rectangles). We take this as evidence that manipulation of

⁴³An early termination is any anticipated conclusion of the term for one of the following reasons: a) the resignation of the mayor; or b) the resignation of the majority of the council or a no-confidence vote in the council.

the election scheduling to sort around the March 1993 reform is not a relevant issue in our sample.

As discussed in Section 6, 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, as mayors elected before and after the reform could differ in their observable and unobservable characteristics because of the different selection process they went through. However, if the effect of the individual ballot elections was somehow resilient, because of the initial difficulty for parties to quickly recruit candidates more suitable to the new electoral system, we should not observe significant differences between mayors elected right before and after the reform.

To this purpose, in Table 6 we report the sample averages of mayors' characteristics by treatment status (being elected for the first time before or after the 1993 reform) for the entire sample of mayors. We consider five different time windows, and report *p-values* to test for the statistical difference of the following indicators: gender, age, whether born in the same region, whether employed at a low occupational level, whether a college graduate, and the probability of being reelected for a second term.⁴⁴ These variables, should meet the following 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. 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). Remarkably, the equalization of mayors' reelection probability is evidence against any potential sample selection bias, that is, mayors elected around March 1993 had the same probability to survive until 2000-2005. At the same time, the absence of any statistically significant difference between the two groups of mayors does not seem to be driven by the small sample size in the two-years window, as almost all the characteristics are equalized in terms of average magnitude. We do find instead that within three and four years after the reform there were systematically more females than within three or four years before the reform (see Panel C and D),

⁴⁴We also compared a set of dummies for whether the mayor was born in the same province/region, and for different levels of occupation/education, but results are qualitatively the same. Other city-level characteristics, like the resident population or geographical location, would not be balanced if the election timing was to a certain degree coordinated, as it actually was, at regional level. We control for the unbalancedness of these variables by including them in the 2SLS estimation.

mayors were more educated, and had a higher reelection probability. This evidence seems compatible with a smooth increase in the quality of the elected mayors, resulting from the new (and more selective) electoral system becoming effective, rather than a sharp change due to the 1993 reform. Accordingly, we specify $f(\cdot)$ and $g(\cdot)$ in Equation 4 as a set of year dummies, excluding the two years before and after the March 1993 reform. In Panel E we present the same tests over the largest asymmetric window (March 1988-March 1997) that we will use in the estimation of equation 4. As expected, in this case almost all the differences are statistically significant, including the occupational level.⁴⁵ These numbers are consistent with the plots in Figure 7, where we draw scatters of the observed values, plus a running-mean smoothing performed separately on either side of the 1993 reform.

7.2.2 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 for the maximum percentage of auctions assigned to the same firm within the term for the sample of mayors elected for the first time between 60 months before, and 48 months after the reform (8,801 observations).

The first column in Table 7 reports the first-stage estimate of the effect of the reform on the actual time in office. As a result of the equalization in the probability of reelection between the treated and the control group (see Table 6), mayors elected for the first time before the reform accumulate, on average, 0.978 terms more than mayors elected after the reform. The first stage F-statistic of the excluded instrument suggests that the instrument is relevant. In columns 2 and 4 of Table 7 we first report the OLS estimates on 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 a one term increase in the time in office causes a 23.28 percent decrease in the number of bidders (with respect to a sample mean of 19.70), which is 12.68 percent for the winning rebate (with respect to a sample mean of 11.68 percent).

⁴⁵A more accurate test would be to check the equalization of the same characteristics over the sample of mayors that we actually use in the 2SLS estimation, instead of the whole population of mayors. However, the small sample size (198 mayors in the March 1992-March 1994 window, and 335 in the March 1991-March 1995) would not deliver meaningful 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. This assumption is reinforced by the fact that the reelection probability is the same for the treated and the control group, and then the probability to survive up to 2000-2005.

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 25.51 percent increase in the maximum percentage of auctions assigned to the same firm within the term (with respect to a sample mean of 24.37 percent). 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 6 this difference should be interpreted as the more colluded mayors being more likely to gain reelection, and therefore to survive longer.⁴⁶

7.3 Interpretation

Following the theoretical framework outlined in Section 3, we interpret all these figures as evidence that the functioning of public procurement auctions deteriorates when a mayor stays in power for too long.

As long as the time in office increases, mayors start colluding with some bidders, who will then be awarded a higher percentage of the following auctions. The fact that the winning rebate is also decreasing over time, suggests that it is not the most efficient bidders that will be awarded a higher number of auctions, but more plausibly that the non-favored firms will start bidding less aggressively, as they learn from previous auctions' outcome that there is a favored bidder.

For the same reason, also the number of bidders decreases over time, because non-favored bidders will soon opt out and save on the entry cost. The evidence on the possibility that local firms and pro-local mayors have a more similar discount rate, and therefore collude with a higher probability, receives instead less support in the data.

⁴⁶We also estimated the same model on a sample including also the mayors elected for the second, third and fourth time within five years before the 1993 reform, to gain in sample size (9,277 instead of 8,801). Results were quantitatively and qualitatively the same.

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 the functioning of public procurement auctions. 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. In fact, we observe less bidders, a higher cost of the public work, and an increase in the probability that the winner is an insider. These effects persist 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.

Our findings highlight another channel through which political collusion could be eliminated, and competition in public procurement restored, i.e., political turnover. From the point of view of a regulator interested in rationalizing public spending, they suggest the introduction of policies favoring political turnover (e.g., the term limit) and, as far as the functioning of procurement auctions is sensitive to repeated interactions between politicians and contractors, they also suggest the introduction of policies aimed at limiting the power of politicians over the auction mechanisms (e.g., centralized purchases at national level).

Appendix A: The Model

We illustrate the main structure of the model focusing on one generic sub-game, a snap-shot of the infinite game, and solve it backward.

Stage 2: Collusion in Repeated Auctions

A non-favored bidder i , each period/auction t , competes with probability p_t against the valuation of the favored bidder. At the beginning of every second Stage, valuations ν_i are i.i.d. draws from the log-concave c.d.f. $F(\nu)$. A non-favored bidder has bidding function $b_i^p : [\underline{\nu}, \bar{\nu}] \rightarrow \mathbb{R}$. We look for a strictly increasing strategies subgame perfect Bayesian equilibrium symmetric among non-favored bidders, where $b_i^p(\nu) = b^p(\nu)$ in every period for the $N - 1$ non-favored bidders.

Given the i.i.d structure we consider the maximization problem of a non-favored bidder as independent of past realizations of ν and that he will choose her bid considering her strictly increasing inverse bidding function $\phi^p(\cdot)$:

$$\max_b (\nu_i - b) [p_t (F(\phi^p(b)))^{(N-2)} F(b) + (1 - p_t) (F(\phi^p(b)))^{(N-1)}] \quad (5)$$

where, in square brackets there is the overall probability that a non-favored bidder i wins the auction bidding b , and $F(\cdot)^{(N-2)}$ is the probability that a non-favored bidder defeats the $N - 2$ honest rivals, while $F(b)$ 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:

$$(\phi^p(b) - b) = \frac{[p_t (F(\phi^p(b))) F(b) + (1 - p_t) (F(\phi^p(b)))^2]}{p_t [(N - 2) F(\phi^p(b)) f(\phi^p(b)) (\phi^p(b)) + F(\phi^p(b)) f(\phi^p(b)) + (1 - p_t) (N - 1) F(\phi^p(b)) f(\phi^p(b)) \phi^p(b)]} \quad (6)$$

Given the structure of the problem we apply the results of Arozamena and Weinschelbaum (2009) for each of the independent sub-game, which provide sufficient conditions to characterize the equilibrium of the auction. They show that when $\alpha(\nu) = \frac{F(\nu)}{f(\nu)}$ is strictly concave then $\phi^{p_t}(b) < \phi^{p_{t+1}}(b)$, for all $b > \underline{\nu}$, with $0 \leq p_t < p_{t+1} \leq 1$. A higher probability of collusion induces non favored bidders to bid less aggressively. Moreover, at any point in time for any valuation $\nu > \underline{\nu}$ of the favored bidder there is a gain from collusion for the coalition between the auctioneer and the favored bidder while the expected utility of a non-favored bidder is strictly decreasing in p_t . Under the same assumptions, the expected revenues are decreasing in the probability of collusion. Next section discusses the conditions such that the diffusion of collusion is the outcome of the repeated game.

Stage 1: Building Collusion

We adapt the model by Gosh and Ray (1996), and Kranton (1996) to get the conditions such that collusion is built through repeated interactions. In each period/auction t , a stage game is played bilaterally by a mayor and a contractor. Players decide the amount of transfers $p \in (0, \hat{p})$. Both players have a benefit of choosing the symmetric p , but each player, individually, has incentives to extract as much collusion from the other, while extending no collusion himself. Let $u(p) \equiv \frac{1}{2}[(1 - p)^\alpha + (p)^\alpha]$ be the utility function. The stage game has a unique Nash equilibrium where both players choose not to collude and get zero payoffs.

We assume that after any period/auction each player of a randomly matched pair mayor-contractor faces the decision to continue or terminate the ongoing relationship. In particular, we consider a scenario where at time T there is a probability τ that the game between a mayor and a bidder continues. If both players decide to continue the same stage game is played once more, otherwise they return in the pool of unmatched players. At any date, the match happens between two types of players: non-myopic and myopic. With probability $(1-\pi)$ players (non-pro-local mayors and non-local-contractors) do not care about future interactions and systematically choose the action 0 of non-collusion. Without loss of generality, we normalize their discount factor to zero. Moreover, we consider the discount factor of the first group of players as the continuation probability of the stage game (e.g., $\delta = \delta^h \tau$).

As in Gosh and Ray (1996) and in Kranton (1996) we look for a pair-wise enforceable (PE) transfer profile that characterizes a sub-game perfect equilibrium. Such profile is robust to both deviations by individual players and to deviations by pairs who are matched to each other. The PE profile consists of two transfers: p_0 be the transfer in period 0, and \hat{p} the constant transfers in the following periods with corresponding lifetime utility $V_0 = \pi(p_0)^\alpha + (1-p_0)^\alpha + \frac{\delta}{1-\delta}u(\hat{p})$. The transfer profile must satisfy the following individual enforceability constraints:⁴⁷

$$\delta[u(\hat{p}) - \pi(p_0)^\alpha - (1-p_0)^\alpha] \geq 1 - (1-p_0)^\alpha \quad (7)$$

and,

$$\delta[u(\hat{p}) - \pi(p_0)^\alpha - (1-p_0)^\alpha] \geq 1 - (1-\hat{p})^\alpha \quad (8)$$

and the following pair-wise enforceability constraints: there exists no p'_0 that yields higher expected utility in the initial period and is enforceable given the strategies of the rest of the population:

$$\pi(p'_0)^\alpha - (1-p'_0)^\alpha > \pi(p_0)^\alpha - (1-p_0)^\alpha \quad (9)$$

and,

$$\delta\left[\frac{1}{1-\delta}u(\hat{p}') - V_0\right] \geq 1 - (1-p'_0)^\alpha \quad (10)$$

And there exists no \hat{p}' that yields higher utility in subsequent periods and is enforceable given the strategies of the rest of the population:

$$u(\hat{p}') > u(\hat{p}) \quad (11)$$

and,

$$\delta\left[\frac{1}{1-\delta}u(\hat{p}') - V_0\right] \geq 1 - (1-\hat{p}')^\alpha. \quad (12)$$

Equilibrium

An equilibrium of this repeated game is composed by a transfer profile (p_0, \hat{p}) : p_0 maximizes $\pi(p_0)^\alpha + (1-p_0)^\alpha$, and satisfies the IEs and PEs constraints (7)-(12), and the per period differential equation (6) is evaluated at (p_0, \hat{p}) . In particular, given the parametric assumptions

⁴⁷The parametrization of the utility function from collusion simplifies the derivation of the IEs, and PEs constraints, (7)-(12), which is identical to Kranton (1996).

it is possible to show that a profile $p_0 < \frac{1}{2}$, and $p = \frac{1}{2}$ is also a PE equilibrium satisfying the (7)-(12) constraints. The model predicts that with such profile of collusion an initial period of high rebates, high entry, low incumbency of local bidders should be followed by a reduction in the rebates, lower entry, higher incumbency of local bidders.

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Tables and Figures

Table 1: City characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max	N.
North-West	0.40	0.49	0	0	0	1	1	3,826
North-East	0.20	0.40	0	0	0	0	1	3,826
Center	0.14	0.35	0	0	0	0	1	3,826
South	0.22	0.42	0	0	0	0	1	3,826
Islands	0.04	0.19	0	0	0	0	1	3,826
Population	11,668	63,363	504	1,807	3,845	8,412	2,733,908	3,826

Only cities with at least one auction observed between 2000-2005. *Population* is the number of resident inhabitants as at the beginning of the first observed term.

Table 2: Mayor/Term characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max	N.
Female	0.08	0.28	0	0	0	0	1	5,210
Age	49.89	9.16	25.41	43.40	49.62	55.81	84.12	5,210
Born in the city	0.52	0.50	0	0	1	1	1	5,210
Born in the province	0.85	0.36	0	1	1	1	1	5,210
Born in the region	0.94	0.24	0	1	1	1	1	5,210
Previous years in office (as mayor)	2.30	3.24	0	0	0	4.14	14.97	5,210
Previous terms in office (as mayor)	0.53	0.72	0	0	0	1	3	5,210
Term limit binding	0.39	0.49	0	0	0	1	1	5,210
<i>Education:</i>								
Secondary	0.52	0.50	0	0	1	1	1	5,210
College	0.47	0.50	0	0	0	1	1	5,210
<i>Employment:</i>								
Not employed	0.11	0.32	0	0	0	0	1	5,210
Low-skilled	0.03	0.18	0	0	0	0	1	5,210
Medium-skilled	0.09	0.28	0	0	0	0	1	5,210
High-skilled	0.77	0.42	0	1	1	1	1	5,210
<i>Political party:</i>								
Center-right	0.11	0.31	0	0	0	0	1	5,210
Center	0.06	0.23	0	0	0	0	1	5,210
Center-left	0.30	0.46	0	0	0	1	1	5,210
Separatist	0.01	0.09	0	0	0	0	1	5,210
Others	0.54	0.50	0	0	1	1	1	5,210
Party longevity (years)	1.77	2.63	0	0	0	4.14	15.78	5,210
Party longevity (terms)	0.41	0.60	0	0	0	1	4	5,210
<i>Coalition:</i>								
N. parties mayor's coalition	1.31	0.99	1	1	1	1	12	5,210
Seats mayor's coalition (%)	67.79	7.52	60	66.67	66.67	66.67	100	5,210
N. seats above majority	2.89	1.08	1	2	3	3	14	5,210

Only mayors who had no early terminations in the past, and with at least one auction observed between 2000-2005. *Previous years/terms in office (as mayor)* without interruption. *Term limit binding* is an indicator of whether the mayor is in her last term in office. *Secondary* includes both lower and upper secondary education. *Low-skilled* includes blue-collar, *Medium-skilled* clerks, and *High-skilled* entrepreneurs and self-employed. *Party Longevity* is the longevity of the party of the mayor in years/terms. *N. parties mayors' coalition* is the number of parties that constitute the coalition of the mayor. *N. seats above majority* represents the number of seats for the mayoral coalition over the absolute majority. .

Table 3: Auction characteristics

	Mean	St.Dev.	Min	p25	p50	p75	Max	N.
<i>Outcome:</i>								
Number of bidders	21.34	21.12	1	5	14	31	100	27,538
Winning rebate (in %)	12.97	8.39	0	6.90	12.42	17.10	49.99	27,538
Winner in the city	0.12	0.33	0	0	0	0	1	27,538
Winner in the province	0.52	0.50	0	0	1	1	1	27,538
Winner in the region	0.70	0.46	0	0	1	1	1	27,538
Max (%) same firm	0.24	0.25	0.02	0.08	0.16	0.33	1	27,538
<i>Selection mechanism:</i>								
Direct negotiation	0.09	0.29	0	0	0	0	1	27,538
<i>Characteristics of the good:</i>								
Starting value (100thousand euros)	5.40	9.35	1.34	2.03	2.94	5.16	190.83	27,538
Road	0.23	0.42	0	0	0	0	1	27,538
School	0.13	0.33	0	0	0	0	1	27,538
Building	0.05	0.22	0	0	0	0	1	27,538
Housing	0.01	0.11	0	0	0	0	1	27,538
Art	0.04	0.19	0	0	0	0	1	27,538
Others	0.54	0.50	0	0	1	1	1	27,538
<i>Year bid delivery:</i>								
2000	0.15	0.36	0	0	0	0	1	27,538
2001	0.20	0.40	0	0	0	0	1	27,538
2002	0.21	0.41	0	0	0	0	1	27,538
2003	0.20	0.40	0	0	0	0	1	27,538
2004	0.15	0.36	0	0	0	0	1	27,538
2005	0.09	0.29	0	0	0	0	1	27,538

Notes. Public tenders for works with starting value greater or equal to 150,000 euros. *Winner in the city/province/region* indicates whether the winning firm is registered in the same city/province/region of the city where the auction is held. *Max % same firm* represents the highest percentage of public tenders 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 maximum price (i.e., the reserve price) paid by the contracting authority and is expressed 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:	Panel A: $N. bidders=21.33$			Panel B: $Winning\ rebate=12.97\%$		
N. years in office	-1.111*** (0.133)	-0.385*** (0.110)		-0.409*** (0.063)	-0.154*** (0.043)	
N. terms in office			-1.888*** (0.507)			-0.767*** (0.208)
Term limit binding	5.198*** (1.386)	2.217** (0.888)	2.503*** (0.920)	0.283 (0.651)	0.151 (0.362)	0.279 (0.384)
Population		0.069*** (0.025)	0.069*** (0.025)		0.057*** (0.014)	0.057*** (0.014)
Starting value		0.683*** (0.077)	0.684*** (0.077)		0.087*** (0.011)	0.087*** (0.011)
Party longevity (terms)		-0.410 (0.479)	-0.413 (0.480)		-0.340 (0.210)	-0.341 (0.211)
N. seats above majority		-0.260 (0.196)	-0.265 (0.196)		0.007 (0.087)	0.005 (0.087)
N. parties mayor's coalition		0.295 (0.194)	0.297 (0.194)		0.161* (0.095)	0.162* (0.095)
Female		0.097 (0.812)	0.108 (0.813)		-0.103 (0.303)	-0.099 (0.303)
Age		0.019 (0.032)	0.019 (0.032)		0.022* (0.012)	0.022* (0.012)
Observations	27,538	27,538	27,538	27,538	27,538	27,538
R-squared	0.008	0.214	0.214	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 4,788 mayors (5,210 terms). Cities with a population larger than 500. Auctions held between 2000-2005, and with no more than 100 bidders. *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 an indicator of whether the mayor is in her last term in office. *Population* is the resident population at the beginning of the term, in 10 thousands. *Starting value* is the maximum price (i.e., the reserve price) payed by the contracting authority and is expressed in 100,000 euros (2000 equivalents). *Party Longevity (terms)* is the longevity of the party of the mayor in terms. *N. parties mayors' coalition* is the number of parties that constitute the coalition of the mayor. *N. seats above majority* represents the number of seats for the mayoral coalition over 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). 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:	Panel A: Winner in region= 70.46			Panel B: Max % same firm=24.41 %		
N. years in office	1.442*** (0.188)	0.464** (0.194)		1.967*** (0.287)	0.781*** (0.282)	
N. terms in office			2.537*** (0.931)			3.609*** (1.361)
Term limit binding	-7.102*** (1.457)	-1.785 (1.470)	-2.421 (1.541)	-6.947*** (2.156)	-2.205 (1.652)	-2.562 (1.803)
Population		0.070*** (0.025)	0.069*** (0.025)		-0.024 (0.037)	-0.024 (0.037)
Starting Value		-0.978*** (0.076)	-0.979*** (0.076)		-0.099*** (0.028)	-0.101*** (0.028)
Party longevity (terms)		1.142 (0.862)	1.136 (0.863)		2.112** (0.830)	2.114** (0.831)
N. seats above majority		-0.389 (0.460)	-0.381 (0.459)		-1.348*** (0.381)	-1.342*** (0.382)
N. parties mayor's coalition		0.467 (0.353)	0.466 (0.352)		-1.276*** (0.286)	-1.278*** (0.286)
Female		0.302 (1.481)	0.292 (1.480)		-1.078 (1.350)	-1.092 (1.350)
Age		0.040 (0.067)	0.038 (0.067)		-0.063 (0.052)	-0.062 (0.052)
Observations	27,538	27,538	27,538	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 4,788 mayors (5,210 terms) for *Winner local*. Estimates on 3,725 mayors (4,322 terms) for *Max % same firm* (terms elected between 1998 and 2003 only). Cities with a population larger than 500. Auctions held between 2000-2005, and with no more than 100 bidders. *Winner in region* indicates whether the winning firm is registered in the same region of the city where the auction is held. *Max % same firm* represents the highest percentage of public tenders assigned to the same firm within the term, and is term invariant. *Term limit binding* is an indicator of whether the mayor is in her last term in office. *Population* is the resident population at the beginning of the term, in 10 thousands. *Starting value* is the maximum price (i.e., the reserve price) paid by the contracting authority and is expressed in 100,000 euros (2000 equivalents). *Party Longevity (terms)* is the longevity of the party of the mayor in terms. *N. parties mayors' coalition* is the number of parties that constitute the coalition of the mayor. *N. seats above majority* represents the number of seats for the mayoral coalition over 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). 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.
Panel A: -12/ + 12 months bandwidth			
Female	0.065	0.063	0.703
Age	44.396	43.920	0.541
Born in the region	0.947	0.947	0.967
Empl. low-skilled	0.822	0.830	0.814
Edu. college	0.544	0.541	0.934
Probability of first reelection	0.831	0.780	0.338
Observations	65	772	
Panel B: -24/ + 24 months bandwidth			
Female	0.063	0.066	0.818
Age	44.824	44.119	0.271
Born in the region	0.953	0.941	0.425
Empl. low-skilled	0.813	0.820	0.756
Edu. college	0.496	0.550	0.106
Probability of first reelection	0.736	0.775	0.398
Observations	91	1,164	
Panel C: -36/ + 36 months bandwidth			
Female	0.044	0.080	0.000
Age	44.328	44.379	0.798
Born in the region	0.940	0.936	0.379
Empl. low-skilled	0.780	0.780	0.981
Edu. college	0.375	0.442	0.000
Probability of first reelection	0.789	0.807	0.137
Observations	1,479	3,623	
Panel D: -48/ + 48 months bandwidth			
Female	0.043	0.080	0.000
Age	44.372	44.397	0.901
Born in the region	0.940	0.937	0.506
Empl. low-skilled	0.780	0.780	0.934
Edu. college	0.380	0.443	0.000
Probability of first reelection	0.785	0.805	0.089
Observations	1,543	3,782	
Panel E: -60/ + 48 months bandwidth			
Female	0.040	0.080	0.000
Age	44.657	44.397	0.155
Born in the region	0.944	0.937	0.108
Empl. low-skilled	0.756	0.780	0.003
Edu. college	0.383	0.443	0.000
Probability of first reelection	0.773	0.805	0.003
Observations	1,992	3,782	

Notes. *Empl. low-skilled* includes blue-collarers. *Born in the region* 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.

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

	(1)	(2)	(3)	(4)	(5)
<i>Dependent variable:</i>	Longevity	N. bidders	N. bidders	Winning rebate	Winning rebate
Method:	OLS	OLS	2SLS	OLS	2SLS
Stage:	First		Second		Second
Mean outcome:	2.066	19.70	19.70	11.68%	11.68%
N. terms in office		-2.406*** (0.866)	-4.567*** (1.406)	-0.518 (0.323)	-1.481*** (0.457)
Before March 1993	0.978*** (0.009)				
Term limit binding	0.815*** (0.050)	-0.170 (2.016)	1.139 (2.260)	-0.760 (0.756)	0.034 (0.831)
Population	0.000 (0.000)	0.094* (0.051)	0.091* (0.049)	0.041*** (0.005)	0.041*** (0.004)
Starting value	-0.000 (0.000)	0.792*** (0.092)	0.790*** (0.091)	0.116*** (0.023)	0.116*** (0.022)
Party longevity (terms)	0.016*** (0.004)	-1.044 (0.803)	-0.708 (0.764)	-0.315 (0.247)	-0.207 (0.240)
N. seats above majority	-0.002 (0.002)	0.252 (0.306)	0.188 (0.298)	0.033 (0.118)	0.017 (0.118)
N. parties mayor's coalition	0.002 (0.001)	0.081 (0.296)	0.137 (0.285)	0.364*** (0.098)	0.379*** (0.098)
Female	-0.008* (0.004)	1.925 (1.419)	1.903 (1.348)	-0.094 (0.526)	-0.094 (0.528)
Age	-0.001*** (0.000)	0.104** (0.050)	0.098** (0.049)	0.033** (0.015)	0.032** (0.015)
Observations	8,801	8,801	8,801	8,801	8,801
R-squared	0.940	0.231	0.234	0.426	0.428
F-exc.-Inst	10,725				
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. Cities with a population larger than 500. Auctions held between 2000-2005, and with no more than 100 bidders. Only mayors in their third (*Treated*) or second (*Control*) term, elected for the first time between March 27, 1988 and March 27, 1997, [-60,+48] months from the electoral reform. *Winner local* indicates whether the winning firm is registered in the region. *Max % same firm* represents the highest percentage of public tenders assigned to the same firm within the term. *Term limit binding* is an indicator of whether the mayor is in her last term in office. *Population* is the resident population at the beginning of the term, in 10 thousands. *Starting value* is the maximum price (i.e., the reserve price) paid by the contracting authority and is expressed in 100,000 euros (2000 equivalents). *Party Longevity (terms)* is the longevity of the party of the mayor in terms. *N. parties mayors' coalition* is the number of parties that constitute the coalition of the mayor. *N. seats above majority* represents the number of seats for the mayoral coalition over 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). 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)
<i>Dependent variable:</i>	Winner in region	Winner in region	Max % same firm	Max % same firm
Method:	OLS	2SLS	OLS	2SLS
Mean outcome:	70.61	70.61	24.37	24.37
N. terms in office	2.470 (1.752)	2.265 (2.725)	2.057 (2.175)	6.217** (2.542)
Term limit binding	6.882 (4.586)	4.756 (4.975)	-6.446 (9.445)	-6.580 (9.444)
Population	0.084*** (0.024)	0.081*** (0.024)	-0.839*** (0.132)	-0.877*** (0.122)
Starting value	-0.992*** (0.126)	-0.994*** (0.126)	-0.111** (0.045)	-0.106** (0.045)
Party longevity (terms)	-0.003 (0.008)	-0.003 (0.008)	0.023*** (0.008)	0.023*** (0.008)
N. seats above majority	-0.085 (0.812)	-0.104 (0.803)	-0.052 (0.574)	0.118 (0.554)
N. parties mayor's coalition	-0.194 (0.633)	-0.204 (0.632)	-1.925*** (0.494)	-1.949*** (0.463)
Female	4.883** (1.974)	4.704** (1.991)	-1.706 (1.851)	-1.714 (1.897)
Age	0.079 (0.089)	0.076 (0.089)	-0.084 (0.075)	-0.080 (0.075)
Observations	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 % same firm* (terms elected between 1998 and 2003 only). In the interval [-24,+24], 2,012 auctions and 335 mayors for *Winner local*, and 1,081 auctions and 143 mayors for *Max % same firm*. Auctions held between 2000-2005, and with no more than 100 bidders. Only mayors in their third (*Treated*) or second (*Control*) term, elected for the first time between March 27, 1988 and March 27, 1997, [-60,+48] months from the electoral reform. *Winner in region* indicates whether the winning firm is registered in the same region of the city where the auction is held. *Max % same firm* represents the highest percentage of public tenders assigned to the same firm within the term, and is term invariant. *Term limit binding* is an indicator of whether the mayor is in her last term in office. *Population* is the resident population at the beginning of the term, in 10 thousands. *Starting value* is the maximum price (i.e., the reserve price) paid by the contracting authority and is expressed in 100,000 euros (2000 equivalents). *Party Longevity (terms)* is the longevity of the party of the mayor in terms. *N. parties mayors' coalition* is the number of parties that constitute the coalition of the mayor. *N. seats above majority* represents the number of seats for the mayoral coalition over 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). 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 ***.

Figure 1: The time line of the model

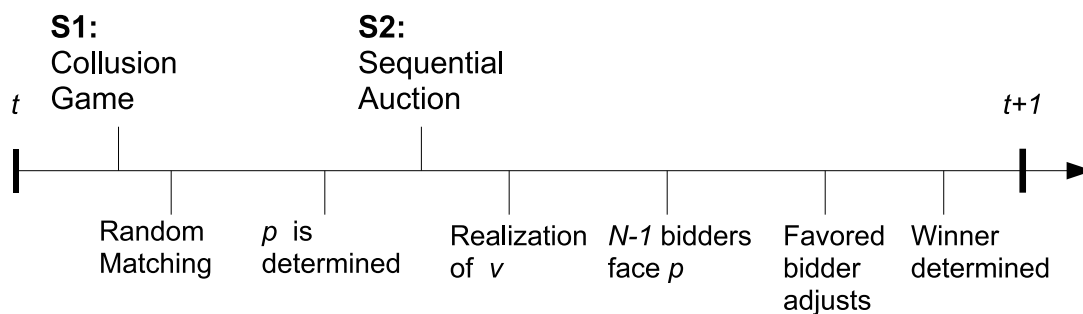
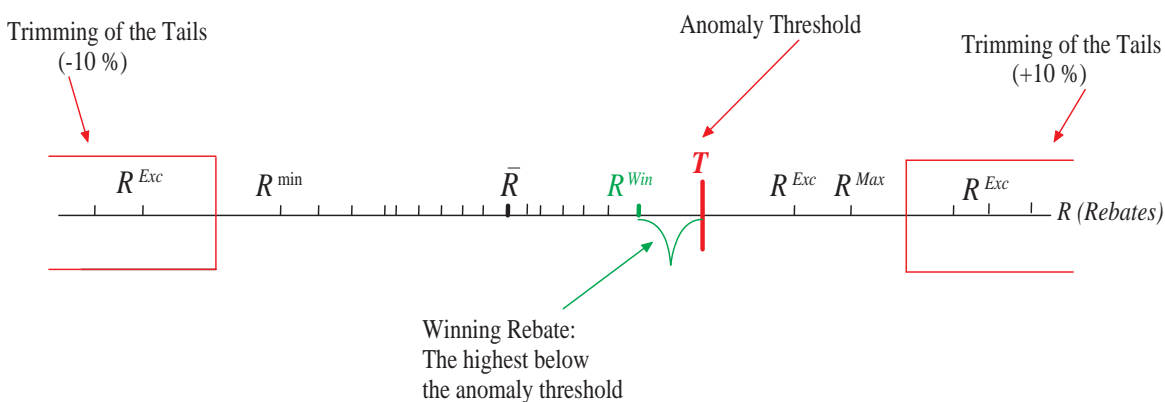
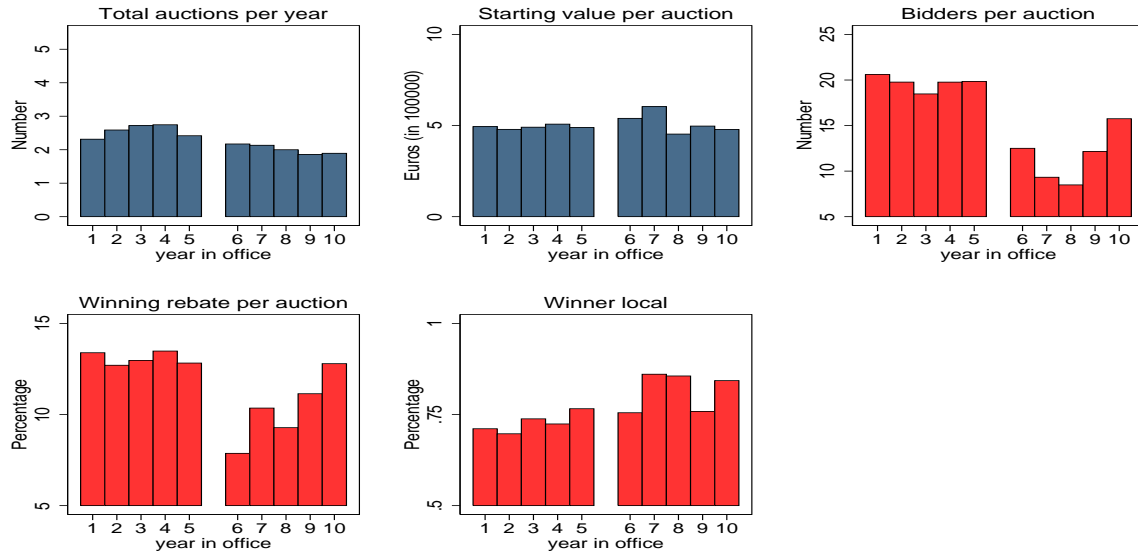


Figure 2: The awarding mechanism



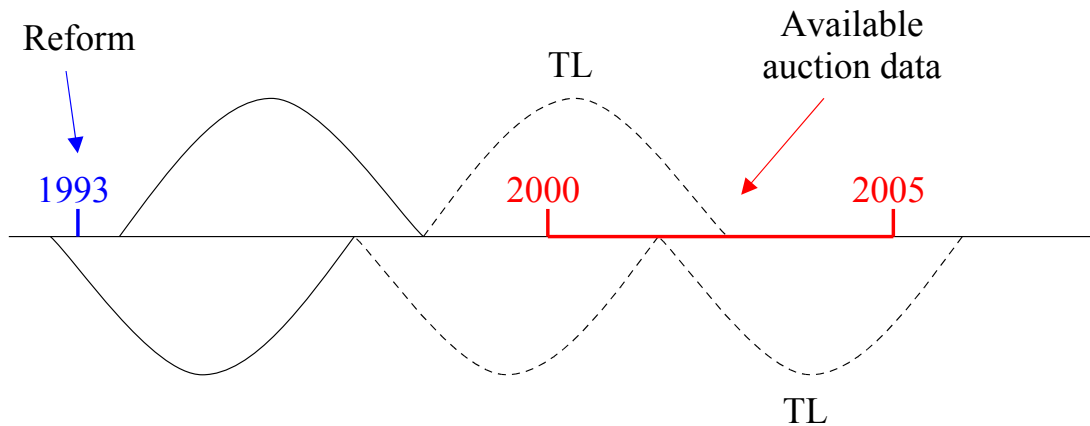
Notes. T , is the anomaly threshold obtained as the sum of \bar{R} and the average deviation of the bids above \bar{R} . R^{Win} is the winning rebate that minimizes the distance from below to T , expressed as a percentage reduction form the starting value. \bar{R} is the average rebate.

Figure 3: Public procurement auctions over terms (no term limit in the second term)



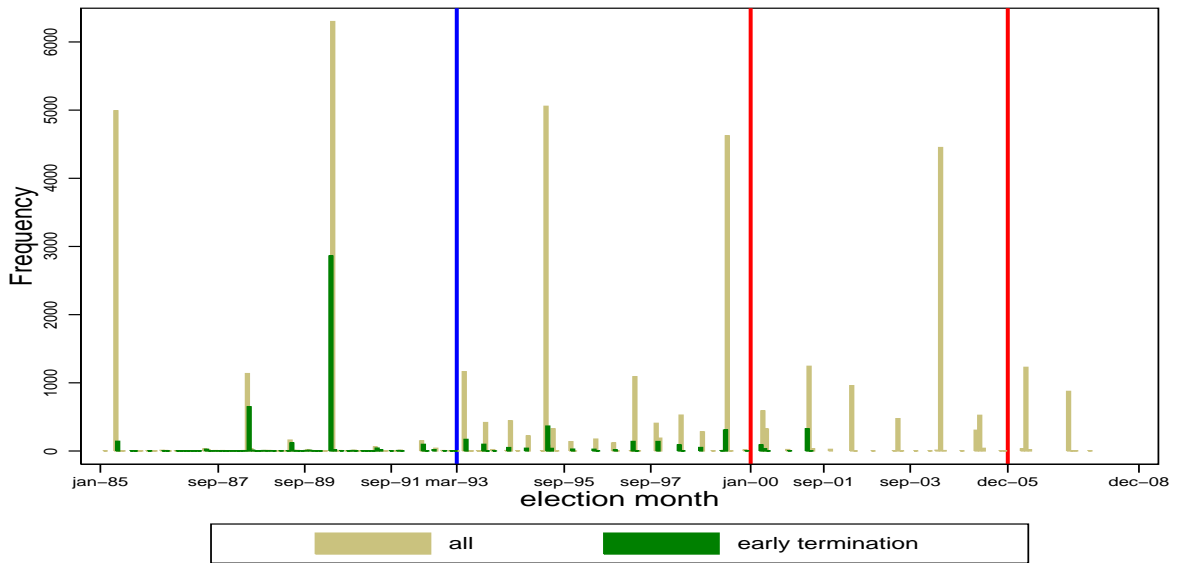
Notes. All variables averaged over the cities, by year within the term. Pooled sample of all first term mayors, and all second term mayors without a term limit binding. *Total auctions per year* is the total number of auctions. *Starting value per auctions* is the reserve price of the auction expressed in 100 thousand euros (2000 equivalents). *Bidders per auction* is the number of bidding firms per auction. *Winning rebate per auction* is the winning rebate expressed as a percentage discount from the starting value. *Winner in region* indicates whether the winning firm is registered in the same region of the city where the auction is held.

Figure 4: The electoral reform



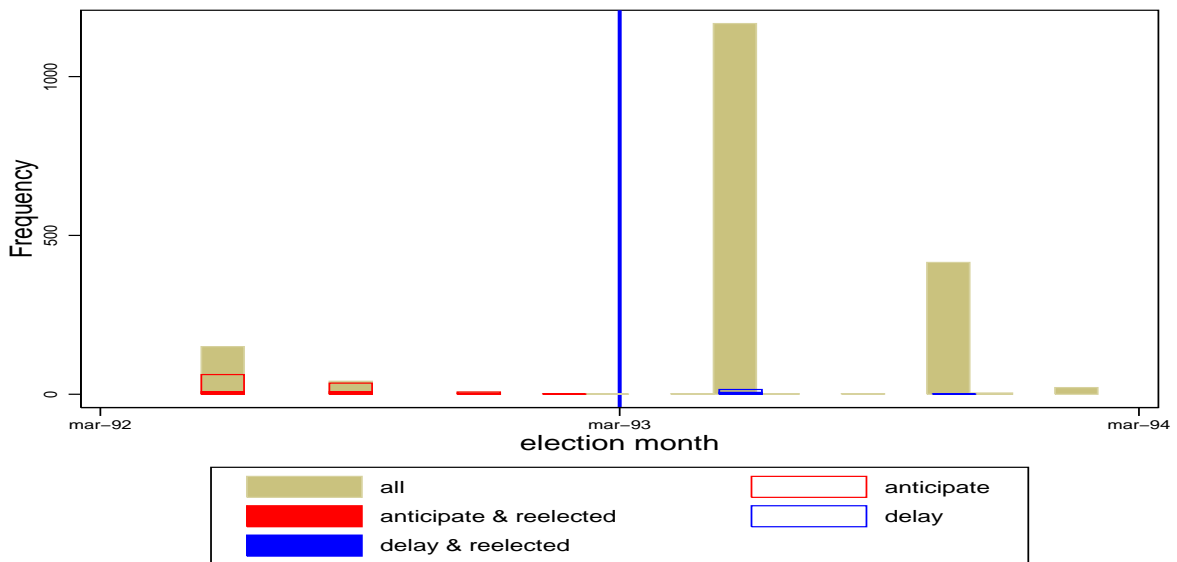
Notes. *TL* stands for the term limit binding. Dash lines for potential following terms.

Figure 5: Election timing



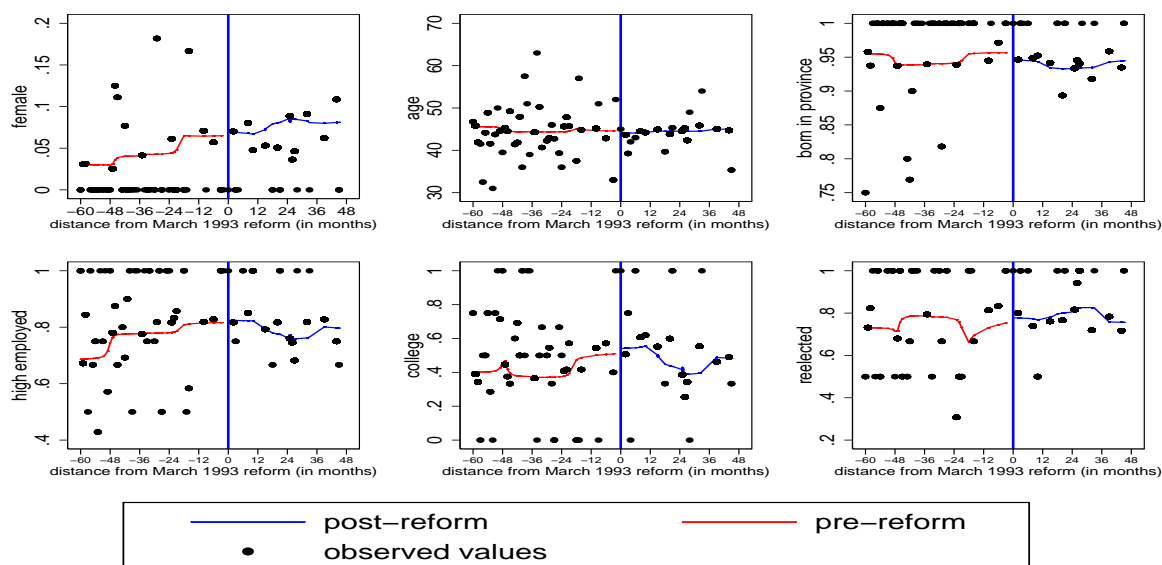
Notes. The blue vertical line denotes the electoral reform. Between red lines: the period over which we observe auction data. *Early resignation* before the end of the fourth year in office because of: mayor's resignation, vote of no confidence by 50% of either the council or the executive committee.

Figure 6: Manipulation of the election timing around the 1993 electoral reform



Notes. The blue vertical line denotes the electoral reform.

Figure 7: 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), performed separately on either side of the electoral reform. The dots are the observed values averaged in monthly intervals.