Rules, Discretion, and Corruption in Procurement: Evidence from Italian Government Contracting

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Abstract

The benefits of bureaucratic discretion depend on the extent to which it is used for public benefit versus exploited for private gain. We study the relationship between discretion and corruption in Italian government procurement auctions, using a confidential database of firms and procurement officials investigated for corruption by Italian enforcement authorities. We show that discretionary procedure auctions (those awarded based on negotiated rather than open bidding) are associated with corruption only when conducted with fewer than the formally required number of bidders or employing discretionary criteria ("scoring rule" rather than first price). We further show that, while these "corruptible" discretionary auctions are chosen more often by officials who are themselves investigated for corruption, they are used *less* often in procurement administrations in which at least one official is investigated for corruption. These findings fit with a framework in which more discretion leads to greater efficiency as well as more opportunities for theft, and a central monitor manages this trade-off by limiting discretion for high-corruption procedures and locales. Additional results based on two standard tools for curbing corruption – turnover and subcontracting limits – corroborate this interpretation. Overall, our results imply that discretion may be under-utilized, given the high potential benefits as compared to the modest increment in corruption.

JEL classifications: C73, D72, D73, K42

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I Introduction

Governments often face a trade-off in the oversight and constraints they impose on lower-level bureaucrats in carrying out their functions. Officials may use discretion to better serve the public's interests, or exploit it for personal gain. The appropriate level of discretion depends on the benefits of an agent's informational advantage relative to the costs from his exploiting discretion for personal gain. From a public welfare perspective, the agency problem is complicated by yet another layer of delegation – politicians or high-level officials who determine the extent of discretion available to lower-level officials may be overly risk-averse, to the extent that the electorate is more attentive to corruption scandals rather than an efficient provision of public goods. Such incentives – whether electoral or promotion-related – may then lead to insufficient delegation and discretion.

In this paper, we study both the determinants and consequences of discretion in the context of government procurement in Italy. Procurement accounts for a large fraction of government expenditure worldwide; for example, for OECD countries the procurement-to-spending ratio held steady at around 30 percent during 2007-2015 (OECD [2017]). Furthermore, corruption is thought to result in substantial "leakage" from procurement expenditures, even in more developed (and less corrupt) countries.[1] Thus, understanding how procurement rules might impact corruption is of interest in its own right, in addition to serving as an apt setting for studying the trade-offs associated with discretion in government bureaucracies more generally.

Our work is enabled by the use of a confidential database obtained from the *Agenzia Informazioni e Sicurezza Interna* (AISI), the Italian equivalent of the FBI. The database lists individuals that have been flagged by the AISI as suspected of various crimes, including corruption. By linking this list to administrative data on the top employees and owners of Italian companies, we classify a firm as *investigated* for corruption if at least one employee or owner was flagged by the AISI for suspected corruption. We then link the resultant firm-level database to information on over 200,000 procurement auctions for the construction and maintenance of public infrastructure held throughout Italy during 2000-2016. The data include the near-universe of auctions involving the two most frequently procured types of contracts: those involving either civic buildings, or roads, highways and bridges. These data allow us to observe whether investigated firms participated in or won each auction. Finally, we complement these firm-level data with similar information on investigations for corruption charges involving the public officials in charge of awarding (and follow-on monitoring) the contracts in our data (we use the same terminology of

[1] A study sponsored by the European Commission reports that, in projects that were found to have been corrupted, 13 percent of expenditures were lost due to corruption (Ferwerda and Deleanu [2013]).

"investigated" and "clean," or "non-investigated," that we use for businesses also for the public officials in charge of the auctions). We know of no other database of corruption risk for individuals and organizations that is comparable to ours.

The scale and richness of our data are such that we may employ a range of fixed effects and controls, which helps to rule out a number of alternative interpretations, which inevitably arise in correlational results. For example, in our analyses that look at the characteristics of auctions won by firms under investigation for corruption, we may include over 6,000 procurement authority (PA) fixed effects, so that we identify the relationship based on the selection of different auction mechanisms by the same entity (e.g., a municipality), or PA-year fixed effects so that we identify the relationship based on the selection of different auction mechanisms in the same place during the same year. The latter specification allows us to account for any potential unobserved time-varying shocks at the procurement authority level.

We begin by examining the types of auctions that are most often won by investigated firms. We show that two auction arrangements are significantly more likely to lead to a contract being awarded to an investigated firm: first, so-called scoring rule auctions, which involve (potentially subjective) non-price criteria in selecting a winner, are 1 percentage point (6 percent) more likely to be won by investigated firms, relative to first-price (non-discretionary) auctions. Auctions that use "negotiated" procedures in which procurement officials invite bidders (rather than allow for open bidding) are no more likely to be won by firms investigated for corruption, relative to open auctions. However, when we look at the subset of negotiated auctions in which officials fail to invite the requisite number of bidders (which we take to be an indication of abuse of discretion), we find a 1.9 percentage point (11 percent) higher probability of an investigated winner. While more at risk of selecting investigated firms, we also find that scoring rule auctions are associated with lower cost overruns and higher award prices, while negotiated procedures are associated with lower delays and higher award prices. In line with earlier work by Coviello et al. [2017], we interpret these features as an indication of improved contract execution.

We then link the *choice* of discretionary auctions to characteristics of procurement administrators that deploy them. In particular, we look at whether the choice of discretion is affected by whether the auction was administered by an individual that the AISI has flagged as suspected of corruption, and also whether the auction occurred in a municipality in which the AISI has identified at least one such official. The first of these analyses aim to examine whether *individual* procurement officials prone to corruption are more likely to select (corruptible) discretionary auctions; the second examines whether locales where suspected corruption is present tend to use "corruptible" discretionary auctions. Our results show effects that go in opposite directions: public officials suspected of

corruption are 2.9 percentage points more likely to use one of the two discretionary auction types we flag for concern (discretionary criteria or discretionary procedures with too few invited participants). By contrast, discretionary auctions are 1.9 percentage points *less* common in "corruption-suspected" municipalities.

We argue that these results are most easily reconciled with classic models of delegation put forward by Holmstrom et al. [1982] and applied to the bureaucratic delegation problem by Epstein and O'halloran [1994]. In our context, greater discretion allows for more efficient implementation of government projects by well-informed and well-intentioned procurement officials, which must be traded off against the higher probability of leakage by corrupt officials. If the choice of auction design is one of the primary means of oversight by a (non-corrupt) central monitor, then less discretion will be allowed in locales where the probability of corruption is higher. When possible, however, corrupt officials deploy discretion, to the benefit of corrupt firms.

This interpretation is supported by two further pieces of evidence focused on methods that, like the selection of the auction procedure and criteria, are often used to curtail corruption: rotation of procurement officers, and tighter limits on subcontracting. Both tools also entail costs: officer turnover destroys the accumulation of the skills essential for procurement design and management, while constraints on subcontracting limit the discretion employed by *firms* in executing contracts. In findings that parallel our results on limits on procurement discretion discussed in the first part of our analysis, we find that both tools are more extensively used in "corruption-suspected" municipalities. In particular, focusing first on turnover, we show that the average proportion of auctions administered by each official is lower in the set of "corruption-suspected" municipalities, which we take as an indication of higher turnover among procurement officials. The implied effect of suspected corruption on turnover is very large, with a 22 percent (6.82 percentage points) lower fraction of contracts managed by an average official in "corrupt" versus "non-corrupt" municipalities (and a nearly identical effect on the value of the contracts managed). Second, we look at subcontracting, which is typically considered the main channel for funneling public money into the cash needed for bribes and kickbacks. Indeed, we show a series of results indicating that firms investigated for corruption subcontract more often and – conditional on subcontracting – they are more than 60 percent more likely to delegate subcontracts to other investigated firms and to award a larger share of all subcontracts to investigated firms. But subcontracting is also a tool for the efficient allocation of job tasks, especially for more complex projects. When inspecting regional procurement regulations on subcontracting rules, we find that regions in which corruption is less of a concern are more apt to loosen rules on subcontracting, whereas regions where corruption is more of a concern implement tighter subcontracting rules.

Overall, the empirical findings in this study offer a new, detailed assessment of the extent of – and the mechanisms involved in – corruption in infrastructure procurement. On the fundamental question of whether a central legislature or senior bureaucrat chooses to impose excessively strict constraints on lower-level officials, while our analyses do not allow for decisive welfare calculations, we argue that the data provide suggestive evidence of overly strict constraints. This argument is exemplified by the consequences of a mid-2000s reform in which the Italian legislature loosened regulations governing the use of negotiated procedures. Whereas such contracts could only be deployed for relatively small projects (under €300,000) in the early 2000s, by 2011 the limit had been raised to €1,000,000. This change, motivated by the government's desire to stimulate the economy by reducing the procedural times to award public contracts, led to a massive increase in the share of auctions held via negotiated procedures, from 10 percent in 2006, to 60 percent by 2012. Yet the vast majority of these were conducted with the legally required number of bidders, and hence the loosening of rules had at most a very small effect on the fraction of contracts awarded to firms under investigation for corruption. And in locations in which officials might have exploited discretion, their use was relatively limited. Indeed, calculations based on our estimates imply a 0.05 percent increase in investigated winners overall between the periods before and after the increase of the threshold for using negotiated procedures. This appears to be a small cost when compared to improvements in contracting quality from discretion, such as a 14 percent reduction in delays.

The rest of the paper proceeds as follows. In the sext section we review the relevant literature and discuss how our findings contribute to it. We then provide a detailed overview of Italian procurement data as well as our data on corruption investigations. This is followed by a presentation of the main results on discretion in auction design. We then outline a simple model of corruption and oversight, in order to organize and interpret the results. This interpretation is supported through additional evidence on turnover and subcontracting. Finally, we present concluding comments and discuss policy implications.

II Literature

Our paper sits at the intersection of several distinct literatures, and we organize our discussion of this related work around what we see as our five main contributions.

Taken as a whole, our results suggest that greater discretion had only a limited impact on corruption (but did reduce delays, and plausibly also costs). This first contribution is relevant to our understanding of the efficiency-corruption trade-off in delegation. The seminal study of Banfield [1975] observed that reducing discretion may limit corruption, albeit at the expense of constraining honest public officials from exercising their

judgment to the benefit of public welfare. This links to the rich and extensive literature on government decentralization and delegation. Huber and Shipan and Bendor et al. [2001] provide earlier overviews of this body of research; we see our work as corresponding to their models of "ex ante constraints" (as in the reduced use of discretion that we study here) rather than ex post monitoring.[2]

Our second contribution is a new measurement of corruption in public contracts that is plausibly more credible and more accurate than prior measures. There is a vast and growing body of work on the political and economic analysis of corruption (see Olken and Pande [2012] and Burguet et al. [2016] for recent surveys of corruption that review and synthesize various models of delegation), which reflects the potential importance of corruption to the functioning of government, and the correspondingly substantial resources devoted to fighting corruption. Thus, we see it as a useful contribution to be able to quantify that 17 percent of public works in Italy are awarded to investigated firms.[3]

Our third contribution concerns the strengths and weaknesses of different procurement methods to limit corruption risks. Our finding that discretion has limited impact overall on corruption is in line with Bandiera et al. [2009], who analyze centralized versus decentralized public procurement and show that excessive payments for standardized goods are driven more by inefficiency than corruption.[4] Our results provide evidence on a well-defined source of inefficiency, namely excessively rigid contracting procedures. Several other studies link procurement methods and oversight to project outcomes. Notable contributions include Brierley [2020], who shows that greater oversight may backfire if politicians themselves are corrupted (a result in the spirit of the classic study of hierarchical corruption in Indian canals by Wade [1982]), Lewis-Faupel et al. [2016], who

[2]Related work by Bandiera et al. [2020] investigates delegation in public procurement by experimentally varying the amount of autonomy granted to procurement officers. They find that shifting decision-making rights from monitors to officers reduces procurement prices. While our analysis also indicates that discretion improves procurement outcomes, our study focuses on a different type of channel (the choice of award procedures and criteria) and a different outcome (the risk of selecting criminal contractors). More broadly, given the monitoring function of higher-level governments, our findings also relate to the literature on the costs and benefits of decentralization (e.g., Bardhan and Mookherjee 2006).

[3]Our work also relates to the studies linking procurement to firm political connections, although our measure of corruption risk is clearly distinct. Mironov and Zhuravskaya [2016] document how firms with public procurement revenue increase the tunneling of funds to politicians around elections. They also document that more corrupt locales tend to award contracts to less productive firms. Auriol et al. [2016] show that politically connected companies are more likely to win auctions with limited competition, which they take to be an indication of corruption. A similar approach is taken by Baltrunaite et al. [2018] in the setting of Italian auctions, in linking political connections to discretionary auctions. Brogaard et al. [2016] show that contracts won by politically connected firms in the U.S. tend to have poorer performance. Our work is distinct from these earlier efforts in a number of ways. Most importantly, we have an unusual country-wide measure which allows us to identify firms as potentially corrupt.

[4]Along similar lines, several recent studies have shown that limiting the discretion of procurement officials is most valuable when the skills or abilities of the public buyers are lower; see Best et al. [2019], Bucciol et al. [2020] and Decarolis et al. [2020].

document the positive impact of e-procurement on road quality in India and on execution time Indonesia, possibly by limiting interactions with corrupt public officials, and Djankov et al. [2017], who document the correlation across countries in procurement rules and practices and link these to survey-based measures of road quality. The central role of competition in curtailing corruption that we uncover parallels the recent work of Colonnelli and Prem [2017], which also points to the role of limited competition in creating rent-seeking behavior in Brazilian procurement. At the macroeconomic level, these are key results for the larger objective of assessing the quality of fiscal policy, as underscored by the recent interest in opening up the black box of "Big G" [Cox et al., 2020].

The fourth contribution relates to the heterogeneous impact of procurement rules across different public organizations. In particular, we show that discretionary auctions are relatively rare in high-corruption *areas*, but are commonly deployed by *individual* administrators under investigation for corruption. While these two findings are, at least superficially, in tension with one another, as we discuss below they follow from a simple model that is very much in line with standard theories of delegation. This framework also allows us to interpret our findings concerning the variation across municipalities in officer turnover and subcontracting. Overall, our results indicate that governments are aware of the trade-off created by discretion, and take it into account in the extent to which it is allowed in different areas. This latter finding was suggested by Coppier et al. [2013], who noted that there is greater discretion in (low-corruption) U.S. and U.K. procurement. Coviello et al. [2017], in their investigation of the economic impacts of allowing greater discretion in the public procurement of works in Italy, also notice that higher-corruption provinces tend to use less discretionary auction procedures. We are, to our knowledge, the first to identify this relationship systematically based on local variation in corruption.

Our fifth and final contribution is to the debate on anti-corruption policies in public procurement. While there is much theoretical work in this area (see, e.g., Ortner and Chassang [2018], for one recent contribution), there are scant empirical findings. The few exceptions include Olken [2007], which provides a comparative analysis of centralized audits versus grassroots participation in monitoring, and Di Tella and Schargrodsky [2003], which presents evidence on the combined effect of public officials' wages and corruption audits. Colonnelli and Prem [2017] provide causal estimates of the real economic impact of anti-corruption audits, showing that positive economic effects of corruption crackdowns are concentrated in government-dependent sectors and suggesting that procurement was a key channel through which corruption occurred. Our findings on the role of firm competition to limit the corruption risk of discretionary auction procedures and criteria, as well as our discussion of turnover and subcontracting, is be relevant for this policy-relevant research agenda. We return to policy considerations in our conclusion.

III Background and data collection

III.A Institutional details on Italian procurement

In recent years, Italian regulations that govern public procurement underwent a number of reforms as a result of, among other things, the passage of European Union Procurement Directives aimed at creating a common set of rules for public procurement in the EU. In particular, these reforms aimed to improve the design of source selection systems, i.e., the process for evaluating bids. We study public contracts under the "ordinary regime," which sets the procurement rules for most projects, excluding secret military contracts and some strategic infrastructure projects.

Source selection systems under the ordinary regime vary along two main dimensions: the awarding procedure and the selection criterion. Starting with the first dimension, there are two primary procedures for awarding contracts: open auctions and negotiations. Open auctions are "ordinary" procedures for the assignment of procurement contracts in which all firms eligible to execute public contracts can bid. In these procedures, the contracting officer overseeing the project has little discretion in the choice of contractor. These auctions presume the feasibility of accurately defining, from the outset, the relevant scope and technical specifications of the contract.

Negotiated procedures are, by contrast, marked by significant discretionary powers. The contracting officer consults a set of prospective contractors and may negotiate the conditions of the contract with one or more of them. Given their discretionary nature, negotiated procedures are treated as exceptional, and admissible only under specific conditions: for the most part, they are permitted only for contracts below a given monetary threshold. Above this threshold, negotiations are allowed only when there is some urgency in fulfilling the contract, or when a previous attempt to run an open auction failed to elicit any bids.

The second key aspect of contracting is the specification of the criterion for determining the winner. Both open and negotiated procedures can use either the "lowest price" criterion or a "scoring rule" criterion (also known as "most economically advantageous tender" criterion). In the first case, the enterprise offering the lowest price is awarded the contract, provided that this offer is judged to be reliable, that is, the offer is not so low as to be unrealistic. The second approach allows for the accounting of a broader range of considerations beyond price, as specified in the call for tender. Non-price parameters of a bid may include both hard and soft elements. An example of a quantitative (hard) parameter could be the number of engineers that will work on the specific project, while an example of a soft element is the aesthetic quality of the proposed solution. There are

a few limits that regulations place on the choice of parameters. In particular, criteria must all pertain to the bid and not the firm, so that past performance cannot be used as a parameter. But procurement officials enjoy wide margins of discretion in setting the parameters (possibly to the advantage of specific firms) and their associated weights.[5]

As one might expect, the full set of regulations governing procurement are far more complex than we can describe here, and we defer to Decarolis and Giorgiantonio [2015] for a more in-depth discussion. However, we observe that, beyond some modest differences, the set of procedures and criteria governing Italian procurement are quite general. By definition, Italian procurement rules also characterize the institutional framework in the EU more generally. But they also reflect procurement rules in a much broader set of countries, as documented in a recent survey by the World Bank [2017].

One particular feature of procurement rules does warrant further elaboration, given our focus on delegation and discretion by individual procurement officials. Whenever not expressly constrained by national or local rules, the choice of both the awarding procedure and the selection criterion is delegated to the contracting officer overseeing each contract (the *"Responsabile Unico del Procedimento"*, or RUP). This public official is selected from among management-level bureaucrats in the relevant public administration (PA), unless none is available for this role (in which case special rules apply). The RUP is nominated via a formal act by the PA's top official, which in municipalities is the mayor.

The RUP is in charge of managing the entire contracting process, from the project definition phase, through the bidding phase, to the awarding and realization of the contract. Thus, the RUP has considerable control over how the contract is structured. But this discretion has to be exercised within the regulatory constraints imposed by European, national and local regulations, and it is subject to oversight both internally within the PA, and from third party auditors (at the local, national and, in certain cases, European level; see Figure A.1). A RUP who wishes to use a discretionary procedure or criterion may aim to be appointed to oversee auctions that are amenable to such methods, and conditional on the project may select more discretionary approaches. However, it is difficult to make strong inferences about a RUP's intent merely from the selection of discretionary auctions. A socially-motivated procurement official may also choose a negotiated procedure to expedite project execution and (with the interests of the municipality at heart) even manipulate contract amounts to facilitate their use. We thus rely on detailed data on RUP and firms described below to discern whether discretion is more

[5] An illustrative example may help convey this point. In 2007, the Italian Supreme Court confirmed the conviction of a group of public officers and business owners for rigging multiple scoring rule auctions in the Santa Maria Capua Vetere municipality. The scheme involved public officials drafting calls for tenders following the recommendations of favored firms: parameters in the scoring formula emphasized elements that advantaged pre-identified firms, e.g., by specifying the use of a specific brand of machinery.

plausibly used for self-serving reasons.

III.B Data

III.B.1 Procurement Data

Our procurement data come from a database provided by the Public Contracts Observatory at the Italian Anticorruption Authority (ANAC), the public entity that oversees public procurement in Italy. Since 2000, ANAC has monitored all public contracts above the threshold reserve price of at least €150,000 until 2010, and €40,000 thereafter. Our dataset contains the universe of ANAC data for the years 2000-2016 and for the two main types of public works: those involving civic buildings (OG01), or transportation infrastructure such as roads, highways, and bridges (OG03).[6] For each contract, we have detailed information about the contracting phase, including the start and end date of the bidding process, the type of contracting authority, the auction procedure used to award the contract, the selection criterion, the number of bidders, and the identity of the winning bidder. The data also include information on auction outcomes, such as the initial project value, the winning discount and the total effective costs, the expected and effective contractual duration, the extent of subcontracting, and the identities of subcontracting firms. Finally, for a subset of auctions, we observe all of the bids.

We observe 5 types of contracting authorities in the data: central administrations, municipalities, other local administrations (regions and provinces), state-owned enterprises, and "decentralized administrations" (specifically, hospitals and universities). For each authority, we know the identity of the RUP managing each contract, and for most of them we also know the exact geographic location (the exceptions include central government administrations, decentralized regional administrations (such as hospitals and universities), and also highways and railways that span geographic boundaries). Local institutions – municipalities in particular – play the largest role in public works procurement. Local governments account for 72% of total projects awarded (53% municipal councils, 14% provincial councils, 3% regional governments). While about half of the contracts in our database are awarded by municipal councils, they are relatively small projects, with an average value of €527,000, as compared to an average value of €847,000 for provincial and regional governments, and over €1.5 million for hospitals and universities. There is also a wide range in the number of contracts per contracting authority.

[6]The procurement of public infrastructure is subdivided by law into 13 job types (OG01,...,OG13). OG01 and OG03 are the most relevant categories which, combined together, represent half of all public contracts for infrastructure, in terms of number of contracts as well as money spent. Although the data contain CPV codes, which refer to more detailed sub-categories, OG codes are more reliable since this latter classification is the only one required by law.

There are 1,266 municipal councils that awarded only a single contract (mean population of 1,404), whereas the municipality of Rome alone awarded 3,519 contracts.

As previously noted, the contracting authority can choose between two main types of awarding procedures, open and negotiated. If the latter is selected, we additionally observe the number of firms invited to participate in the auction, and for all auctions we see the number of firms that present offers (the number of bidding firms is, by definition, less than or equal to the number of invited offers). Furthermore, we observe the identity of the winning firm and of all of its subcontractors, and, for auctions held after 2010, also the identity of all participants. Under normal circumstances, negotiated procedures require a minimum number of invitations. When we observe fewer than the legally mandated number of invitations, we flag the auction as involving potential abuse of discretionary procedures (denoted by the variable $DiscretProc_{lowN}$). Conversely, we denote as $DiscretProc_{highN}$ negotiated auctions with the legally mandated number of bidders. Finally, we denote all negotiated procedures (both $highN$ and $lowN$) by the variable $DiscretProc$. Note that a below-minimum number of invited bidders does not automatically indicate abuse – it may instead result from a contract's urgency or a lack of qualified firms.

Auctions may be awarded based on a price-only system or one that incorporates a wider set of considerations (i.e., scoring rule auctions).[7] Since scoring rule auctions allow for a range of non-price (and potentially subjective) parameters set by the RUP and thus involve more discretion than first-price auctions, we define an auction as having a discretionary criterion (denoted by the variable $DiscretCrit$) if it is awarded via a scoring rule.

To capture the two types of discretionary auctions we will emphasize, we define a summary measure, $Discretion$, which denotes auctions for which $DiscretProc_{lowN} = 1$ or $DiscretCrit = 1$. While in principle $DiscretProc_{lowN}$ and $DiscretCrit$ can both occur simultaneously, this is rarely the case in practice since the regulations tend to favor negotiations for smaller value (or urgent) contracts, while the scoring rule system is used for complex projects and requires more time to award the contract since a commission, and not just the RUP, evaluates the bids.

Beyond our measures of auction procedure and criterion, we include a number of other auction attributes as controls. Most importantly, we control for the auction reserve price ($Reserve$), which is the monetary value, reported in the call for tenders,

[7] A third alternative is also available, the so-called average bid auction (ABA). The ABA is a variant of the first-price auction in which the winner is the firm offering the lowest price among a subset of "non-excluded" offers. The ABA induces higher participation and subcontracting, as well as bid coordination (Decarolis [2018], Conley and Decarolis [2016]), but for our analysis, we simply view it as a non-discretionary auction. Hence, we will not treat it separately from the other first-price auctions.

above which the PA is unwilling to pay for the contract. Price bids are expressed as discounts over this reserve price. In our analysis, the reserve price will enter linearly (in logarithm) as a control in many of our specifications, as well as via a series of dummy variables for contracts in various reserve price ranges, which correspond to thresholds which triggered stricter rules and/or monitoring of an auction, with cutoffs of €100,000; 150,000; 300,000; 500,000; 1,000,000, and 1,500,000. At these threshold values, both the publicity requirements of the call for tenders and the set of eligible bidders change.

The auction database provides us with additional information that we will exploit in the analysis. In particular, we observe the identity of the firm winning the auction and the identities of those receiving subcontracts (if any). Information on each firm includes its name and the location where it was incorporated, as well as a unique social security identifier, which provides the link to the criminal investigations data. Finally, we also observe some standard procurement auction outcomes, including delivery time, price and (for about half of our sample of auctions[8]) the total costs for completion. Data on the expected contractual duration as well as the effective total completion time allow us to construct a measure of contractual delay (*Delay*) and cost overrun (*Extra Cost*). Since *Delay* can be positive or negative and has extreme outliers, we use an inverse hyperbolic sine transformation. The final price of the winning bid is expressed as a discount over the reserve price (*Discount*) and, similarly, *Extra Cost* is calculated as the difference between the final price and the awarding price, over the initial reserve price.

III.B.2 Criminal Investigations Data

A contribution of this study is to introduce a new measure of criminality in public procurement. As previously noted, in the procurement data we observe bidders' and subcontractors' identities. For each firm, we then obtained the full list of its owners and top managers through the Company Accounts Data System. This is a proprietary database maintained by CERVED Group that we observe for four separate years: 2006, 2011, 2014 and 2016. For each firm, the union of all owners and managers recorded in any of these four periods represents the set of individuals connected to the firm in our analysis. For each individual, their record of criminal investigations (which we will describe shortly) was coded, and this information was aggregated across firm-linked individuals to obtain a firm-level measure of potential criminal status. We use the same criminal investigations database to determine the suspected criminality of each RUP in our data.

Records of individuals' criminal investigations were analyzed for us by AISI (Italy's internal intelligence and security agency) using a centralized archive, the *Sistema D'Indagine*

[8]For a detailed discussion of the reasons behind limited data availability, see Decarolis and Palumbo [2015].

Interforze (SDI), which is a primary source of information that police officers and intelligence agencies use to identify potential targets for further investigation.[9] This database contains reports of all individuals investigated by any of the Italian police forces: state police (*Polizia di Stato*), finance police (*Guardia di Finanza*), military police (*Carabinieri*), and environmental police (*Guardia Forestale*).

An entry in the SDI database typically occurs after a police force, based on a preliminary investigation, determines that there is sufficient evidence to open a formal investigation. This investigation might or might not lead to a court case and, if so, to a conviction. Therefore, court cases are clearly a subset of the entries in the SDI database (see Figure A.2). The resulting sample of suspect offenders thus includes individuals that were convicted, acquitted, or never charged. The latter two groups plausibly comprise a large number of offenders whose guilt could not be proven in court. Indeed, corruption cases are generally complex, and convictions relatively rare. This is particularly true in Italy, where the trial must go through three levels of judgment (*Primo grado*, *Appello*, and *Cassazione*) within a relatively short statute of limitation – between 6 and 12 years. For these various reasons, official data on (convicted) offenders may greatly understate the extent of corruption.[10] Note that the investigated individuals are unaware that they are under investigation, unless the case is formally brought to a criminal court. For the same reason, unless a formal court case has begun, a PA cannot exclude firms from auctions even if their owners/managers are investigated for corruption charges.

AISI searched the SDI database for all managers and owners we identified as associated with each firm, and flagged those who had been investigated for corruption and other related crimes. Specifically, the following categories of crime were considered: corruption, malfeasance and embezzlement; abuse of power and undue influence; and violations in public auctions. Based on the individual-level records extracted from SDI, suspected criminals in 3,848 firms winning a contract over the period 2000-2016 were identified (9.8% of all firms winning at least one contract). We define *InvestigatedWinner* as an indicator variable denoting that an auction was won by a firm ever associated throughout our sample period (via employment or ownership) with at least one individual present in the SDI database. This measure thus varies only across firms and not over time. This

[9]The SDI data have been previously used in research by Pinotti [2017]. Our access to the data is enabled via a framework agreement between AISI and Bocconi University.

[10]Decarolis and Giorgiantonio [2019] analyze the universe of court sentences for corruption in public auctions finding that only 2% of the firms awarded public contracts were thus implicated. In the same set of auctions, our measure flags 17% of contract winners as potentially criminal (note that Decarolis and Giorgiantonio [2019] use a smaller and different set of auctions than the one used in our paper). While the SDI data do not suffer to the same extent from the under-reporting problem that afflicts judicial data, they may include some false positives. In practice, the frequency of false positives is likely very low, as police officers record suspect offenders in the SDI only in the presence of clear probable causes.

approach is conservative, as the date at which suspect offenders are reported in the SDI provides little information – if any – on the date an offense was actually committed.

The SDI data also allow us to flag procuring agencies and public administrators as suspected of corruption. For each auction, we observe the agency procuring the contract and, within the administration, the RUP in charge of the specific contract. AISI searched the SDI database for all RUPs, flagging those suspected of the same types of crimes used to flag managers and owners (i.e., corruption, abuse of power, and so forth). Overall, 6% of the RUPs in our sample (managing 9.7% of all contracts) were flagged as "investigated." We use this list to identify auctions administered by an investigated RUP ($InvestigatedRUP$) and also administrations in which at least one investigated RUP was employed during our sample period (16% of all public administrations, denoted by $InvestigatedPA$, managing 40% of the contracts).

In concluding our discussion of the criminality data, it is important to discuss two, related potential problems: reverse causality and sorting. In our setting, reverse causality could occur if, for instance, a firm would become more likely to be labeled as suspect when winning negotiated procedures (with few participants) due to the police concentrating its (limited) monitoring efforts on these types of procedures. We believe that, if anything, the opposite is in fact likely to be true in our data, based on extensive discussions with the AISI representatives who helped us in accessing the police data. These officials gave no indication that police monitoring efforts are concentrated on public tenders characterised by the criteria and procedures analyzed in this study. Furthermore, they emphasized that investigations typically result from complaints to the police from a losing bidder, which are less likely for negotiated procedures, for two reasons. First, there are simply fewer firms in negotiated procedures. Second, since procurement officers open themselves up to scrutiny when bidders complain, it is also reasonable to assume that officials will use their discretion in negotiated procedures to avoid inviting firms which, for any reason, are more likely to report concerns to the police (this is even more the case if the public official is himself corrupt and has a favored firm among the participants). Thus, while we cannot rule out reverse causation entirely, we believe that if a differential monitoring intensity between negotiated and open procedures is present, in our context it would most plausibly imply that the estimates we present below represent a conservative assessment of the increased corruption risks associated with reduced competition and discretion.[11]

Finally, on the issue of sorting, it could involve both suppliers and contracting offi-

[11]However, one important observation from the AISI is that monitoring efforts are concentrated in geographical areas where the presence of criminal organizations has been previously detected, and as a result we will need to take care in interpreting results involving variation at the municipality level in the presence of investigated firms. (Though to the extent that these factors are time-invariant, our fixed effects specifications account for these geographic factors.)

cers. For firm sorting, one might worry that firms that expect to be awarded contracts through discretionary systems might exert additional effort to avoid being detected as potentially corrupt. Such efforts might include using figureheads as company owners and managers.[12] However, as mentioned above, it is not the case that certain types of procurements are more systematically investigated than others by the law enforcement agencies. Since the controls placed on firms is lower for smaller contract values, we should expect a greater presence of investigated firms participating in and winning lower-valued procurements. However, since lower value contracts are also those for which discretionary procedure auctions can be used, this could mechanically lead to us to finding a positive association between discretion on corruption. Similarly, an obvious concern about contracting officers is whether the RUP might manipulate the contract value to make it eligible for the use of discretionary procedures. Such behaviour is illegal, as it is expressly forbidden by procurement law. A corrupt RUP might nevertheless choose to take this risk if discretionary procedures were instrumental for rent-seeking activities. In this case, the presence of manipulation should, if anything, increase the probability of detecting an effect of discretion on corruption, assuming that bureaucrats who sort below the threshold are using this leeway to benefit investigated firms. Overall, it is very unlikely that sorting by either suppliers or contracting officers can explain why our estimates below show that discretion does not lead to more corruption.

III.B.3 Descriptive Evidence

We begin by presenting an overview of some of the main features of the data. While in our main analysis we exploit within-municipality variation over time or (in some cases) within-region variation across municipalities, the patterns in this subsection explore trends across time and broad regional differences in procurement practices at a relatively high level of aggregation.

One important feature of our institutional setting is that the maximum reserve price for negotiated contracts was increased from €100,000 to €500,000 in 2008, and then to €1 million in 2011. As we show in Figure 1, this led to an increase in negotiated contracts; the fraction of contracts awarded via scoring rule (the complement of first-price auctions) remains roughly constant.

Did this change result in more contracts awarded to investigated firms? In Figure 2, we examine whether there is any obvious evidence in favor of this view in the aggregate data. The figure plots the fraction of contracts won by investigated firms for three groups,

[12] This behavior is found by Daniele and Dipoppa [2019] in the context of firm subsidy allocation in Italy. The extent of likely figureheads is substantially larger for firms obtaining subsidies below the threshold value that triggers the need for special certifications on probity of the owners and managers.

based on the relevant thresholds for the 2008 and 2011 expansions: contracts less than or equal to €500,000, those between 500,000 and 1 million, and contracts above 1 million. If discretion led to greater corruption, we would expect a relative increase in the fraction of contracts won by investigated firms in the €150,000 to 500,000 range in 2008 and 500,000 to 1 million range in 2011.[13] However, we observe no discernible change in any reserve price interval after either reform (see Appendix Figure A.4). Given that the contract size is endogenous – we observe sorting around each of the thresholds in every year in our sample – it is not possible to provide a sharp interpretation of this "non-result." But at the same time, it does fit with our overall set of findings that we document in the remainder of the paper – discretion in itself does not necessarily promote corruption, and monitors may take steps to ensure that its use is limited in locales in which discretion is mostly likely to be abused.

To provide a preview of why greater discretion might not have increased corruption, we consider two further cuts of the data. First, instead of comparing the fraction of investigated winners by the contract reserve price (as in Figure 2), we present in Figure 3 the fraction of investigated winners for three types of more discretionary auctions: those with negotiated procedures and the legally mandated number of invited bidders ($DiscretProc_{highN}$); those with negotiated procedures and "too few" invited bidders ($DiscretProc_{lowN}$); and scoring rule auctions ($DiscretCrit$). Over the full sample period, we observe that negotiated procedures are *only* associated with criminal winners for auctions when there are fewer than the legally mandated number of bidders. Scoring rule auctions (which have potentially discretionary selection criteria) have the highest rate of investigated winners. Combining these patterns with the general prevalence of each type of auction, one may see why the increased use of negotiated procedures had no discernible impact on the rate of investigated winners – as can be seen in Figure 4, the increase came primarily from auctions *with* the legally mandated number of invited bidders, a category for which we see a relatively low rate of corruption. Naturally, in comparing the corruption of different auction types, we wish to control for a range of municipality and auction attributes in comparing various types of auction mechanisms, which we will do in our regression analyses.

We next turn to a geographic comparison of auction procedures and outcomes, in part to anticipate a second pattern in the data that may limit the effect of discretion on corruption. Specifically, in Table 1 we compare auction characteristics for South,

[13]Note that these reforms were not associated with any other substantial changes concerning bureaucrats' discretion as, for instance, the 2011 reform came about not as an organic reform of the procurement code generally, but as a targeted measure of the Berlusconi government to promote economic growth by expanding the use of the less bureaucratic-intensive negotiated procedures. See Art. 4, sub. r, Law Decree 70/2011, modifying Art. 122, sub. 7, Legislative Decree 163/2006.

Central, and North Italy over our full sample period, 2000-2016. Given the South's long history with, and reputation for, corruption, it is perhaps unsurprising that the fraction of auctions overseen by procurement officials suspected of corruption is notably higher in the South relative to Central and North Italy (first row). In the second row, we show the mean fraction of auctions won by firms suspected of corruption. Again, there is a North-South gradient: investigated firms are more likely to win in the South relative to the North and Central regions, though the difference is much more modest than for RUPs. We next turn to the selection of auctions that, in the preceding figure, were associated with higher levels of corruption, i.e., $Discretion = 1$ auctions (recall these are $DiscretCrit = 1$ and $DiscretProc_{lowN} = 1$ auctions). Notably, these are far more common in the (relatively less corrupt) North (third row). In the last two rows, we look at the North-South choice of discretion for auctions administered by investigated procurement officials and clean (non-investigated) officials. Interestingly, across all areas investigated administrators select discretion more often. The relative rarity of "corruptible" auction procedures in the high-corruption South suggests another potential explanation for the muted link between the increase in negotiated auctions and investigated winners: problematic auctions are used less often in locales where they are more apt to be corrupted.

Naturally, these patterns are merely presented as motivation – there are many factors that could account for the North-South differences we observe. We will attempt to account for these factors when we focus on within-PA variation in our regressions. But overall, the patterns in Table 1 offer descriptive evidence that is broadly consistent with the regression analysis reported in the next section, and which will be useful for understanding how Italian authorities may have limited the extent to which discretion can be exploited by officials for private gain.

Before proceeding to our regression results, we conclude this section with a presentation of the summary statistics for our data in Table 2. Panel (A) provides summary statistics at the auction-level for the whole sample of just over 200,000 auctions. Of these, 37% are done using negotiated procedures, and 83% of auctions use the price-only criterion. Investigated firms are awarded 17% of the contracts and investigated RUPs administer 10% of all auctions. The average number of bidders across all auctions is 27, but for negotiated procedures, the average number of invited bidders is 7. Relative to an average reserve price of nearly €1 million, the final price entails, on average, a 7% cost overrun (relative to the initial reserve price), and the average delay is 63% relative to the originally specified contractual duration.

Panel (B) reports summary statistics at the level of the public administrations awarding contracts. We observe 14,024 administrations out of which 16% have at least one RUP suspected of corruption. 52% of public administrations are in the North, 35% in

the South, and 13% in the Center. In terms of administration type, local PAs award most contracts, with municipalities representing 57% of the PAs in the dataset (though they administer only 53% of auctions). Of the 7,985 municipalities observed, 67% have fewer than 5,000 inhabitants, while only 1% of municipalities have more than 60,000 inhabitants. The average administration awards 15 contracts over the sample period, with an average total value of nearly €1.5 million.

IV Empirical Analysis

We now turn to examine the relationship between the choice of auction mechanism to firms and officials suspected of corruption. We first examine the link from the type of auction to whether it is won by an investigated firm, and then turn to look at the choice of auction of investigated public officials. We will then use the framework in Section V to interpret these patterns in terms of the tradeoff invoked by expanding discretion.

IV.A Discretionary auctions and investigated winners

We employ throughout variants on the following specification:

$$InvestigatedFirm_{xay} = \beta Discretion_{xay} + Controls_{xay} + \alpha_a + \gamma_y + \varepsilon_{xay} \quad (1)$$

for auction x conducted by contracting authority a in year y. We include contracting authority fixed effects to account for local differences in the choice of procurement mechanisms as well as (localized) differences in corruption; the year fixed effects absorb shifts over time in the prevalence of discretionary contracts as well as corruption. Finally, as controls, we include a linear term for the logarithm of the reserve price as well as a set of fixed effects for various size thresholds.[14] We use robust standard errors clustered at the level of the contracting authority throughout.

Because this expression employs a large number of contracting authority fixed effects, our empirical approach might raise concerns if discretion only varies within a small, selected pool of administrations. However, as shown in Table 3, this is not the case: many administrations experience variation in the various measures of discretion analyzed and, moreover, these administrations do not appear to be selected in any obvious way.

[14] In practice, the point estimates we report below are quite insensitive to the inclusion/exclusion of these covariates. For example, if we include only year fixed effects as controls, the estimate is about 0.003 higher than what we report below, a difference of about 30 percent as compared to the fully saturated specifications.

We present these results in Table 4. In columns (1) and (2) we show results using $DiscretProc_{lowN}$ and $DiscretCrit$ respectively as our measure of discretion, and in column (3) we include both as covariates. The coefficient on each variable is stable across all specifications and significant at least at the 1% level in all cases. The coefficient on $DiscretProc_{lowN}$ of 0.02 implies that auctions employing negotiated procedures with "too few" invited bidders are associated with a 12% higher probability of being won by an investigated firm. The coefficient on $DiscretCrit$ is approximately half as large. In column (4) we add the variable, $DiscretProc_{highN}$, as a covariate, which denotes auctions that are done via discretionary procedure, but with the requisite number of bidders. The coefficient on $DiscretProc_{highN}$ is very small (0.0013), and we can reject at the 99% level that it is even half as large as the coefficient on $DiscretProc_{lowN}$. (We can reject at the 0.1% level that the two coefficients are equal). Finally, in column (5) we use the summary discretion measure, $Discretion$, pooling together both $DiscretProc_{lowN}$ and $DiscretCrit$. The coefficient of 0.012 implies that more discretionary auctions are associated with a 7% higher probability of being won by a criminal firm. Columns (6) – (10) repeat these analyses, limiting the sample to auctions administered by municipal councils, as this is the sample we will focus on in analyzing whether the patterns we document are robust to controls for municipal attributes. The patterns are broadly similar, though the coefficients on the two distinct discretion variables are much closer in magnitude, and the coefficient on the pooled discretion measure is larger.

The correlation between the choice of discretionary auction and the selection of an investigated firm as winner is robust to a range of considerations. In addition to procurement administration fixed effects, we may include region × year or even province × year fixed effects (a total of 1,770 additional fixed effects), and the point estimates remain quite similar. We may also amend the definition of $InvestigatedWinner$ to make it more – or less – inclusive. In Appendix Table A.1, we show the results using a definition that focuses more narrowly on corruption (restricting attention only to firms investigated for (i) corruption, malfeasance and embezzlement or (ii) abuse of power and undue influence, but excluding those investigated for (iii) violations in public auctions) and in Appendix Table A.2, we expand the definition to include firms associated with individuals suspected of waste management crimes. The inclusion of the latter group is at the suggestion of anti-corruption authorities, who indicated to us that it is a common area for organized crime and corruption. In both cases, we observe broadly similar patterns to those reported in Table 4. Finally, in Appendix Table A.3 we include procurement-authority-by-year fixed effects. While being more demanding and restrictive, this specification greatly improves identification, as it allows us to take into account any unobserved time-varying shocks at the authority level. Notably, results are remarkably similar to the ones of Table 4.

In Appendix Table A.4, we explore whether the higher rate of investigated winners for $DiscretProc_{lowN}$ and $DiscretCrit$ auctions is the result of selection into the participants' pool, or selection of the winner (conditional on the pool of bidders). We run a specification analogous to the one in equation (1), but now using data at the bidder level:

$$InvestigatedBidder_{ixay} = \beta Discretion_{xay} + Controls_{ixay} + \alpha_a + \gamma_y + \varepsilon_{xay} \quad (2)$$

As noted in our data description, bidder-level data are only available for starting in 2011. We observe a positive coefficient on $DiscretProc_{lowN}$ across all specifications, with a value of 0.011 – 0.012 (significant at the 1 percent level). No other variable is significant. These findings provide some suggestive evidence that (uncompetitive) negotiated procedures may be corrupted by directing invitations to investigated firms, whereas scoring rule auctions may be corrupted by tailoring the selection criteria to favored firms, rather than foreclosing entry into bidding.

IV.B Investigated administrators and the choice of discretion

In Table 5, we explore the choice of discretion as an auction mechanism. We begin with results that most closely parallel those of the preceding section, with public administration fixed effects. In column 1 the dependent variable is $Discretion$, while in columns 2 and 3 we distinguish between the effect on $DiscretProc_{lowN}$ and $DiscretCrit$. In all cases, the coefficient on $InvestigatedRUP$ is positive (significant at least at the 5% level), indicating a higher use of discretionary auctions; comparing columns 2 and 3, the point estimate is more than twice as high for discretionary criterion auctions, though the base rate of discretionary criterion auctions is also much higher.[15]

In the remainder of the table, we introduce $InvestigatedPA$ as a covariate. Since this variable varies only at the PA-level, we can include only coarser fixed effects. In Table 5 we employ fixed effects for each of the country's 20 regions, and in Appendix Table A.6 we use a finer partition, with fixed effects for each of 110 provinces. (Recall that, for a subset of procurement authorities (hospitals, highways, and so forth), we do not have a mapping to a specific geographic location; thus auctions conducted by these PAs are dropped from specifications with region or province fixed effects.) In columns 4 and 5 we include $InvestigatedRUP$ and $InvestigatedPA$ respectively as covariates, with $Discretion$ as the outcome variable. Note that, by definition, these variables are positively correlated ($\rho = 0.45$). It is intriguing, therefore, that their coefficients are of

[15] In Table A.5, we explore the direct effect of $InvestigatedRUP$ on investigated winner. The effect is positive and significant, albeit small in magnitude. The estimates for the other coefficients remain qualitatively identical to those in the baseline estimates in Table 4.

opposite sign (significant at the 1% level). Specifically, PAs that have had at least one administrator suspected of corruption are 7.7% less likely to use discretionary auctions (a coefficient of 0.017 relative to a base rate for *Discretion* of 0.22) while, for a given municipal council, a corrupt administrator is 8.6% more likely to use a discretionary auction (0.019/0.22). In column 6, we include both variables – as might be expected given their strong positive correlation, in this specification the magnitude of each coefficient increases, nearly doubling for both $InvestigatedRUP$ and $InvestigatedPA$. Columns 7 and 8 repeat the specifications from column 6, which include both $InvestigatedPA$ and $InvestigatedRUP$, but using our two distinct discretion variables as the outcomes, $DiscretProc_{lowN}$ and $DiscretCrit$. In these specifications, the relationships between both variables and discretion are driven by the selection of $DiscretCrit$ auctions (though we refer back to column 1 to emphasize that, with finer fixed effects, there is a discernable positive relationship between $InvestigatedRUP$ and the choice of discretionary procedures).[16]

IV.C The direct benefits and costs of discretionary auctions

We now turn to describe the benefits of discretion. The main official motivation for encouraging negotiated procedures is speeding up administrative procedures. The administrative burden is lighter for negotiated procedures than with open auctions: PAs can publish shorter, less detailed calls for tenders, and these calls have shorter minimum mandatory publicity periods (about half of the 52 days typically required for open tenders, but even less if certain conditions are met). The selection of the winning bid is also faster, as typically the RUP selects the winner directly from among a small set of bidders. At the opposite end of the spectrum, scoring rule auctions require the creation of ad hoc commissions to evaluate bids and select winners.

A different margin along which discretion can benefit PAs is by helping to reduce the adverse selection effects of open, competitive bidding. As mentioned earlier, incomplete contracts and non-contractible quality are a near-defining feature of contract procurement. A first price open auction can be the most problematic allocation mechanism when even just one opportunistic firm participates. Although several institutional features in the system are geared toward limiting the problem of "too good to be true" bids, discretion in selecting participants and bids can be a powerful tool (it is indeed the pillar of private contracting). We provide some indication of these potential benefits of discretion in Table 6. The table presents the results of specifications that parallel those presented above, using the inverse hyperbolic sine of the contract's delay in implementa-

[16]Replicating the specifications in Table 5 using as dependent variable *DiscretProc*, we find no relationship between investigated RUPs or PAs and this outcome; see the Appendix Table A.7.

tion ($Asinh(Delay)$), the discount offered by the winning firm, and the extra cost realized at the end of the contract as outcomes, in place of $InvestigatedWinner$.[17] While delay is a highly imperfect indication of performance – for example, it makes little sense to include $DiscretCrit$ as an explanatory variable, since execution time may be part of the scoring rule to evaluate contracts – in the absence of ex-post quality evaluations of contracts, it nonetheless provides one objective indication of the winning firm's performance.

Table 6, column (1) includes $Discret$ as an explanatory variable, along with fixed effects for procurement administration and year, and flexible reserve price controls. As would be expected if discretion speeds the completion of a contract, the coefficient on $Discret$ is negative, though small in magnitude and only borderline significant ($p < 0.07$). We distinguish between $DiscretCrit$ and $DiscretProc_{lowN}$ in column (2), and find that there is a much stronger negative relationship for negotiated procedures – recall that, as we noted above, it is hard to interpret the relationship between discretionary criterion and delay, as completion time may be a component of the scoring rule used to evaluate bids. In column (3) we add a control for negotiated procedures – recall that this captures auctions in which bidders must be invited to participate in the auction, whereas $DiscretProc_{lowN}$ denotes negotiated procedure auctions in which "too few" participants are invited. Interestingly, once one accounts for whether an auction is a negotiated procedure – which itself is associated with much shorter delays – there is little incremental effect of $DiscretProc_{lowN}$ on delay.

The following columns of Table 6 repeat the regression analysis for the two other outcomes. We observe a clear negative and economically large impact of discretion on winning discounts: the coefficient on $Discret$ implies a 4 percentage point lower discount, relative to an average winning discount of 18 percent. Column 6 shows that most of the drop is associated with discretionary criteria and, to a lesser extent, discretionary procedures with too few bidders. Negotiated procedures with the appropriate number of bidders more generally are associated with lower discounts, as indicated by the negative coefficient on $DiscretProc_{highN}$, but the size of the effect is about half of that of the discretionary criterion. Thus, it appears that discretion has a direct impact on increasing the price paid by PAs by a significant amount, as expected if discretion were used to select higher quality bids. In the final section, we will relate this increase of public cost to the (potential) benefit for a corrupt RUP. Finally notice that the final price, inclusive of cost overruns, is essentially unaffected by the choice of discretion, as the estimated coefficients are either not significant or, in the case of discretionary criterion, significant

[17] All three outcomes are available only for a subsample of auctions. Therefore, we also test the robustness of our main results in this restricted sample. Specifically, Table A.8 replicates results of Table 4 for the subsample of auctions for which we have either Delay, Discount or Extra Cost information.

and negative, but small in magnitude.[18]

V Conceptual Framework: Corruption and Oversight

In this section, we lay out a very simple and intuitive model to interpret our empirical results. The patterns documented above may be organized through the lens of the theory of delegation, originally laid down by Holmstrom et al. [1982] and applied to political economy settings in particular as outlined in Bendor et al. [2001] and Huber and Shipan. Holmstrom et al. [1982] in particular describes the classical optimal delegation problem with no transfers: a central monitor (the principal) trades-off the benefits of an agent's discretion against the costs of self-dealing, without being allowed to link transfers to the realized outcomes. This framework plausibly resembles the situation of the procurement officers in our data, whose wages and careers are only weakly associated with the performance of the contracts they supervise.

Our simplified version of this style of model considers the task of a central monitoring authority (such as a regional government) that aims to limit corruption. Discretion makes it easier for officials to abuse their positions if they choose to do so, but also empowers civic-minded officials to execute contracts more efficiently. The principal has limited information on the infrastructure needs of lower-level governments (e.g. municipalities), and hence receives a noisy signal as to the benefits of running an auction using discretionary methods. As a result, infrastructure provision may be more efficient if local officials – who have a stronger local presence and/or expertise – choose the auction format. The misalignment results from potential self-dealing by corrupt local officials.

More specifically, we assume that a central authority may choose whether to allow procurement officials in administration a to run an auction with greater discretion. Let d be a parameter that captures the potential benefit from discretion in implementing the project so that, for example, the value of the project is v in the absence of discretion and $v+d$ if discretion is allowed. While v is perfectly observed, d is known only to the official overseeing the project; others (including enforcement officials) observe only $\hat{d} = d + \epsilon$. It is possible that $d < 0$, so that discretion is socially destructive, whereas monitors may still receive a positive signal. This assumption allows for the case that a civic-minded official will choose not to use a discretionary auction.

A further cost of discretion is that it provides opportunities for self-dealing, which may be obfuscated precisely because of uncertainty in the value of discretion. We do not aim, at this level of abstraction, to model the firm-official interaction. In our simple

[18] In Table A.9 we repeat the analysis but limiting the attention to contracts awarded by local authorities. Results are remarkably similar and of slightly larger magnitude.

framework, one can think of corrupt officials extracting kickbacks from firms, or prospective bidders corrupting procurement officials by offering bribes. For a potentially corrupt administrator, we think of their theft decision as dictated by the private returns from stealing s, less a punishment cost which is a function of detection probability e_a, which is a public-administration-specific parameter, so that his payoff function will be: $\pi = s - e_a s^2$. In the internal solution, this payoff function leads to a theft choice of $s^* = 1/2e_a$.

We assume that the monitoring authority may constrain a public administration from utilizing discretionary auctions by setting a threshold for the signal of discretion's benefit, accounting for both stealing (which is a function of the public administration's enforcement efforts, e_a) and the probability that a contract is corrupted (which depends on the share of corrupt public officials in administration the administration, p_a). A risk-neutral monitor seeking to maximize the project value will then set a threshold $\hat{d}^* = p_a/2e_a$.

This model captures the simple intuition that, in locations with weaker enforcement or a higher prevalence of corrupt agents (which plausibly are correlated), there will be a higher threshold set for the use of discretionary auctions. Hence, differences among administrations in (p_a, e_a) might lead to instances in which the monitor restrains discretion in situations in which it would be socially optimal to allow for it. But it also follows that corrupt officials will use discretionary auctions more often since, by definition, non-corrupt officials use discretion only when $d > 0$ whereas corrupt ones will do so whenever the monitor allows it (i.e., the threshold is high enough).

V.A Re-evaluating the overall effect of increased discretion

In Section IV.A, we found that negotiated contracts with many bidders – which constitute the vast majority of auctions with discretion – were won by investigated firms at the same rate as open price-only auctions. While negotiated contracts with "too few" bids and scoring rule auctions were won more often by investigated firms, we also observed in Section IV.B that regional governments may take steps to limit the use of these mechanisms in locales that are vulnerable to corruption.

These findings naturally return us to the question of whether the limits to discretion imposed by procurement regulations were too strict. Procurement regulations are the result of a complex web of rules determined by the European Procurement Directives, Italy's national procurement law and, in most cases, local rules (at the regional, provincial and even municipality levels; see Figure A.1). At the local level, there are many examples of rules either limiting or expanding RUP's discretion: for instance, Calabria, Campania and Sicily, the three regions with endemic criminal organizations, passed various regional

guidelines and regulations limiting the use of discretionary procedures or criteria.

The most straightforward setting to explore the aggregate consequences of changing the limits to discretion is to focus on the nationwide reforms that loosened the rules on the use of negotiated procedures during the late 2000s. While our earlier discussion emphasized the role of a local (regional) monitor that could set the minimum required expected benefit from discretion to activate it ($\hat{d}^*$, in the model above), we also discussed the existence of national rules which set strict monetary thresholds on contract values to determine which ones may be awarded via discretionary methods. This type of rule is typical in procurement regulations, and indeed a similar setup is present in the US for accessing the Simplified Acquisition Procedure.[19]

The motive behind this form of regulation can be easily understood if one presumes that the national regulator does not even observe the signal of the value of discretion for a specific project, and we further augment our basic model to assume that the benefits to the agent from stealing increase with project size.[20] In this augmented framework, setting a maximum project value beyond which discretion is forbidden can serve to limit the risks from stealing.

Note, however, that this additional rigidity imposed at the national level comes at the cost of limiting discretion for local administrations and RUPs that would use it for public benefit. This rigidity may further be excessive (relative to the social welfare optimum) if political economy considerations lead to a large weight on theft by national bureaucrats and politicians.[21] A similar argument may be applied to a bureaucrat with career concerns and reduced performance incentives: discretion will be under-utilized if it increases the probability that an official will face a corruption investigation which, in the Italian context, would defer any promotion until acquittal, without sufficient offsetting

[19] In the US, since the Federal Acquisition Streamlining Act of 1994, Simplified Acquisition Procedures (SAP) were introduced to promote efficiency and economy in contracting by reducing administrative costs and unnecessary burdens for agencies and contractors. Under the SAP, contracting officers can select private contractors in more informal ways, for instance by getting oral (rather than written) quotes and selecting the winner without the need for a formal comparative assessment among quotes. The SAP applies to purchases of supplies or services whose anticipated dollar value does not exceed the Simplified Acquisition Threshold, which has increased over time, reaching $ 150,000 as of 2014, and making purchases under the SAP an even larger portion of federal procurement.

[20] Under this modification, the optimal stealing would become $s^* = \frac{v}{2e_a}$, where v is the baseline project size, as in Section V.

[21] For example, reelection concerns may lead a politician to limit stealing per se – beyond its impact on project outcomes – because of the negative publicity from revelations of corruption in public works. The responsiveness of politicians to corruption scandals has been documented, in particular, through a series of papers exploiting the richness of Brazilian data on corruption audits, including Avis et al. [2017] and Ferraz and Finan [2011]. The former study documents a significantly lower rate of corruption in municipalities in which mayors can run for reelection, while the latter estimates a structural model of agency which illustrates that the reduction in corruption after an audit comes primarily from the perceived non-electoral costs of engaging in corruption.

rewards.[22]

These changes led to only a modest increase in either of the auction types that we have flagged as associated with corruption. For example, comparing auctions held prior to 2008 versus those held 2011 and later, the fraction of auctions for which $DiscretProc = 1$ or $DiscretCrit = 1$ increases from 20.5% to 23.6%: while discretionary procedure auctions increased substantially (from 0% to 12.7%) this increase was largely offset by a substitution away from discretionary criterion (scoring rule) auctions. Taken at face value, our regression coefficients imply a 1.5 percentage point increase in auctions won by investigated firms for the incremental 3.1% of auctions conducted via discretionary procedure or criterion. This calculation leads to a 0.05% increase in investigated winners overall (0.031×0.015). Given our proposed framework, these results are unsurprising. Indeed, recall that the increase in negotiated procedure auctions *with* the legally mandated number of bidders is about 50% between 2008 and 2011. Thus, if these led to even small efficiency gains relative to open first-price auctions, it would more than offset the loss from the very small increment in corrupted auctions. We find this to be quite plausible given our findings on the improvements contracting quality from discretion, such as a 14 percent reduction in delays.

VI Additional Evidence: Tools to Limit Corruption

To the extent that the limited use of discretion we observe is an indication of steps taken to minimize local corruption (as we argue), it may be natural to consider other tactics that a central authority might take to reduce opportunities of self-dealing in vulnerable PAs. In this section, we present additional evidence concerning two common policies to curb corruption: job rotation and limits to subcontracting. Both policies are extensively used in public procurement regulations, and both induce a trade-off between reduced corruption risks and potential inefficiencies. In the case of turnover, the inefficiencies primarily involve frictions in the accumulation of human capital that is essential for a well-functioning procurement processwhile in the case of subcontracting it stems from constraints imposed on suppliers in how they arrange their production process. In this section, we analyze the use of these two mechanisms for limiting corruption, for which there is limited evidence on their efficacy in the literature. Moreover, while there is a

[22]This is the well-known problem of low-powered incentives for public employees, which has been documented across many countries and institutions (see, for instance, the analysis of Indian bank nationalizations by Banerjee et al. [2004]). The problem may be exacerbated by the initial selection of individuals choosing to become bureaucrats (as analyzed, for instance, through a randomized study of initial public sector wage offers in Mexico by Dal Bo et al. [2013]) as well politicians (see the recent review by Dal Bo and Finan [2018]).

long and established theoretical literature on job rotation, there is no prior theoretical (or empirical) work documenting the link between corruption and subcontracting.

VI.A Administrator turnover in investigated municipalities

Staff turnover is used in many settings to ensure the independence of officials. Rotation of audit partners, for instance, was made compulsory for US public companies by the Sarbanes-Oxley Act of 2002. Intuitively, rotation can break the links between a corrupt public official and firms with which he may collude and, moreover, rotation of officials can speed up and/or facilitate revelations of corruption.[23]

Although there are no formal provisions governing public official turnover in Italian procurement law, rotation as an anti-corruption tool has often been invoked in policy debate.We explore its usage within our data through a set of municipal-level analyses relating $InvestigatedPA$ to the average number of auctions handled by each RUP. Our measure, $Turnover$, captures the average fraction of a PA's auctions during our sample period that is handled by a given individual. In particular, if we define δ_{ia} as the share of all contracts for public administration a that are awarded by official i, then our measure of turnover is the complement of an HHI concentration index which, by construction, ranges from zero to 10,000:

$$Turnover_a = 1 - [\sum_j \delta_{ja}^2/10,000] \quad \text{for} \;\; j = \{1, ..., J_a\} \tag{3}$$

where j indexes each of the J_a officers in administration a throughout our sample period. We take one minus the concentration index so that the measure is increasing in turnover, i.e., $Turnover_a$ is higher if a given contract is less likely to be handled by an official that oversees a large fraction of a's overall contract volume.

$Turnover$ is a public-administration-level variable, which is the level at which we run this analysis. We are primarily interested in its relationship to our PA-level measure of suspected corruption, $InvestigatedPA$, and control also at a fine level for geography, via the following specification:

$$Turnover_a = \beta InvestigatedPA_a + Population_a + Region_{R(a)} + \epsilon_a \tag{4}$$

In this specification, $Population$ is a set of dummy variables for each 5,000 person interval for municipalities with population less than 100,000, and dummy variables for each

[23] See Choi and Thum [2003] for a formal argument on the conditions in which rotation will have these effects and, more generally, for references on models of "horizontal competition" between public agents as a corruption-fighting tool.

100,000 person interval between 100,000 and 1,000,000 (the municipalities of Rome and Milan, each with population greater than a million, are the omitted category). *Region* is a set of dummy variables for each of Italy's 20 regions (the results are virtually identical when we include 110 province fixed effects below). We present these analyses in Table 7. We focus on our sample of municipalities, since turnover is so strongly correlated with the size of a PA, and in this sample, we can control flexibly for population. In the first column, we include only $InvestigatedPA$ and population fixed effects. The coefficient on $InvestigatedPA$ is 0.075, significant at the 0.001% level, indicating that in municipalities with at least one public official suspected of corruption, our $Turnover$ variable is 23.7% higher (0.075, relative to a mean of 0.35 for $Turnover$). The estimated effect increases to 0.078 in column 2 when we include fixed effects for each of Italy's 20 regions, and is virtually unchanged when we add 110 province fixed effects in column 3. In column 4 we add third-order polynomials for population, as well as a control for the average number of discretionary auctions in the municipality. These additions have little effect on the estimated relationship between $InvestigatedPA$ and $Turnover$.

Finally, in the next four columns, we repeat the same analysis but using the share of contract values. Hence, instead of the number of contracts awarded by a RUP relative to the overall number of contracts in the PA, we calculate the total value of all contracts awarded by a RUP over the overall value of contracts awarded by the PA. To avoid issues related to differential winning discounts, we use the initial reserve price instead of the winning (or final) price. The results are nearly identical to those in the first four columns.

VI.B Subcontracting by criminal firms

Subcontracting is a distinctive feature of contract procurement that is often asserted (and found in court cases) to be a channel for bribes and kickbacks. Payments to subcontractors, recorded on the main contractor's books as legitimate works but never (fully) performed by the subcontractor, may be used to generate cash for corrupt payments and conceal bribes. Thus, we might expect an association between investigated winners and investigated subcontractors. Yet there is a legitimate efficiency-based rationale for subcontracting, especially for complex jobs involving heterogeneous tasks.[24]

This trade-off inherent in the use of subcontracting may account for the divergent approaches taken by Italian regional governments in constraining its use: as documented in Decarolis and Giorgiantonio [2015], over the sample period that we analyze, several northern regions and autonomous provinces (Valle d'Aosta, Bolzano, Friuli Venezia Giu-

[24]For both a discussion of the subcontracting regulations in Italy and a model of the efficiency-enhancing features of subcontracting see Branzoli and Decarolis [2015].

lia, and Veneto) passed laws that expanded the scope for subcontracting beyond that which was allowed by the national legislator. At the same time, Sicily's regional procurement law introduced *more* stringent rules (relative to national standards) to limit subcontracting, specifically mentioning its known association with corruption and criminal infiltration.[25] We do not have systematic contract-level information on whether a specific call for tenders included limits to subcontracting. However, for a small set of 244 municipalities, we obtained this information from Decarolis and Giorgiantonio [2019]. The estimates analogous to those reported for turnover (see Appendix Table A.10) is also positive, albeit insignificant (e.g., the t-statistics are generally below 1). While consistent with a positive association between more at-risk administrations and greater limits to subcontracting, we have insufficient data to explore this possibility with any rigor.

Our data, however, offers a unique possibility to examine the extent to which subcontracts are associated with suspected criminal behavior. To the extent that $Investigated\ Winner$ captures whether a firm is more likely to engage in self-dealing, we assert that, all else equal, investigated firms will engage in more subcontracting, and furthermore, given the between-firm collusion required in corrupt subcontracting relationships, we hypothesize that, conditional on subcontracting, investigated firms will tend to give subcontracts to other investigated firms.

The graphical evidence in Figure 5 is clearly suggestive of the relevance of the latter hypothesis. In terms of both the probability that the contract will involve at least one investigated subcontractor (left panel) and the share value of subcontracts to investigated firms over the overall subcontract value (right panel), the evidence indicates that investigated winners disproportionately select investigated subcontractors. This graphical evidence is bolstered by the analyses presented in Table 8. Since the extent of subcontracting will naturally vary by contract size and complexity, we introduce successively more controls to account for various auction attributes. The dependent variable, $InvestigatedSubcontractor$, indicates that at least one subcontract was assigned to a firm suspected of corruption. Note that, since these analyses condition on the existence of at least one subcontract, the sample size is far smaller than in our earlier regressions. The patterns indicate an extremely strong correlation between suspected corruption of the winning firm and that of its subcontractors. The point estimate on $InvestigatedWinner$

[25]The national legislation allows subcontracting whenever expressly provided for in the call for tenders but limited to 30% of the total contract value. The regional laws, instead, involved the following modifications documented in Decarolis and Giorgiantonio [2015]: "since 2005, Valle d'Aosta has provided that – in the presence of certain requirements – subcontracts whose value is less than €15,000 are not subject to prior authorization from the contracting authorities; until October 2009, Bolzano established that the use of subcontracting was admissible up to 40% of the total contract value, and not 30% as required by national legislation; Veneto provided that the use of subcontracting was admissible up to 40% of the total contract value."

indicates that corrupt firms are 3-5 percentage points more likely to subcontract to another corrupt firm, which represents a 45-70 percent increase relative to the base rate of subcontracting to investigated firms of 8 percent for clean (non-investigated) winners.

We explore other subcontracting outcomes in Table 9. We begin with an indicator variable for any subcontracting as the dependent variable in column 1; there is no significant relationship with $InvestigatedWinner$ for this "extensive" margin measure. When we look at the intensive margin in columns 2 and 3 – based on subcontracting value as a fraction of total contract value, and number of subcontractors – we do observe that both are higher for investigated winners. Thus, overall, we find some evidence that subcontracting, in general, is higher in contracts won by investigated firms. In the remaining three columns, we present alternative measures of subcontracting to suspected criminal firms, to complement our results in Table 8: the fraction of investigated subcontractors as a fraction of the overall number of subcontractors (column 4) and the share of subcontract value going to investigated firms as a fraction of total subcontract value (column 5). In all cases, we find a strong and positive relationship with $InvestigatedWinner$.[26]

In accordance with the judicial evidence, our findings might indicate that a corrupt firm seeks corrupt subcontractors because it needs to create false invoices to facilitate theft of project funds. Other, not mutually exclusive explanations, are also plausible.[27] Regardless of the precise mechanism(s), however, it appears likely that the choices of regional regulators – tighter subcontracting rules in the South, and looser rules in the North – were consistent with the different features of subcontracting in high versus low corruption areas. To the extent that corruption risks vary across regions, but the complexity of projects (for which subcontracting would be beneficial) does not, these regional reforms likely enhance the efficacy of the public procurement process.

[26]Finally, we investigate whether the relationship between $InvestigatedWinner$ and $InvestigatedSubcontractor$ is mechanically induced by investigations of particular contracts. In particular, one may be concerned that when an auction winner is suspected of corruption, the investigation automatically extends to all subcontractors. If this were the case, we should observe a strong, proportional increase in the number of investigated subcontractors as the total number of contractors increases, but *only* in the presence of a contract winner that is itself under investigation. Figure A.3 displays a binned scatterplot of the average number of investigated subcontractors as a function of the total number of subcontracts (weighted by the reserve price for the overall contract), for $InvestigatedWinner = 0$ and $InvestigatedWinner = 1$ contracts separately. There is a positive, linear relationship for both groups, which argues against investigations spreading outward from the winner.

[27]One possibility is that a subcontractor may learn whether the principal contractor is engaged in corruption. Hence, having a corrupt firm as a subcontractor minimizes the chances that such a firm will leak this information to enforcement authorities. Alternatively, it might be that corruption and collusion go hand in hand: members of bidding rings are more likely to be corrupt, and dynamic considerations for maintaining the cartel also lead members to share revenues with cartel members via subcontracting.

VII Conclusions

We present evidence suggesting that discretion, to the extent that it limits competition, is associated with higher suspected corruption in procurement. We show that these auctions are chosen more often by officials suspected of corruption, and less often in public administrations in which at least one procurement official has been investigated for corruption. The model that we present for organizing these results – a well-meaning central monitor who curtails the use of discretion in areas more prone to corruption – also fits with patterns we document on turnover among procurement administrators, and also rules on subcontracting.

We see several main takeaways from our findings. First, given the central role played by competition in the patterns we document, our results argue against certain classes of models which emphasize bribery as a means of competing with other bidders, and those which model corruption as the outcome of a competitive (and efficient) bidding process in which the best firm is willing to bribe the most to secure a contract. Second, presuming there is enough competition (i.e., sufficient bidders), rigid constraints on auction officials' discretion (e.g., via minimum contract size thresholds) may be costly tools that, at least based on our measure, have a modest impact on corruption. Indeed, our rough assessment based on the costs and benefits of discretion suggest that it is likely under-utilized in our setting. In our view, this result is unexpected, particularly for a country like Italy, which has been traditionally characterized by high levels of corruption, given its level of development.

We also see a number of avenues for future research. For example, we wish to better understand the costs invoked by rules to limit corruption – i.e., constraints on discretion and subcontracting, and higher bureaucratic turnover – as a step to further clarifying the trade-offs that result from anti-corruption policies. Indeed, while turnover may be seen as a tool that does not impede the use of discretion, it may invoke comparable trade-offs, as high turnover potentially limits the accumulation of task-specific knowledge, learning by doing, and trust that increase with experience. Furthermore, in this first assessment of the link between discretion and corruption, we have taken a broad view of the data. Future work may help to better understand the specific mechanisms that underlie the correlations we document – for example why there is such strong "matching on probity," as suggested by our subcontracting results.

Finally, our findings have a number of policy implications. In particular, the difference in outcomes of negotiated auctions with "many" versus "few" bidders is potentially important for assessing the overall costs and benefits of discretion. Indeed, our findings suggest that discretion itself is not necessarily problematic, but rather discretion com-

bined with foreclosure of competition: scoring rule auctions limit competition by tailoring contract terms to a specific firm's capabilities, while negotiated contracts with few invited bidders by construction limit the competitive bidding process. Hence, the use of more discretionary auctions should go hand in hand with more stringent requirements about fostering firm participation.

More generally, in both developed and developing countries, the legal and regulatory frameworks governing public procurement have a profound impact on the interactions between governments and private sector firms, and ultimately on the effectiveness of government service delivery. In 2013, the World Bank began publishing an annual study – Benchmarking Public Procurement – which analyzes the public procurement regulations of about 180 economies; these reports real considerable heterogeneity across countries. Our results help to explain why such a variety of systems exist, as we argue that trade-offs in the choice of procurement rules (in particular the extent to which discretion is allowed) depend critically on the local conditions (in particular the extent of corruption and also the monitoring effectiveness).

By the same reasoning, the same rules may have highly heterogeneous effects, depending on the context where they are used. In this respect, one noteworthy element of our analysis for policy design is the finding of higher corruption risks associated with scoring rule auctions. In the European Union, after 10 years of negotiations between member states, a new Procurement Directive was published in 2014. At its core, it features a switch from the previous highly rigid system of price-only open auctions to a more discretionary system, in which scoring rule auctions are effectively the default. The effects of this change have still to be studied, as its full implementation is quite recent. Member states are permitted an adjustment period to adopt the Directive in their legislation and Italy, for instance, implemented the new rules only in April 2016. However, our results indicate that the goal of creating a common legislative framework in the EU to foster economic integration and cross-border procurement may come at a cost of requiring regulations that are not necessarily well-suited to all institutional environments – the new rules may result in regulations that for some areas lead to substantially higher corruption risk, while for other areas, the one-size-fits-all regulations may not allow for sufficient discretion. Our estimates are a first step in quantifying the elements of this important trade-off.

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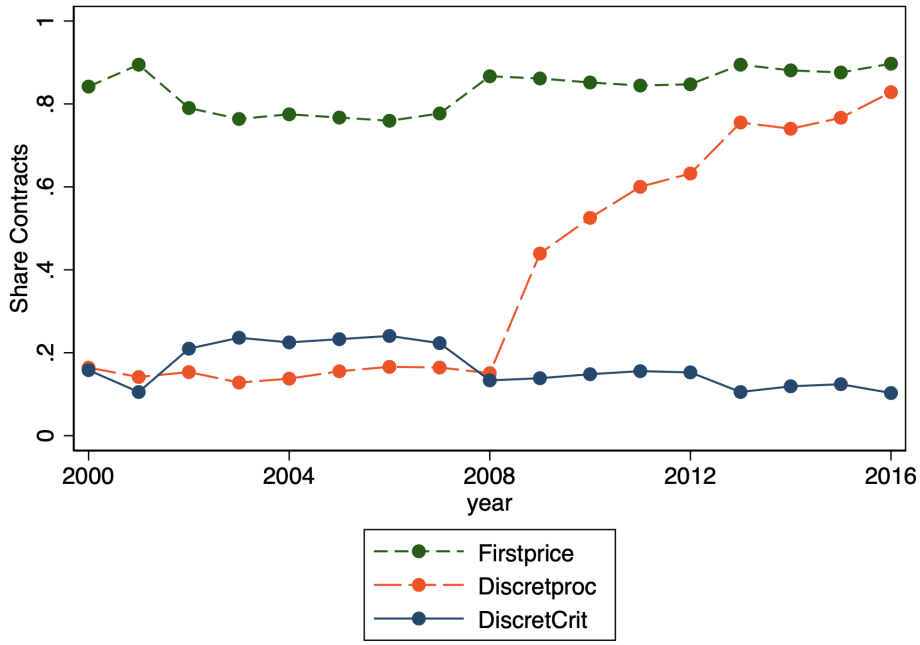
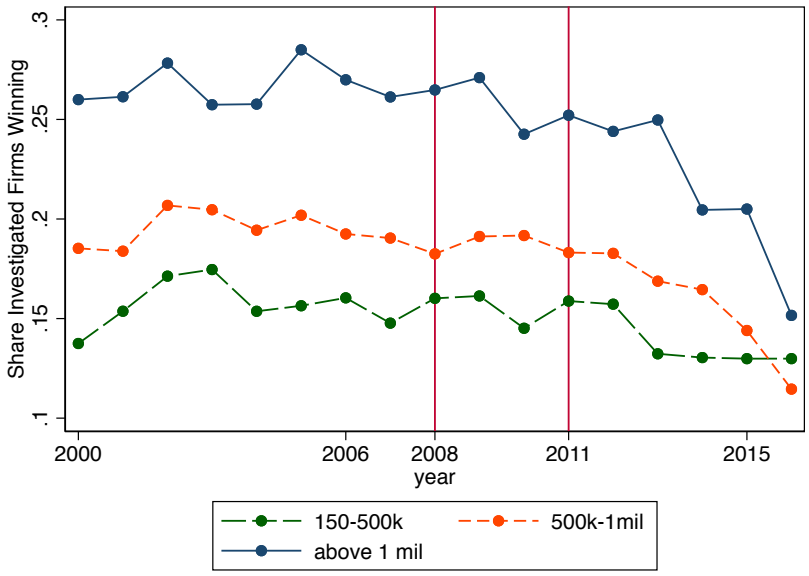
Figure 1: Procedures and criteria over time



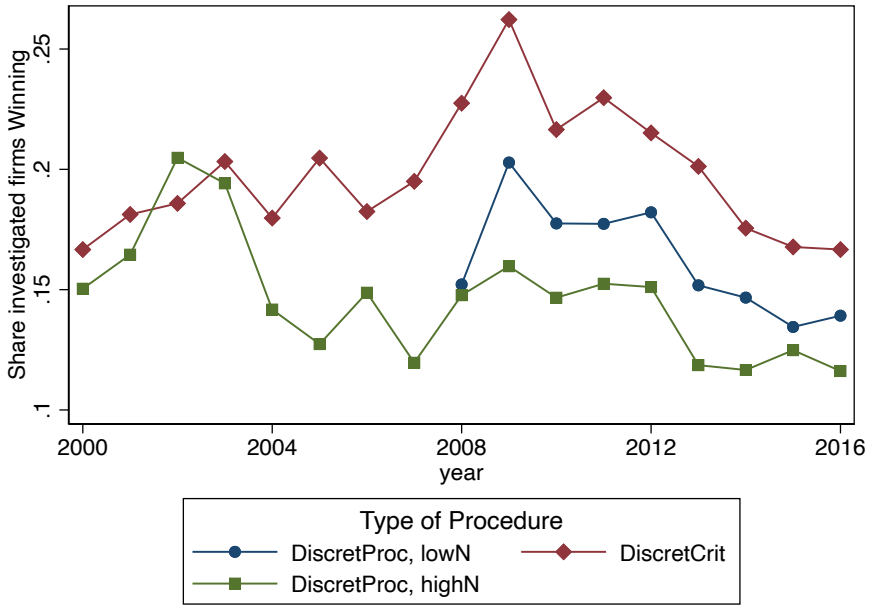
Note: The graph shows, by year, the share of contracts awarded through, respectively, first-price auctions as well as the subset of first-price auctions via negotiated procedure, and scoring rule auctions.

Figure 2: Share of contracts won by investigated firms, by reserve price



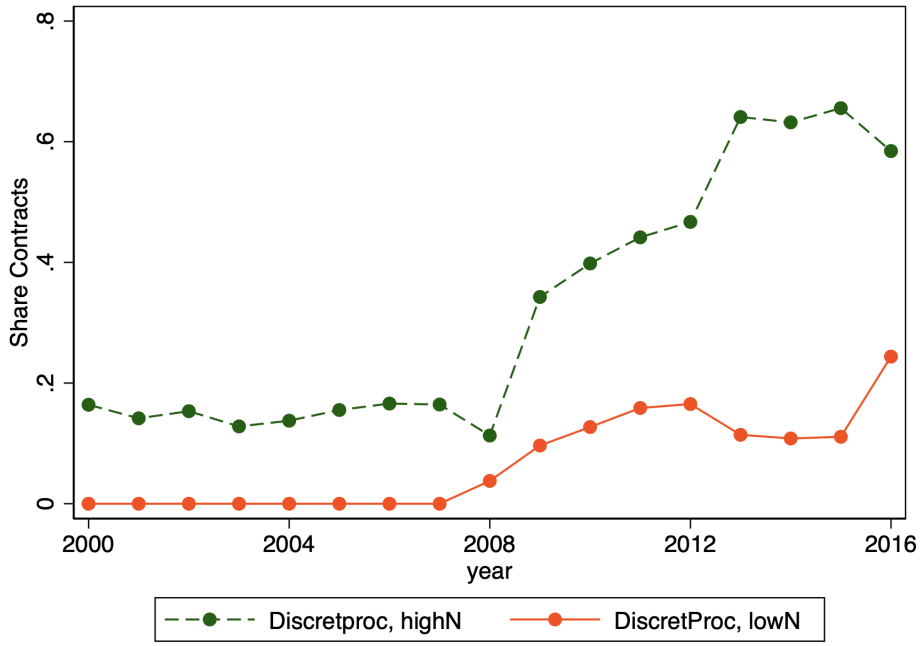
Note: The graph depicts the share of contracts awarded to investigated firms, separately by the reserve price: €150,000-500,000; €500,000-1,000,000; and over €1,000,000.

Figure 3: Share of contracts won by investigated firms, by type of procedure



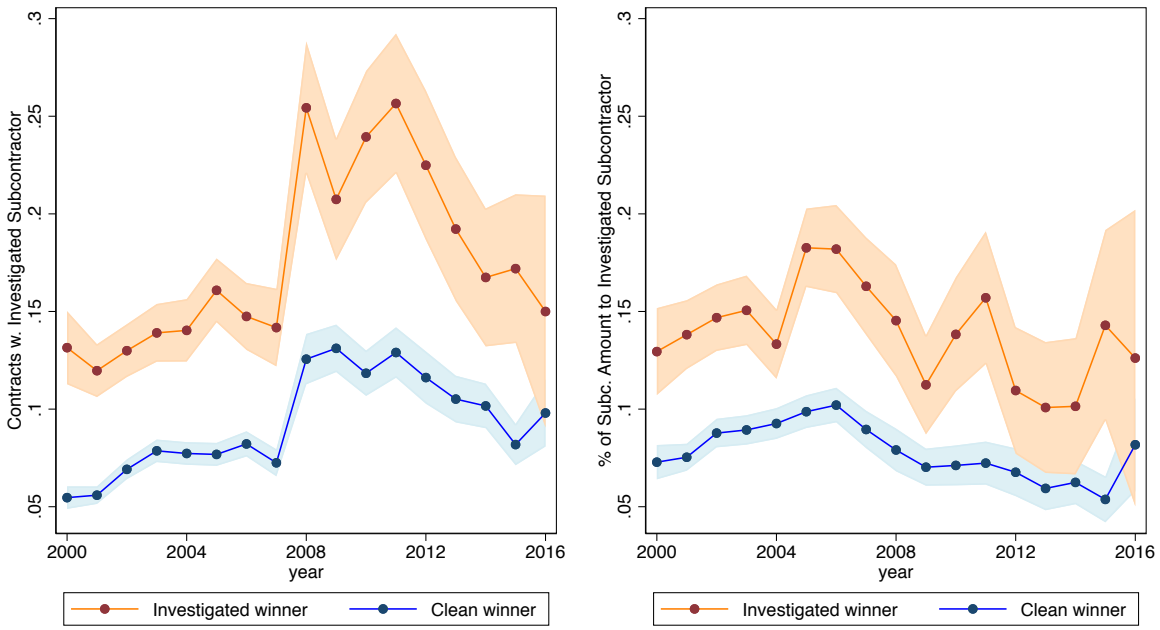
Note: The graph shows the share of contracts awarded to investigated firms, by type of procedure. In particular, the red (diamond) line indicate the share of contracts awarded using $DiscretCrit$ as an awarding criterion won by investigated firms, the blue line (circles) indicates the share of contracts awarded using $Discretproc_{lowN}$ as procedure won by investigates firms, and finally the green (square) line indicates the share of contracts awarded using $Discretproc_{highN}$ as procedure won by investigates firms.

Figure 4: Discretionary procedures over time



Note: The graph shows the share of contracts awarded through, respectively, Discretionary Criterion, overall Discretionary Procedures and Discretionary Procedures with few bidders, over time.

Figure 5: Subcontracting by investigated and clean (non-investigated) winners



Note: The graph shows the share of contracts (left) and the contract amount (right) subcontracted to investigated subcontractors by investigated and non-investigated firms, respectively.

Table 1: Summary statistics by geographical area

	(1) South	(2) Center	(3) North
Investigated RUP	0.164	0.122	0.0697
	(0.370)	(0.328)	(0.255)
Investigated Winner	0.175	0.161	0.168
	(0.380)	(0.367)	(0.374)
Discr. Auction	0.149	0.125	0.298
	(0.356)	(0.331)	(0.457)
Discr. Auction, Investigated RUP	0.178	0.138	0.323
	(0.382)	(0.345)	(0.468)
Discr. Auction, Clean RUP	0.143	0.124	0.303
	(0.350)	(0.329)	(0.460)

Note: The sample refers to the universe of contracts awarded by municipalities or other local authorities: 27 % of contracts awarded in the South, 23 % in the Center and 50% in the North. $InvestigatedRUP$ is an indicator equal to 1 if the public official in charge of the auction has been investigated. $InvestigatedWinner$ is an indicator equal to 1 if the firm winning the auction has been investigated. $Discr.Auction$ denotes auctions for which either a discretionary procedure with fewer than the legally mandated number of bidders ($DiscretProc_{lowN}$) or a discretionary criterion ($DiscretCrit$) has been used to award the auction.

Table 2: Summary statistics for the full data

	A. Auction Level			
	(1)			
	Mean	Median	S.D.	N
Discretion	0.22	0.00	0.42	211,507
DiscretCrit	0.17	0.00	0.38	211,507
$DiscretProc_{lowN}$	0.06	0.00	0.24	211,507
$DiscretProc_{highN}$	0.31	0.00	0.46	211,507
DiscretProc	0.37	0.00	0.48	211,507
Price Only Auction	0.83	1.00	0.38	211,507
investigated Firm	0.17	0.00	0.38	200,092
Investigated RUP	0.10	0.00	0.30	211,507
No. Bidders	26.93	10.00	41.64	210,405
No. Invited Bidders	7.48	4.00	16.78	103,205
Reserve Price (mil)	0.92	0.30	14.14	195,718
Winning Discount	18.22	16.88	11.58	192,362
Extra Cost (wrt Base)	7.01	3.37	13.85	83,088
Contractual Duration	239.91	180.00	224.98	144,942
Delay (days)	135.08	73.00	220.48	108,663
	B. Administration Level			
	(1)			
	Mean	Median	S.D.	N
Investigated PA	0.16	0.00	0.37	14,024
Area==North	0.51	1.00	0.50	9,328
Area==Center	0.13	0.00	0.34	9,328
Area==South	0.35	0.00	0.48	9,328
Total N. Auctions, by PA	15.06	4.00	68.25	14,024
Total Value (in bil), by PA	148.00	17.89	2,061.68	14,024
PA_type==Central Admin	0.02	0.00	0.14	14,024
PA_type==Other Local PA	0.05	0.00	0.22	14,024
PA_type==Cities	0.57	1.00	0.50	14,024
PA_type==Transportations	0.03	0.00	0.16	14,024
PA_type==Hospitals & University	0.17	0.00	0.38	14,024
PA_type==Other	0.17	0.00	0.37	14,024
Population==Pop. up to 5k	0.67	1.00	0.47	7,004
Population==5-10k	0.16	0.00	0.37	7,004
Population==10-20k	0.09	0.00	0.29	7,004
Population==20-60k	0.06	0.00	0.23	7,004
Population==60-250k	0.01	0.00	0.11	7,004
Population==above 250k	0.00	0.00	0.04	7,004

Note: *DiscretProc* denotes all negotiated procedures. $DiscretProc_{highN}$ denotes negotiated procedures with at least the legally mandated number of bidders. $DiscretProc_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. *DiscretCrit* denotes scoring rule auctions. *Discretion* denotes auctions for which either $DiscretProc_{lowN}$=1 or *DiscretCrit*=1. Winning Discount is measured as a percentage of discount relative to the initial reserve price. *ExtraCost* is measured as a percentage of the initial reserve price. *ContractualDuration* and *Delay* are both measured in days.

Table 3: Summary statistics for identification

	All PAs	Cities		
	(1)	(2) South	(3) Center	(4) North
Total PAs	14,384	2,374	937	4,098
Total PA, >1 Auction	10,439	2,140	863	3,573
At least 1 Discret	6,845	1,372	530	2,653
At least 1 DiscretCrit	5,993	1,290	473	2,226
At least 1 $DiscretProc_{lowN}$	3,214	341	224	1,593
PA w. Variance in Discret	6,387	1,323	526	2,495
PA w. Variance DiscretCrit	5,667	1,243	470	2,125
PA w. Variance in $DiscretProc_{lowN}$	3,156	341	223	1,581

Note: $DiscretProc$ denotes negotiated procedures. $DiscretProc_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. $DiscretCrit$ denotes scoring rule auctions. $Discretion$ denotes auctions for which either $DiscretProc_{lowN}$=1 or $DiscretCrit$=1.

Table 4: Auction-level regressions, investigated winner

	all procurement authorities					all city councils				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiscretCrit	0.0122***		0.0132***	0.0133***		0.0191***		0.0199***	0.0197***	
	[0.00325]		[0.00328]	[0.00328]		[0.00400]		[0.00401]	[0.00403]	
$DiscretProc_{lowN}$		0.0215***	0.0229***	0.0222***			0.0127**	0.0152***	0.0163***	
		[0.00495]	[0.00500]	[0.00512]			[0.00592]	[0.00589]	[0.00583]	
$DiscretProc_{highN}$				0.00183	0.00326				-0.00321	-0.00336
				[0.00316]	[0.00312]				[0.00425]	[0.00423]
Discretion					0.0147***					0.0199***
					[0.00304]					[0.00367]
Dep. Var. Mean	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Observations	199089	199089	199089	199089	199089	107994	107994	107994	107994	107994
R-sq	0.118	0.118	0.118	0.118	0.118	0.130	0.129	0.130	0.130	0.130

Note: In all specifications, the dependent variable is an indicator equal to 1 if an investigated firm is awarded the contract. $DiscretProc_{highN}$ denotes negotiated procedures with at least the legally mandated number of bidders. $DiscretProc_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. $DiscretCrit$ denotes scoring rule auctions. $Discretion$ denotes auctions for which either $DiscretProc_{lowN}$=1 or $DiscretCrit$=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p<0.1$,$^{**}p<0.05$,$^{***}p<0.01$.

Table 5: Auction-level regressions, choice of procedure

	(1) Discretion	(2) DiscretProc$_{lowN}$	(3) DiscretCrit	(4) Discretion	(5) Discretion	(6) Discretion	(7) DiscretProc$_{lowN}$	(8) DiscretCrit
Investigated RUP	0.0298***	0.00996**	0.0210***	0.0189***		0.0339***	0.000439	0.0330***
	[0.00805]	[0.00402]	[0.00766]	[0.00650]		[0.00854]	[0.00419]	[0.00780]
Investigated PA					-0.0170***	-0.0257***	0.00372	-0.0291***
					[0.00639]	[0.00754]	[0.00461]	[0.00598]
Dep. Var. Mean	0.222	0.222	0.222	0.222	0.222	0.222	0.0589	0.169
Observations	206421	206421	206421	166768	166768	166768	166768	166768
R-sq	0.325	0.257	0.321	0.210	0.210	0.211	0.131	0.196
Geog. FE	PA	PA	PA	Region	Region	Region	Region	Region

Note: The dependent variable is indicated on top of each column. *DiscretProc* denotes all negotiated procedures. *DiscretProc*$_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. *DiscretCrit* denotes scoring rule auctions. *Discretion* denotes auctions for which either *DiscretProc*$_{lowN}$=1 or *DiscretCrit*=1. *InvestigatedRUP* is an indicator equal to 1 if the public official in charge of the auction has been investigated. *InvestigatedPA* is an indicator equal to 1 if any of the public officials in the PA have been investigated. All regressions include Year fixed effects, a linear control for reserve price (in log) Price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 6: Auction-level regressions, outcomes

	Delay (Asinh)			Winning Discount			Extra Cost		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Discretion	-0.142***			-4.031***			-0.312		
	[0.0469]			[0.267]			[0.282]		
DiscretProc$_{lowN}$		-0.259***	-0.129*		-3.965***	-3.023***		0.396	0.492
		[0.0766]	[0.0756]		[0.422]	[0.356]		[0.509]	[0.520]
DiscretCrit		-0.0778	-0.0837		-3.971***	-4.117***		-0.640**	-0.656**
		[0.0538]	[0.0535]		[0.241]	[0.251]		[0.268]	[0.270]
DiscretProc$_{highN}$			-0.340***			-2.426***			-0.276
			[0.0635]			[0.356]			[0.215]
Dep. Var. Mean	3.296	3.296	3.296	18.11	18.11	18.11	7.035	7.035	7.035
Observations	107067	107067	107067	191053	191053	191053	81439	81439	81439
R-sq	0.250	0.250	0.251	0.443	0.444	0.448	0.219	0.219	0.219

Note: The dependent variable is indicated at the top of each column. *Delay* is the inverse hyperbolic sine transformation of the number of days between the expected contractual duration and the effective total completion time. *Winning Discount* is the final price of the winning bid expressed as a discount over the reserve price (Discount) and *ExtraCost* represents excess completion costs, calculated as the difference between the final price and awarding price, over the initial reserve price. *DiscretProc*$_{highN}$ denotes negotiated procedures with at least the the legally mandated number of bidders. *DiscretProc*$_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. *DiscretCrit* denotes scoring rule auctions. *Discretion* denotes auctions for which either *DiscretProc*$_{lowN}$=1 or DiscretCrit=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) Price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 7: municipal-level regressions, turnover

	N. of Contracts				Contract Value			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investigated PA	0.0749***	0.0781***	0.0772***	0.0719***	7542.8***	7681.3***	7447.3***	6882.1***
	[0.00782]	[0.00796]	[0.00808]	[0.00802]	[784.4]	[805.0]	[816.8]	[809.0]
% Discret				-0.000131				-34.70***
				[0.000129]				[11.92]
Dep. Var. Mean	0.316	0.316	0.316	0.316	-72241.7	-72241.7	-72241.7	-72241.7
Observations	6712	6712	6712	6712	6712	6712	6712	6712
R-sq	0.208	0.248	0.265	0.285	0.226	0.252	0.271	0.295
Geog. FE		Region	Prov.	Prov.		Region	Prov.	Prov.

Note: In columns 1-4, the dependent variable is the number of contracts awarded by a RUP relative to the overall number of contract in the PA. In columns 5-8, the dependent variable is the share of contract value awarded by a RUP, i.e., the total value of all contracts awarded by a RUP divided by the overall value of contracts awarded by the PA. $InvestigatedPA$ is an indicator equal to 1 if at least one RUP in the PA has been investigated for corruption. $\%Discret$ measures the average share of auctions awarded by the PA for which either $DiscretProc_{lowN}$=1 or $DiscretCrit$=1. All regressions include 24 population bin fixed effects as well as geographic fixed effects either at the province- or region-level, as indicated. Specifications 4 and 8 also include a third order polynomial in population as control. Robust standard errors clustered at the PA-level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table 8: Auction-level regressions, investigated subcontractors

	(1)	(2)	(3)	(4)	(5)	(6)
Investigated Winner	0.0510***	0.0514***	0.0494***	0.0494***	0.0342***	0.0342***
	[0.00358]	[0.00361]	[0.00362]	[0.00362]	[0.00326]	[0.00326]
Discretion		0.00486	0.00326		0.00293	
		[0.00462]	[0.00460]		[0.00409]	
Investigated RUP		-0.000862	-0.000438	-0.000518	-0.000402	-0.000350
		[0.00637]	[0.00621]	[0.00621]	[0.00644]	[0.00642]
Investigated PA		0.00463	0.00379	0.00389		
		[0.00500]	[0.00495]	[0.00496]		
$\text{DiscretProc}_{lowN}$				-0.0176**		-0.0216***
				[0.00847]		[0.00806]
DiscretCrit				0.00734		0.00727
				[0.00502]		[0.00445]
Dep. Var. Mean	0.0818	0.0818	0.0818	0.0818	0.0818	0.0955
Observations	80601	78462	78462	78462	96971	96971
R-sq	0.0567	0.0571	0.0608	0.0609	0.150	0.150
Geog. FE	Region	Region	Region	Region	PA	PA

Note: In all specifications, the dependent variable is an indicator equal to 1 if an investigated firm is awarded to a subcontract. $InvestigatedWinner$ is an indicator equal to 1 if an investigated firm is awarded the main contract. $InvestigatedRUP$ is an indicator equal to 1 if the public official in charge of the auction has been investigated for corruption. $InvestigatedPA$ is an indicator equal to 1 if at least one RUP in the PA has been investigated. $DiscretProc_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. $Discretion$ denotes auctions for which either $DiscretProc_{lowN}$=1 or $DiscretCrit$=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) Price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed Maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

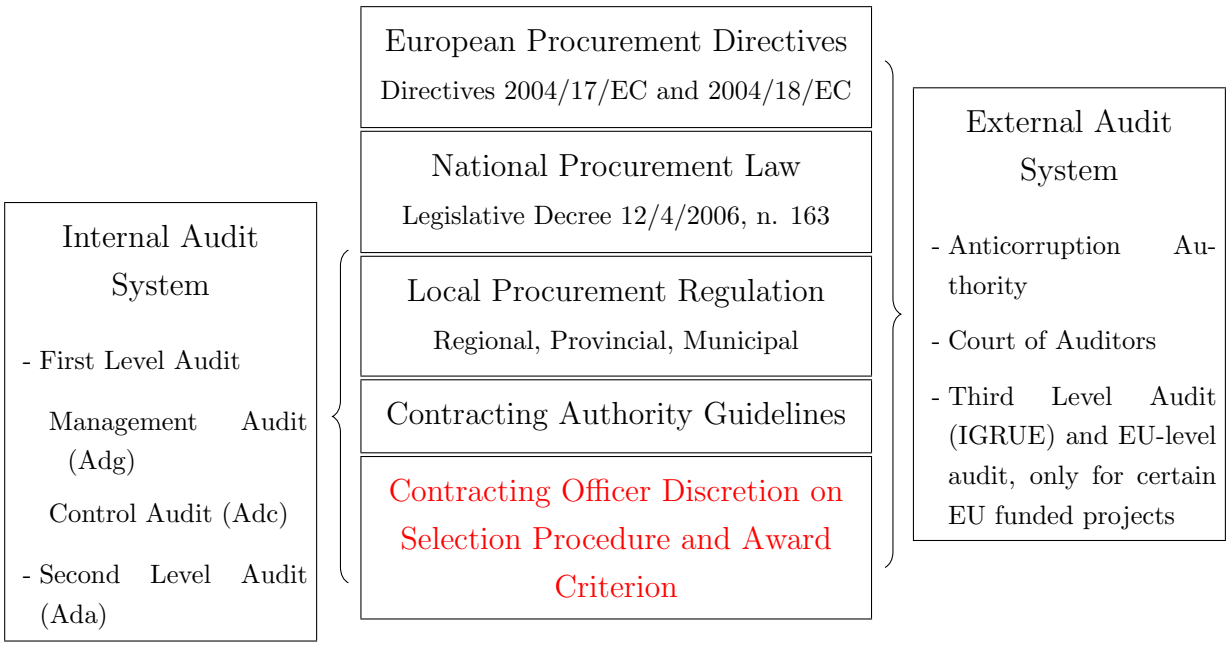
Table 9: Auction-level regressions, other subcontracting outcomes

	(1) Subcontracting	(2) % Amount Subc. (wrt base)	(3) N. Subcontracts	(4) % Investigated among Subc.	(5) % Subc. Amount to Investigated
Investigated Winner	-0.000360	0.0132***	0.108***	0.0145***	0.0305***
	[0.00287]	[0.00129]	[0.0357]	[0.00166]	[0.00406]
Investigated RUP	-0.0145*	-0.00201	-0.0207	0.00209	0.00252
	[0.00846]	[0.00291]	[0.0726]	[0.00389]	[0.00846]
$\text{DiscretProc}_{lowN}$	-0.0500***	-0.00309	-0.0241	-0.0136**	-0.0219***
	[0.00681]	[0.00450]	[0.190]	[0.00542]	[0.00821]
DiscretCrit	-0.00999	0.0116***	0.387***	-0.00272	-0.00386
	[0.00673]	[0.00267]	[0.0636]	[0.00233]	[0.00491]
Dep. Var. Mean	0.493	0.109	2.565	0.0423	0.0949
Observations	195158	96635	96971	96971	52370
R-sq	0.375	0.183	0.347	0.146	0.172

Note: The dependent variable is indicated on top of each column. *Subcontracting* is an indicator equal to 1 if there is any subcontract. *% Amount Subc.(wrt base)* is the total subcontracting value as a fraction of total initial contract value; *N.Subcontracts* is the number of subcontractors; *% Investigated among Subc.* indicates the number of investigated subcontractors as a fraction of the overall number of subcontractors; *% Subc. Amount to Investigated* measures the share of subcontract value going to investigated firms as a fraction of total subcontract value. $Investigated\,Winner$ is an indicator equal to 1 if an investigated firm is awarded the main contract. $InvestigatedRUP$ is an indicator equal to 1 if the public official in charge of the auction has been investigated for corruption. $DiscretProc_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. $DiscretCrit$ denotes scoring rule auctions. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) Price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under Urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

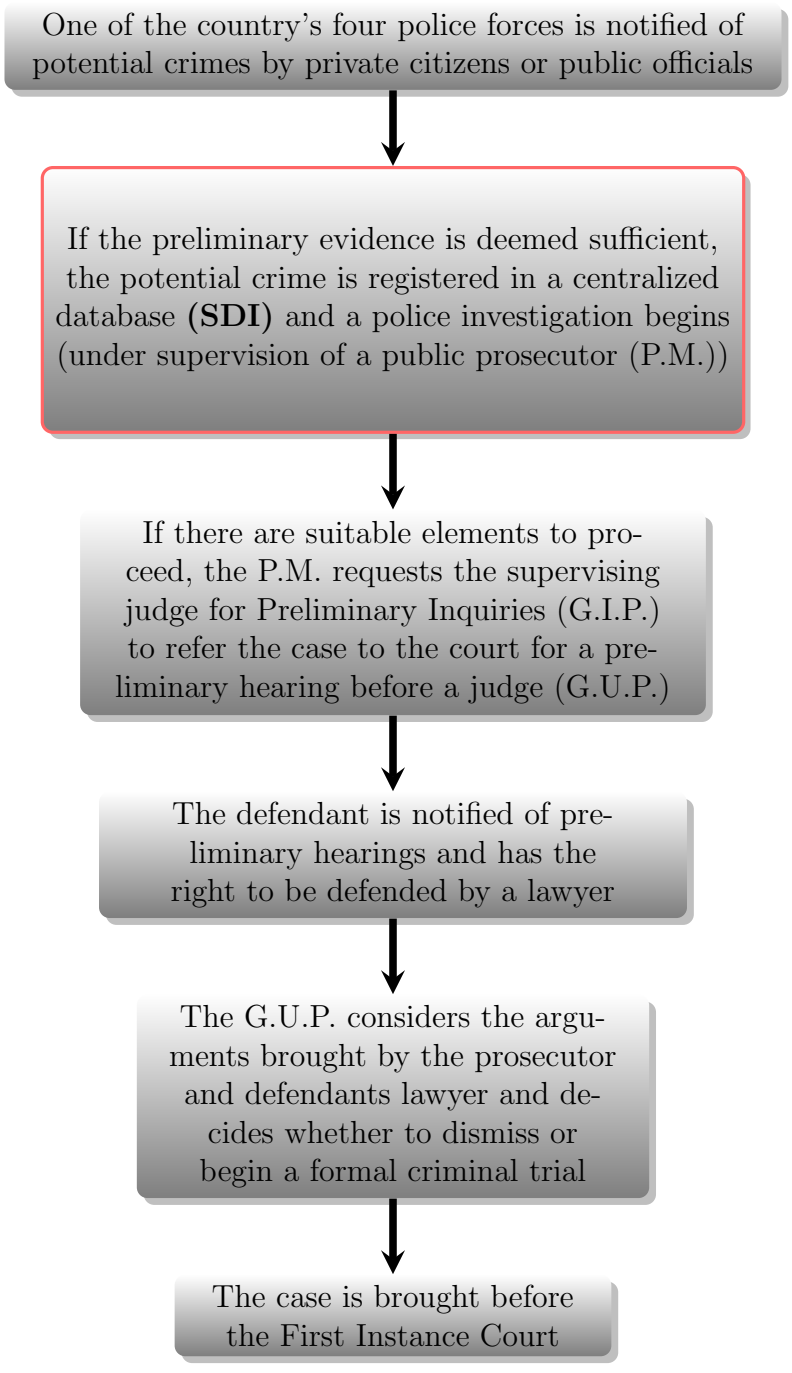
Appendix: For Online Publication Only

Figure A.1: Regulatory Constraints and the Procurement Audit System



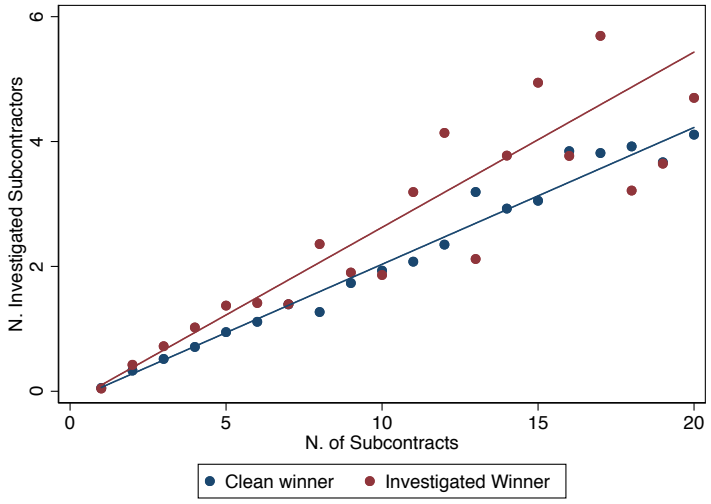
Note: The figure illustrates the set of regulatory constraints and audit oversight, subject to which a contracting officer exercises discretion over the supplier selection procedure and contract awarding criterion. At any point in time, the exact set of regulations and audit processes applicable depend on the contract reserve price, job characteristics, source of project funding, and the identity of the contracting authority. The system has changed over time, but for most of the contracts in our sample, the relevant regulations are the European Procurement Directives 2004/17 and 2004/18 and Italian procurement law (L.D. 163/2006). For the typical contract, the audit process has two levels and is also subject to scrutiny by external auditors. When the project is at least in part funded by the EU, there is a third audit level conducted by the regional offices of the Ministry of the Treasury (IGRUE) and, possibly, further levels of European audits as well.

Figure A.2: The Investigation Process



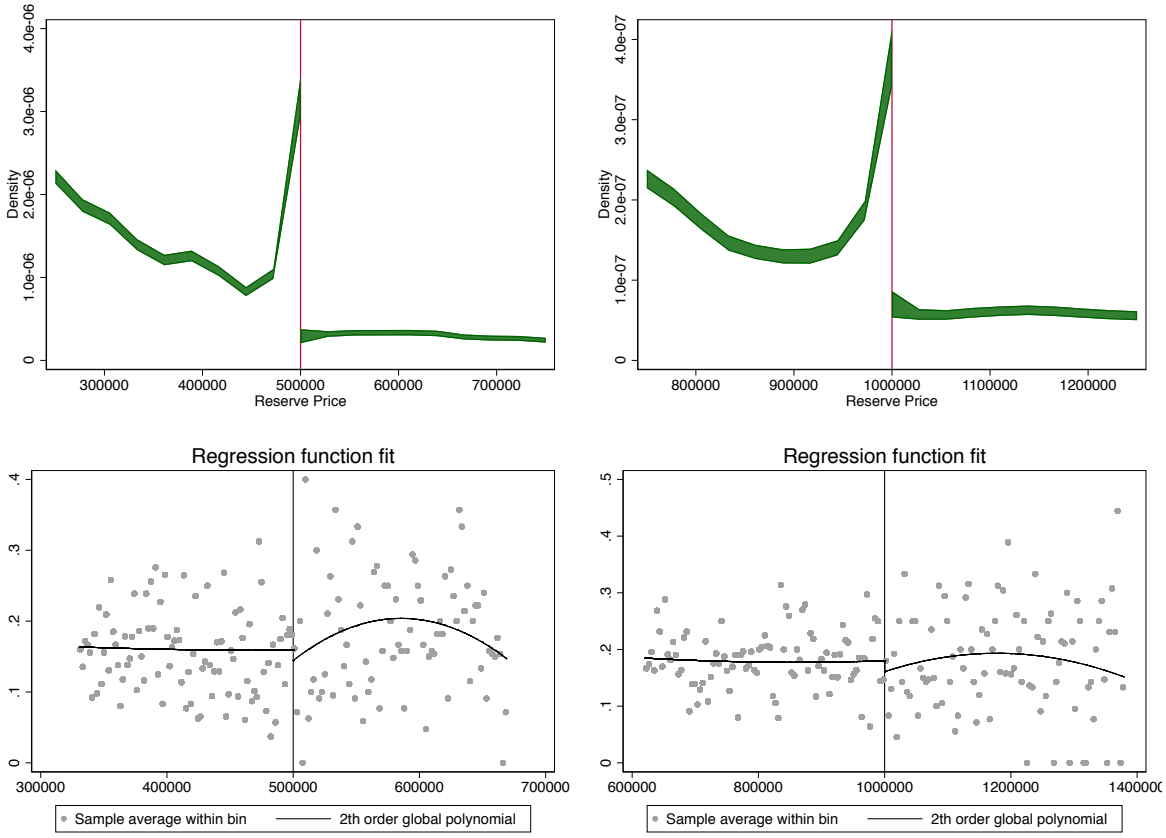
Note: The figure shows the various steps in the investigation process in Italy. Our data comes from the second step, highlighted in red.

Figure A.3: Share of investigated subcontractors, by number of subcontracts and investigated winner



Note: The figure is a binned scatterplot. Each dot represents the average share of investigated subcontractors for auctions with a given number of subcontracts, separately for auctions in which the main contract was won by an investigated firm, versus all other (non-investigated) firms.

Figure A.4: Regression discontinuity plots



Note: These graphs depict the results of our analysis using a Regression Discontinuity Design. The top panels display the density of contracts with reserve price around the €500,000 and €1,000,000 cutoffs, respectively. The green bands depict confidence intervals for the of the estimated density function. The bottom panels display the average fraction of contracts awarded to investigated firms across equally-sized bins of the reserve price, and fitted polynomials functions on each side of the cutoff. All estimates are performed using optimal bandwidth selection procedure by Cattaneo et al. [2019].

Table A.1: Auction-level regressions, investigated winner - Restrictive definition

	all					cities				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiscretCrit	0.00983***		0.0107***	0.0109***		0.0143***		0.0149***	0.0150***	
	[0.00275]		[0.00281]	[0.00281]		[0.00324]		[0.00326]	[0.00326]	
$\text{DiscretProc}_{lowN}$		0.0181***	0.0193***	0.0163***			0.00979***	0.0117***	0.0110***	
		[0.00408]	[0.00418]	[0.00426]			[0.00345]	[0.00352]	[0.00364]	
$\text{DiscretProc}_{highN}$				0.00773***	0.00864***				0.00209	0.00180
				[0.00230]	[0.00228]				[0.00287]	[0.00277]
Discretion					0.0119***					0.0148***
					[0.00253]					[0.00281]
Dep. Var. Mean	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Observations	199089	199089	199089	199089	199089	107994	107994	107994	107994	107994
R-sq	0.103	0.103	0.103	0.104	0.103	0.112	0.112	0.112	0.112	0.112

Note: In all specifications, the dependent variable is an indicator equal to 1 if an investigated firm is awarded the contract. In this table, we restrict the definition of investigated firms to those investigated for (i) corruption, malfeasance and embezzlement or (ii) abuse of power and undue influence, (i.e., we do not include in our definition those investigated for violations in public auctions. DiscretProc denotes negotiated procedures. $\text{DiscretProc}_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$.

Table A.2: Auction-level regressions, investigated winner - Broad definition

	all					cities				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiscretCrit	0.0170***		0.0181***	0.0182***		0.0203***		0.0210***	0.0212***	
	[0.00369]		[0.00371]	[0.00372]		[0.00470]		[0.00470]	[0.00470]	
$\text{DiscretProc}_{lowN}$		0.0212***	0.0231***	0.0206***			0.0125*	0.0152**	0.0143**	
		[0.00557]	[0.00559]	[0.00588]			[0.00714]	[0.00711]	[0.00723]	
$\text{DiscretProc}_{highN}$				0.00650*	0.00719**				0.00278	0.00224
				[0.00378]	[0.00362]				[0.00504]	[0.00496]
Discretion					0.0180***					0.0201***
					[0.00337]					[0.00424]
Dep. Var. Mean	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Observations	199089	199089	199089	199089	199089	107994	107994	107994	107994	107994
R-sq	0.138	0.138	0.138	0.138	0.138	0.148	0.148	0.148	0.148	0.148

Note: In all specifications, the dependent variable is an indicator equal to 1 if an investigated firm is awarded the contract. In this table, we extend the definition of investigated firms to include firms investigated for waste management crimes. DiscretProc denotes negotiated procedures. $\text{DiscretProc}_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) Price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$.

Table A.3: Auction-level regressions, PA X Year fixed effects

	all					cities				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiscretCrit	0.00752*		0.00791*	0.00795*		0.0186***		0.0188***	0.0187***	
	[0.00455]		[0.00456]	[0.00456]		[0.00647]		[0.00648]	[0.00647]	
$\text{DiscretProc}_{lowN}$		0.0236***	0.0239***	0.0224***			0.0176**	0.0180**	0.0196***	
		[0.00572]	[0.00575]	[0.00602]			[0.00760]	[0.00760]	[0.00758]	
$\text{DiscretProc}_{highN}$				0.00375	0.00559				-0.00476	-0.00451
				[0.00415]	[0.00407]				[0.00636]	[0.00633]
Discretion					0.0116***					0.0206***
					[0.00410]					[0.00538]
Dep. Var. Mean	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Observations	170210	170210	170210	170210	170210	86195	86195	86195	86195	86195
R-sq	0.241	0.241	0.241	0.241	0.241	0.289	0.289	0.289	0.289	0.289

Note: In all specifications, the dependent variable is an indicator equal to 1 if an investigated winner is awarded the contract. DiscretProc denotes negotiated procedures. $\text{DiscretProc}_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include PA*Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under Urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table A.4: Bidder-level regressions, participants' pool

	participant					auction				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiscretCrit	0.00248		0.00240	0.00232		0.0199**		0.0198**	0.0197**	
	[0.00292]		[0.00292]	[0.00292]		[0.00924]		[0.00923]	[0.00930]	
$\text{DiscretProc}_{lowN}$		0.0125**	0.0125**	0.0143***			0.0221**	0.0220**	0.0221**	
		[0.00533]	[0.00533]	[0.00538]			[0.00896]	[0.00896]	[0.00912]	
$\text{DiscretProc}_{highN}$				-0.00364	-0.00282				-0.000338	0.000571
				[0.00392]	[0.00392]				[0.00801]	[0.00774]
Discretion					0.00114					0.0223***
					[0.00228]					[0.00738]
Dep. Var. Mean	0.163	0.163	0.163	0.163	0.163	0.161	0.161	0.161	0.161	0.161
Observations	462821	462821	462821	462821	462821	24197	24197	24197	24197	24197
R-sq	0.0562	0.0563	0.0563	0.0563	0.0562	0.223	0.223	0.223	0.223	0.223

Note: In columns 1-5, the dependent variable is an indicator equal to 1 if an investigated firm participates in the auction. The unit of observation is the auction participant, so we have multiple observation per auction. Columns 6-10 replicate columns 6-10 of Table 4, but restricts the sample to auctions for which we have information on the participants. Across all columns, we restrict attention to contracts awarded by municipal councils. DiscretProc denotes negotiated procedures. $\text{DiscretProc}_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include controls for participant firms' characteristics, and in particular firm net worth, firm size, profits, operating margin, negative operating margin dummy, change in operating margin. Regressions also include PA and Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table A.5: Auction-level regressions, investigated winner on investigated RUP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Investigated RUP	0.0095*	0.0095*	0.0092*	0.0092*	0.0093*	0.0098*	0.0096*	0.0095*	0.0097*	0.0093*
	[0.0052]	[0.0052]	[0.0052]	[0.0052]	[0.0052]	[0.0052]	[0.0052]	[0.0052]	[0.0052]	[0.0052]
DiscretCrit	0.0130***		0.0140***	0.0141***			0.0130***			
	[0.0033]		[0.0033]	[0.0033]			[0.0033]			
DiscretProc$_{lowN}$		0.0215***	0.0230***	0.0224***				0.0215***		
		[0.0050]	[0.0050]	[0.0051]				[0.0050]		
DiscretProc$_{highN}$				0.0015	0.0029				0.0043	0.0029
				[0.0032]	[0.0032]				[0.0032]	[0.0032]
Discretion					0.0154***					0.0154***
					[0.0031]					[0.0031]
PA FE	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Dep. Var. Mean	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
Observations	195158	195158	195158	195158	195158	195158	195158	195158	195158	195158
R-sq	0.118	0.118	0.118	0.118	0.118	0.117	0.118	0.118	0.117	0.118

Note: This table is the counterpart of Table 5 but including *Investigated RUP* among the regressors.
$^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table A.6: Auction-level regressions, choice of procedure, province FE

	(1) Discretion	(2) DiscretProc$_{lowN}$	(3) DiscretCrit	(4) Discretion	(5) Discretion	(6) Discretion	(7) DiscretProc$_{lowN}$	(8) DiscretCrit
Investigated RUP	0.0298***	0.00996**	0.0210***	0.0207***		0.0391***	0.00167	0.0381***
	[0.00805]	[0.00402]	[0.00766]	[0.00731]		[0.0100]	[0.00443]	[0.00888]
Investigated PA					-0.0170***	-0.0297***	0.00124	-0.0318***
					[0.00608]	[0.00786]	[0.00420]	[0.00589]
Dep. Var. Mean	0.222	0.222	0.222	0.222	0.222	0.222	0.0589	0.169
Observations	206421	206421	206421	110618	110618	110618	110618	110618
R-sq	0.325	0.257	0.321	0.228	0.228	0.229	0.143	0.212
Geog. FE	PA	PA	PA	Province	Province	Province	Province	Province

Note: This Table is the counterpart of table 5 but using a finer partition for the geographic fixed effects, one for each of Italy's 110 provinces. DiscretProc denotes negotiated procedures. DiscretProc$_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either DiscretProc$_{lowN}$=1 or DiscretCrit=1. Investigated RUP is an indicator equal to 1 if the public official in charge of the auction has been investigated. Investigated PA is an indicator equal to 1 if any of the public officials in the PA have been investigated. All regressions include Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses.
$^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$.

Table A.7: Auction-level regressions, choice of DiscretProc procedures

	(1)	(2)	(3)	(4)
Investigated RUP	0.000852	0.00873		0.000846
	[0.0101]	[0.00738]		[0.00972]
Investigated PA			0.0123	0.0120
			[0.0101]	[0.0121]
Dep. Var. Mean	0.222	0.222	0.222	0.222
Observations	109511	110269	110269	110269
R-sq	0.574	0.500	0.500	0.500
Geog. FE	PA	Region	Region	Region

Note: The dependent variable across columns is DiscretProc, which denotes all negotiated procedures. Investigated RUP is an indicator equal to 1 if the public official in charge of the auction has been investigated for corruption. Investigated PA is an indicator equal to 1 if at least one RUP in the PA has been investigated. All regressions include Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$.

Table A.8: Auction-level regressions, subsample of auctions with outcomes' data

	all					cities				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiscretCrit	0.0168***		0.0179***	0.0178***		0.0254***		0.0266***	0.0266***	
	[0.00585]		[0.00585]	[0.00586]		[0.00733]		[0.00730]	[0.00737]	
$\text{DiscretProc}_{lowN}$		0.0278***	0.0291***	0.0293***			0.0279***	0.0302***	0.0302***	
		[0.00774]	[0.00777]	[0.00803]			[0.00887]	[0.00890]	[0.00898]	
$\text{DiscretProc}_{highN}$				-0.000638	0.00111				-0.000131	0.000603
				[0.00520]	[0.00505]				[0.00693]	[0.00675]
Discretion					0.0211***					0.0299***
					[0.00491]					[0.00599]
Dep. Var. Mean	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161
Observations	66458	66458	66458	66458	66458	37311	37311	37311	37311	37311
R-sq	0.145	0.145	0.145	0.145	0.145	0.165	0.165	0.165	0.165	0.165

Note: This table is analogous to Table 4, but restricting the sample to the subset of auctions for which we have information on the outcomes used in Table 6. In all specifications, the dependent variable is an indicator equal to 1 if an investigated firm is awarded the contract. DiscretProc denotes negotiated procedures. $\text{DiscretProc}_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$.

Table A.9: Auction-level regressions, outcomes (municipalities only)

	Delay (Asinh)			Winning Discount			Extra Cost		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Discretion	-0.156***			-4.313***			-0.530*		
	[0.0508]			[0.388]			[0.272]		
$\text{DiscretProc}_{lowN}$		-0.462***	-0.334***		-3.153***	-2.418***		0.276	0.242
		[0.0825]	[0.0862]		[0.571]	[0.401]		[0.438]	[0.428]
DiscretCrit		-0.0417	-0.0586		-4.667***	-4.829***		-0.776**	-0.768**
		[0.0601]	[0.0595]		[0.316]	[0.342]		[0.301]	[0.310]
$\text{DiscretProc}_{highN}$			-0.358***			-2.105***			0.108
			[0.0626]			[0.601]			[0.309]
Dep. Var. Mean	3.296	3.296	3.296	18.11	18.11	18.11	7.035	7.035	7.035
Observations	58071	58071	58071	104628	104628	104628	46276	46276	46276
R-sq	0.260	0.260	0.261	0.437	0.439	0.442	0.249	0.249	0.249

Note: The dependent variable is indicated on top of each column. Delay is the inverse hyperbolic sine transformation of the number of days between the expected contractual duration and the effective total completion time. Winning Discount is the final price of the winning bid expressed as a discount over the reserve price (Discount) and Extra Cost represents excess completion costs, calculated as the difference between the final price and awarding price, over the initial reserve price. DiscretProc denotes negotiated procedures. $\text{DiscretProc}_{lowN}$ denotes negotiated procedures with fewer than the legally mandated number of bidders. DiscretCrit denotes scoring rule auctions. Discretion denotes auctions for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include PA and Year fixed effects, a linear control for reserve price (in log) price and 5 dummies for different contract size thresholds (up to 100k, 100-150k, 150-300k, 300-500k, 500k-1mil, 1-1.5mil, over 1.5mil) as well as controls for contract characteristics: 4 dummies for category type (Civil Building, Roadworks, Specialized Works or Others), 1 dummy for whether the contract was awarded under urgency and 1 dummy for whether the object of the contract entailed maintenance. Robust standard errors clustered at the PA level are in parentheses. $^{*}p < 0.1$,** $p < 0.05$,*** $p < 0.01$.

Table A.10: Municipal-level regressions, limits to subcontracting

	(1)	(2)	(3)	(4)
Investigated PA	0.0581	-0.0257	-0.000326	-0.0178
	[0.0639]	[0.0565]	[0.0634]	[0.0572]
% Discret				-0.000471
				[0.00146]
Dep. Var. Mean	0.220	0.220	0.220	0.220
Observations	223	223	215	223
R-sq	0.0935	0.413	0.516	0.420
Geog. FE		Region	Prov.	Region

Note: The dependent variable is an indicator equal to 1 if the call for tenders included limits to subcontracting. Investigated PA is an indicator equal to 1 if at least one RUP in the PA has been investigated for corruption. % Discret measures the average share of auctions awarded by the PA for which either $\text{DiscretProc}_{lowN}$=1 or DiscretCrit=1. All regressions include 24 fixed effects for population bins. Specifications 2 to 4 also include geographic fixed effects either at the province or region level, as indicated. Specification 4 also includes a third order polynomial in population as control. Robust standard rrrors clustered at the PA level are in parentheses. $^{*}p < 0.1$,** $p < 0.05$,*** $p < 0.01$.