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PROCUREMENT MANAGERS AND EFFECTIVE TENDERING: THE CASE OF ITALIAN PUBLIC WORKS CONTRACTS

by Audinga Baltrunaite‡, Enza Maltese*, Tommaso Orlando†, and Gabriele Rovigatti‡

Abstract

This paper studies whether and how much procurement managers matter for effective procurement outcomes. We utilize detailed data on Italian procurement for public works, and on the identity of public officials responsible for their tendering and execution. Our analysis shows that, *ceteris paribus* and even within the same procuring agency, the managers' identity matters for effective procurement. We further leverage institutional reforms that tightened the eligibility criteria for procurement managing roles as a natural experiment to evaluate the correlation between managerial quality and procurement performance. Key performance indicators include the duration of administrative procedures for tender awarding and the completion time for public works. Our findings suggest a direct positive relationship between the caliber of procurement managers and the expediency of both tender awarding and project completion.

JEL Classification: D73, H57, H83.

Keywords: public procurement, public works, public management.

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1. Introduction^{*}

The effectiveness of public goods' provision does not only depend on the quality of the policymakers' decisions, but also on the capacity of public officials who are responsible for translating policy into output (Baltrunaite et al. 2021a; Decarolis et al. 2020a, 2020b; Giuffrida and Rovigatti 2021; Spiller 2009; Tirole 1986). While the state is involved in delivering a wide range of services, public procurement is particularly prominent: in developed countries, governments' purchases of goods, services and works account for 13 percent of GDP (OECD, 2021). Effective procurement, therefore, may directly translate into substantial cost savings or – keeping costs constant – quality gains for the public sector.

The measurement of the procurement success is a challenging task, since the government demands a heterogeneous set of purchases and the procurement outcomes not only depend on the procurement prices, but also on the timeliness and the quality of what was purchased. In turn, buyers' individual characteristics (Bandiera et al. 2021, Best et al. 2017; Buccioli et al. 2020), bureaucratic competence (Decarolis et al. 2020c), the features of procuring agencies, such as central versus local ones (Baltrunaite et al. 2021b, Chiappinelli 2020) may play an important role.

Complex procurement requires technical knowledge of product and market characteristics, legal knowledge and managerial abilities in the tender design and contract negotiation. Likewise, private sector productivity, variability of public procurement outcome (such as duration, cost overrun, time overrun, rebate) could be explained by managers' individual characteristics and managerial practices (Bloom and Van Reenen, 2007; Bloom et al. 2014; Janke et al. 2019; Limodio 2021). Indeed, procurement officials may exert a direct influence on the procurement process by designing and executing the public tender and, if a private contractor is ultimately selected, by supervising the execution phases. In recent years, in fact, Italian public procurement legislation has focused attention on enhancing the quality and professionalization of procurement officials.

This paper contributes to the literature on the impact of managerial practices on public procurement by empirically investigating to what extent procurement managers (Responsabile Unico del Procedimento, – RUP hereafter) impact tender outcomes. To this end, we focus on Italian public works and build a novel dataset that contains detailed information on both public works and on the identities of public procurement managers. We measure procurement success by the contract awarding and execution speed. These measures directly depend upon the effort and expertise of the procurement manager and can be interpreted in an unambiguous way. First, faster administrative procedures contribute to speeding up the process through which public policy is translated into public goods. Second, the reduction of time taken to complete the final public works also reduces the waste of resources in terms of public sector labor input, and increases the value for money of the stakeholders.

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The empirical analysis consists of two parts. First, we show descriptive evidence on how certain characteristics of procurement managers relate to the effectiveness of procuring. More precisely, through a *ceteris paribus* analysis we examine whether their demographic and professional characteristics relate to procurement success. We document that while gender or being born in the same municipality of the procurement authority appear to have no significant relationship with swift awarding of public works tenders, the age and the education (e.g., the presence of a technical university or high-school degree) matter positively. Instead, as far as procurement execution is concerned, being born locally does relate positively to the duration of the execution, possibly due to the presence of place-based connections between public officers and private contractors. In addition, experienced RUPs award more quickly and streamline the execution of public works. While their excessive workloads seem to increase the durations of both phases.

Second, we address the potentially endogenous assignment of public procurement managers to public contracts, by exploiting legislative changes in Italy that regulate their selection. At the end of 2017, the guidelines of the National Anti-Corruption Authority (Autorità Nazionale Anticorruzione, henceforth – ANAC) introduced specific professional requirements for becoming a procurement manager. These requirements were based on a combination of factors, including years of experience (tenure) in procurement and education level. As expected, stronger qualifications were required for larger tenders at the thresholds of 150 thousand and 1 million euros and the EU threshold.¹ Before this regulatory change, RUPs were assigned to contracts without any constraints; therefore, we exploit this reform as a lever for procurement officers' quality which (weakly) increases after the reform at each of the above mentioned tender value cut-offs. We adopt a difference-in-differences approach to study whether the procurement managers' quality affects the procurement success. The results hinge on the identifying assumption that the change in procurement outcomes over time (from before to after the reform) would have remained the same for tenders below and above the specific tender value thresholds affected by the 2017 reform.

We find evidence that procurement managers' quality improves the speediness of tender awarding procedures: tenders above the thresholds imposing stricter selection criteria were awarded faster after the 2017 reform. The effect is mostly coming from the €150,000 cut-off around which the institutional changes which, we argue, were binding. Interestingly, we do not detect any effects on the duration of the execution phase. In fact, this is consistent with the consideration that the procurement officers' powers in affecting this phase are more modest, as the private contractor primarily manages the timely delivery of the procured works. To shed light on the underlying mechanisms, we analyze how the reform impacted the allocation of RUPs within procurement agencies. We find that the agencies reacted both by appointing relatively less experienced, yet eligible, public officers and by concentrating the workload of the existing procurement managers in public works rather than in the procurement of supplies and services.

¹ The EU threshold is currently 5.382 million euros. Previously, it was slightly modified several times, but always remained close to this value.

2. Institutional Background

In Italy, the RUP² is responsible for managing the process of acquiring goods and services for public institutions, such as government agencies, local authorities and schools. The RUP must ensure that the procurement process is conducted fairly and efficiently and in compliance with laws and regulations. RUPs are typically involved in every stage of the procurement process, from identifying the need for goods or services to inviting potential suppliers and negotiating the contract details with them; their duties include designing the tenders as well as managing the awarding procedures. For example, they are involved in evaluating the bid documentation of tender participants which then is used to establish the final ranking that determines the winning bid. Procurement officials in Italy are also responsible for monitoring the contracts' execution and ensuring that suppliers are fulfilling their obligations. Overall, procurement officials play a critical role in ensuring that public funds are used effectively and that public institutions receive the goods and services they need to operate effectively.

The RUP is appointed by the head of his/her organization ; until 2016 the RUP was comparable to a bureaucrat and no technical knowledge or skills were required for this role. The new Public Contracts Code in 2016 (Legislative Decree no. 50/2016) extensively defined the RUP's tasks and duties. It also entrusted ANAC to draft specific guidelines and provide the minimum qualifications needed to serve the role according to the complexity of the contract. The ANAC guidelines, in force since December 2017, established requirements for becoming a RUP linking the tender euro-amount with specific qualifications (years of experience and the level of education). Higher qualifications were required for larger tenders,³ depending on three main value thresholds: 150 thousand euros, 1 million euros and the EU threshold (Table 1).The new Procurement Code approved in December 2022 and in force since April 2023, also recognizes and stresses the centrality of the role of the RUP who has to be considered in charge of the whole project, in all its phases: programming, planning, assignment, and execution. Furthermore, the new Code also reinforces the importance of ongoing training of the RUP as a project manager in order for her to develop technical and organizational competences. Indeed, the RUP should represent a guarantee for the achievement of the objectives of the public works in compliance with the scheduled times and costs, quality and workers' safety.

Table 1: RUP requirements

Contract Amount	Degree	Work Experience
Less than €150,000	Technical high-school degree (e.g., surveyor, industrial expert).	Three years in the awarding of public works.
Between €150,000 and €1,000,000	Technical high-school degree (e.g., surveyor, industrial expert).	Ten years in the awarding of public works.
	Technical Bachelor's degree (e.g., architecture, engineering).	Three years in the planning, awarding, or execution of public works.
	Technical Master's degree, plus a professional qualification (e.g., certified architect or engineer).	Two years in the planning, awarding, or execution of public works.

² The figure of RUP for the awarding and execution of public contracts was introduced by the Law no. 109/1994 (the so-called "Merloni Law").

³ The guidelines specify that, in the absence of employees with the required characteristics, the head of the contracting office acts as RUP.

Between €1,000,000 and the EU threshold	Technical high-school degree (e.g., surveyor, industrial expert).	Fifteen years in the planning, awarding, or execution of public works.
	Technical Bachelor's degree (e.g., architecture, engineering).	Five years in the awarding of public works.
	Technical Master's degree, plus a professional qualification (e.g., certified architect or engineer).	Three years in the planning, awarding, or execution of public works.
Above the EU threshold	Technical Master's degree, plus a professional qualification (e.g., licensed architect or engineer).	Five years in the planning, awarding, or execution of public works.

3. Data and descriptive evidence

Data sources and variables. The analysis uses a novel fine-grained dataset on the procurement of public works in Italy that includes information on published tenders, their associated contracts,⁴ and information on the award process— e.g., the duration of different procurement phases, the chosen awarding criteria and, crucially, the RUP's identifier and characteristics. To build this dataset, we rely on several data sources. In particular, directly from ANAC we obtain the identifier, the gender, the age, and the birthplace of the RUPs for the universe of public works tenders since 2014.⁵ We match them with ANAC's *Open Data*, an administrative database that collects information on the universe of public tenders and relative contracts published in Italy.⁶ Furthermore, from a private provider of data on Italian public procurement, Telemat, we acquired information on the qualifications (i.e., if they possess a technical qualification, a high-school or a university degree and, in this case, its type) of RUPs who managed municipal-level public works.

The information contained in the ANAC *Open Data* extends to the universe of tenders valued at more than €40,000.⁷ In particular, it reports: i) all tender characteristics – the relevant dates (publication, expiration), base price, the object, the contracting authority, and the source of funding; ii) information on the awarding phase – the winning price, the relative rebate, the type of awarding procedure, the number of bidders; and (iii) some variables related to the execution phase.

In public procurement, managers can play a crucial role in affecting the duration of the awarding procedures and, through their contract design and supervision efforts, the quality of the final execution. We define two duration variables to measure the length of the awarding and execution phases. The former accounts for the length – in days – of the time span between publication and contract signing. In a similar fashion, the measure of *execution duration* is based on the time elapsing between the contract signing date and the completion date.

⁴ The tender is the administrative act through which the (public) buyer signals the intention to purchase goods, services, or works from a contractor. It is typically used to award (and corresponds to) one contract. Only in a few cases, the tender corresponds to multiple contracts.

⁵ Given the sensitive nature of the data, we obtained it from ANAC via an *ab hoc* agreement with our Institution

⁶ Each administration has to request a tender ID (*Codice Identificativo Gara*, CIG) specifying all relevant information before publishing the tender. From that moment on, ANAC keeps track of all developments related to the tender.

⁷ Specifically, €40,000 is the price threshold above which tenders must be recorded within the ANAC dataset.

In addition, we construct variables to measure the experience and the degree of specialized skills acquired by the individual RUP. First, the variable *RUP experience* is defined, for each tender-RUP pair, as the cumulative number of public works contracts managed by the same RUP before that tender: it proxies the task management experience developed by the RUP until that moment. Second, the variable *RUP_workload* is, for each tender-RUP pair, the number of public works tenders managed by the RUP in the two months prior to that tender.⁸ This variable is rather different compared to the *RUP experience*, as it measures the degree of task congestion that the manager might be facing. Given that RUPs can – in principle – manage tenders of any type (public works, but also the procurement of supplies and services), we also build two relative measures of RUP specific expertise in public works tenders by taking the ratio of the above variables to the overall number of tenders managed.⁹

Descriptive statistics. In Table 2 we report descriptive statistics of the variables we use in the empirical analysis. Our reference sample consists of the tenders for public works with base price above €40,000 and below the European threshold (currently at €5,382,000), published¹⁰ between 2014 and 2019.

Table 2: Descriptive statistics – variables

	Mean	Median	Min	Max	sd	N
Tender characteristics						
Awarding probability	0.74	1	0	1	0.46	230,385
Tender base price	402,307	160,000	40,000	5,547,753	689,103.2	230,385
Durations (in days)						
Awarding	117	85	-	2,495	135.2	171,701
Execution	246	188	-	2,337	224.2	93,787
RUP characteristics - professional						
Workload (# tenders last two months)	3.7	1	1	213	9.6	229,392
Workload – specialization	0.87	1	0.1	1	0.23	230,385
Experience (# tenders before the i th)	35.8	9	0	1,561	103.3	229,392
Experience – specialization	0.73	0.86	0	1	0.32	215,139
RUP characteristics - personal						
Rup Female	0.17					39,165
Rup age	52.4	53.00	20	75	7.8	230,093
Rup age < 35	0.02					4,602

⁸ The two-month period is chosen because it is shorter than the average awarding duration and, therefore, implies that the tenders opened in that time window are, on average, still ongoing at the time when the given tender is being opened.

⁹ Specifically, the variables are $RUP_experience_specialization_{it} = RUP_experience_{it} / all_RUP_tenders_{it}$ and $RUP_workload_specialization_{it} = RUP_workload_{it} / last_two_months_all_tenders_{it}$, where $all_RUP_tenders_{it}$ and $last_two_months_all_tenders_{it}$ are the number of tenders of any type (supplies, services and public works) managed by RUP i until time t or in the two months before t , respectively. Consider two RUPs, A and B. They both have an experience of 10 public works tenders and a workload of 3 active tenders, but A also managed 20 service tenders – with 5 still active. Including the specialization measures would allow us to capture the fact that i) B is extremely specialized and only manages public works tenders/contracts; ii) most of A’s time is not devoted to the public works tenders, as long as they are a minority share of her active commitments.

¹⁰ In a few cases, it is possible to award a contract without prior tender publication (this is the case for some negotiated procedures). Nonetheless, public administrations must publish notices and documents on the awarding process. For those contracts, the “*tender publication date*” coincides with the date in which the notices are published.

Rup age > 60	0.17	39,116
Technical university degree	0.69	95,855
Technical high-school	0.23	95,855

Notes: Elaboration on openANAC and Telemat data.

The first row reports the awarding probability which, in our sample, amounts to an average of 74 per cent across all tenders. The second line refers to the tender base price¹¹ for the full sample of tenders. The average tender in our data amounts to procurement of public works for about 400 thousand euros. The distribution of prices is rather right-skewed, with the median value being much smaller than the average value, which is driven by fewer, highly-valued tenders around the EU threshold. More than 70% of tenders reported in Table 2 are eventually awarded; while only about a half of the awarded contracts are then followed by a complete execution phase.

For those tenders that report awarding and execution data, we compute *Awarding* and *Execution* durations. The baseline durations of the two phases are both right-skewed but rather different, with the awarding procedure of – on average - almost four months, and the average execution taking more than 8 months to complete.

The professional RUP characteristics include both the workload and the experience measures. Both are right-skewed, with the RUP managing on average almost four contracts at a time and having previously worked with more than 35 contracts. The median manager, though, is “lighter”, a workload of just one contract, and 9 contracts overall. Indeed, the average figures are inflated by a few experienced RUPs (e.g., Special Commissioners have up to thousands contracts). We find a similar picture when we look at the degree of specialization in public works.

The gender composition is extremely unbalanced, with only 17% of contracts managed by a female RUP¹²; in addition, the average (and median) RUP is around 53 years-old, with only 2% of RUPs being 35 or younger. Finally, 69% of tenders are managed by a RUP with a university technical degree (i.e. in architecture or engineering), and 23% by one with a high-school technical diploma (e.g., construction expert (*perito industriale edile*), geometer (*geometra*), etc.).¹³

4. The role of managers in the procurement process

We first investigate the relationship between public managers’ individual characteristics and the outcomes of the procurement process, in terms of the duration of the awarding and execution phases. In order to do that, we fit models of the following form:

¹¹ It is the amount that the contracting authority publishes in the tender, and on which potential suppliers are expected to exert a discount. In this sense, it is the maximum price that the authority is willing to spend for procuring the tender’s object. The reported values are the one published with the tender, and are therefore nominal – i.e., they do not account neither the sectoral nor the overall inflation.

¹² This is in line with previous contributions with Italian data – see e.g. Decarolis et al. (2021).

¹³ The data allow us to distinguish technical degrees (architecture and engineering) from other degrees – e.g., lawyer or more general “dottori” (doctors), which is the general title attributed to graduates. The baseline specification in Section 4 uses this more detailed information to construct the control variable relative RUPs’ education in Section 4. We note that our results are robust to controlling for the broader variable that is defined using these additional degree categories.

$$Y_{ijrt} = \alpha + \beta P_{ijrt} + \theta C_{ijrt} + \eta A_j + \tau_t + \gamma R_{rt} + \varepsilon_{ijrt}$$

for tender i , managed by administration j and RUP r and published in month t . Here Y_{ijrt} is the outcome of interest; P_{ijrt} is the base price of the tender; C_{ijrt} is a vector of characteristics of the contract (whether it was EU-funded, the category of public works and the type of awarding procedure); A_j is a vector of constant characteristics of the administration – including the type (central or local) and the geographical area - τ_t are monthly fixed effects; R_{rt} is a vector of characteristics of the RUP – both personal (the gender, the birthplace, the age) and professional (whether she holds a degree, its type, the experience, the workload and the specialization rates); and ε_{ijrt} is the usual error term.

We estimate several models consistent with this general form. In the baseline model (model 1), A_{jt} contains administration-specific variables and we do not control for any characteristic of the RUP.¹⁴ We then augment the model by letting A_j be administration fixed effects (model 2), adding RUP personal characteristics such as age, gender, birthplace (model 3) and skill-related characteristics (having a degree, experience and workload in model 4)¹⁵. Finally, in order to capture the full manager-driven variation in outcomes, we let R_{rt} be RUP fixed effects (model 5).

In Table 3 we report the results related to both the duration of the awarding phase (columns 1 to 5) and the duration of the execution phase (6 to 10) for all models. The base price is a proxy for contract complexity: we find, in fact, that bigger contracts are associated with longer awarding procedures and execution (the former parameter tends to shrink when we add further controls, suggesting that some of this effect comes through other observable characteristics). We find that administration-level observable characteristics in terms of type (central, regional, local) and geographical location only partially capture the variation in their performance, which must be related to variables that are either unobservable (e.g., relational capital) or unaccounted for (e.g., average skill level of the employees). In fact, when we substitute administration level controls with administration fixed effects (columns 1 and 2), the explanatory power of the model improves; (the adjusted R^2 is .23 and .37, respectively).

When we add RUP-level personal characteristics to the model we find, unlike Decarolis et al. (2021), only a weak correlation between gender of the RUP and the length of the awarding phase, and none with the duration of execution. We also find a significant positive association between execution time and the presence of RUPs born “locally” (RUP - birthplace). This may suggest that procurement managers may be laxer in supervising and enforcing the contract when they operate within their own place-based network. Furthermore, we find that it takes experienced RUPs less time to complete the awarding and the execution phase. On the contrary, the amount of workload the procurement manager faces negatively relates to the

¹⁴ More specifically, C_{ijrt} contains the number of accepted bids, the awarding procedure type, the object as classified within the Common Procurement Vocabulary (CPV), the public works category, whether the tender is funded through EU cohesion funds while A_j contains the geographic area of the contracting authority and its type.

¹⁵ $RUP - birthplace$ is an indicator variable equal to one when the RUP birthplace corresponds to her workplace at the municipality level (e.g., a manager born in Rome working for the local municipal administration). In order to foster clarity and interpretability of the results, in the regressions we use indicators for RUPS showing above-average *age*, *experience* and *workload*.

pace of the procurement process (model 4). The explanatory power of the two models, though, is unaltered by the inclusion of such variables.

Finally, we investigate whether other RUP individual-level characteristics effectively explain a further share of the variation in outcomes, by replacing the previous characteristics with RUP fixed effects (column 5). While the estimated parameters turn out to be quite stable under this substitution, we find that the unobserved characteristics of the RUPs are even more important factors in explaining variations in the duration of both the award and the execution phases. Indeed, taking them into account increases the explained variation (in terms of adjusted R^2 , we move from .37 to .4 and from .29 to .32 for awards and executions, respectively). Naturally, the choice of RUPs may not be independent from the tender characteristics, in particular, the unobservable underlying complexity of the public works. In fact, sensible administrators would assign the most complex tenders to the best RUPs (i.e., most skilled, in any observable or unobservable sense), driving down their performance. This would not allow us to draw causal conclusions from our exercise, despite the possibility to control for RUP fixed effects.

Table 3: Regression results –awarding and execution duration

	Log(Awarding Duration)					Log(Execution Duration)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
log Amount	0.176*** (0.008)	0.175*** (0.008)	0.175*** (0.008)	0.176*** (0.008)	0.173*** (0.008)	0.408*** (0.011)	0.412*** (0.011)	0.412*** (0.011)	0.413*** (0.011)	0.423*** (0.011)
RUP - gender			-0.029** (0.014)	-0.029** (0.014)				-0.005 (0.020)	-0.003 (0.020)	
RUP - birthplace			0.017 (0.012)	0.017 (0.012)				0.063*** (0.018)	0.061*** (0.018)	
RUP – age (indicator)			-0.043*** (0.010)	-0.043*** (0.010)				0.022 (0.015)	0.018 (0.016)	
RUP – technical degree			-0.033** (0.013)	-0.035*** (0.013)				0.046** (0.019)	0.040** (0.019)	
RUP – experience (indicator)				-0.035** (0.015)					-0.041* (0.022)	
RUP – workload (indicator)				0.085*** (0.009)					0.059*** (0.013)	
N	60,673	60,673	60,673	60,673	60,673	38,254	38,254	38,254	38,254	38,254
Adj R ²	0.223	0.367	0.368	0.369	0.405	0.195	0.293	0.293	0.294	0.325
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tender Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Administration Controls	Yes					Yes				
Administration FE		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
RUP - personal			Yes	Yes	Yes			Yes	Yes	Yes
RUP - professional				Yes					Yes	
Rup FE					Yes					Yes

Notes: regression of awarding duration (columns 1 to 5) and execution duration (columns 6 to 10) on various models. Tender Controls include the number of accepted bids, the awarding procedure type, the object as classified within the Common Procurement Vocabulary (CPV), whether the tender is funded through EU cohesion funds and the public works category. Administration Controls include the geographic area of the contracting authority and the public administration type.

RUP and administration fixed effects. The majority of administrations (53 percent) only have a single RUP managing all the contracts in our sample. This is a renowned feature of the fragmented Italian public procurement market, with numerous municipal administrations handling a small number of contracts and fewer larger ones managing more contracts. From an econometric perspective, the joint estimation of RUP and administration fixed effects in specifications (5) and (10) of table 3 may be biased, if the two are collinear. For a meaningful interpretation of the analysis on the distribution of RUP fixed effects across administrations, we restrict our attention to a sample of administrations that have at least two distinct RUPs in our data. By doing this, we mechanically solve the collinearity issue, as long as the RUP fixed effects cannot be, by construction, nested within the administrations.

In Table 4 we report the results of the estimation with administration fixed effects and RUP-level controls (columns 1 and 3) and with administration and RUP fixed effects (columns 2 and 4), for both the awarding and the execution durations. All specifications also feature month fixed effects and all tender-level controls. The results are in line with those presented in table 3, despite a smaller sample size. The adjusted R² also shows a similar pattern: it does increase substantially controlling for the RUP fixed effects that cover all time invariant unobservable characteristics. Both specifications are rather saturated, featuring between 2,000 and 6,000 fixed effects.

Table 4: Regression results –awarding and execution duration for multi-RUP administrations

	Log(Awarding Duration)		Log(Execution Duration)	
	(1)	(2)	(3)	(4)
log Amount	0.165*** (0.008)	0.160*** (0.009)	0.400*** (0.012)	0.411*** (0.013)
RUP - gender	-0.029** (0.014)		-0.003 (0.020)	
RUP - birthplace	0.017 (0.012)		0.060*** (0.018)	
RUP – age (indicator)	-0.046*** (0.011)		0.013 (0.016)	
RUP – technical degree	-0.034*** (0.013)		0.047** (0.019)	
RUP – experience (indicator)	-0.047*** (0.017)		-0.045* (0.025)	
RUP – workload (indicator)	0.088*** (0.010)		0.061*** (0.014)	
N	48,206	48,206	30,255	30,255
Adj R ²	0.362	0.407	0.299	0.337
Month FE	Yes	Yes	Yes	Yes
Tender Controls	Yes	Yes	Yes	Yes
Administration FE	Yes	Yes	Yes	Yes
Rup FE		Yes		Yes

Notes: regression of awarding duration (columns 1-2) and execution duration (columns 3-4) on models with administration and RUP fixed effects. Tender Controls include the number of accepted bids, the awarding procedure type, the object as classified within the Common Procurement Vocabulary (CPV), whether the tender is funded through EU cohesion funds and the public works category. The sample includes procurement agencies that have at least two distinct RUPs in the period of analysis.

5. Empirical strategy

Descriptive evidence presented in Section 4 shows that the managers' characteristics are related to the procurement outcomes. Yet, given the potentially endogenous assignment of managers to tenders the estimated parameters do not reflect any causal link between the RUP's characteristics and the RUP's performance and thus cannot be interpreted as drivers of procurement success.

In order to circumvent the endogeneity issues, we rely on the legislative changes described in Section 2 to investigate the role of the RUP's specialization and experience on procurement performance. More specifically, we exploit the fact that the reform raised qualification requirement for the appointment of RUPs only for contracts above specific thresholds ("treated" contracts). In other words, only "higher quality" RUPs were allowed to manage tenders above these thresholds after the reform, while any public officer can be freely assigned to those below the threshold ("control" contracts). Prior to the reform, the choice of RUP was unconstrained for all contracts both above and below the threshold. We use these legislative changes over time and across contracts to estimate a simple difference-in-differences (DiD) model of the following form:

$$Y_{ijrt} = \alpha + \beta \text{above}_{it} + \gamma \text{aboveXpost}_{irt} + \theta C_{ijrt} + \eta A_j + \tau_t + \varepsilon_{ijrt} \quad (2)$$

where, as before, i stands for the tender, j for the administration, r is the RUP and t the month. The aboveXpost_{irt} variable is an indicator function for all contracts above the specific thresholds (above_{it}) published after the reform. We consider the €150,000 and €1 million thresholds separately, and symmetrically restrict the sample of contracts around the threshold value to the ones with base price from €50,000 to €250,000 and from €700,000 to €1,300,000, respectively. In the main specifications, we include a number of tender, administration and RUP characteristics within C_{ijrt} and A_j , and R_{rt} .

Identification assumptions. The parameter of interest γ captures an *intention-to-treat* effect (ITT) of the increase in the quality requirements for the RUP's appointment on procurement outcomes. It rests on the identifying assumption that the control group units constitute a valid counterfactual for the time changes of potential untreated outcome of treatment group units, i.e., that in absence of the reform the outcome variable in the two groups would have developed over time in a parallel manner. This assumption can only be tested indirectly using the pre-treatment data and verifying the assumption's validity before the treatment happens. As the time window in our data is rather narrow, we do not have sufficient periods to present an elaborate analysis to corroborate this assumption. We, instead, present a set of alternative identification checks.¹⁶

First, the main source of identification comes from contracting authorities where the new regulation turned out to be binding, i.e., those where contracts above the thresholds were previously managed by non-qualified RUPs. These administrations were forced to appoint different, qualified employees to run these larger tenders afterwards. The parameter γ captures the effect of increases in the quality of the RUPs as long as the behavior and the procurement outcomes of the authorities already employing qualified personnel (i.e., those where the reform was not binding) were not affected by the reform. Furthermore, the causal interpretation of the results rests on the Stable Unit Treatment Value Assumption (SUTVA) whereby the reform does not affect the potential outcomes for the "control" contracts. This would be consistent with procurement agencies maintaining the conditions of tendering under the relevant cut-

¹⁶ Using the very short sample pre-treatment period we can utilize (from June to December 2017), we find evidence that supports the parallel trends' assumption. The results are available upon request.

offs, and implementing personnel reallocation or hiring policies only for the bulk of contracts affected by new qualification requirements.

Moreover, in estimating equation (2), the ITT effect of “managing tenders through qualified RUPs” rests on the implicit assumption that there exists a positive relationship between professional qualifications - be it in terms of degrees, technical diplomas or experience - and quality in managing contracts.

While we observe the age, the birthplace, the experience and workload of RUPs, and the educational attainments of a subset of them, we are unable to assess their tenure¹⁷. Therefore, we cannot directly observe and study the degree of compliance by administrations with respect to the requirements set by the reform and, instead, have to assume full compliance with the regulation. One concern is that, at specific regulatory thresholds, contracting authorities might have already been compliant *before* the reform (e.g., by assigning senior managers to the highest-valued contracts), in which case the regulatory change would not have been binding. We test the plausibility of this assumption by leveraging the granularity of our data. We are able to identify the first time that a RUP managed a tender since 2014 – hence, we can generate a measure of “truncated” procurement-specific tenure in our sample that, together with the information on the titles and age, allows us to build a proxy for eligible individuals at each regulatory threshold. More specifically, for each of the thresholds reported in Table 1, we generate a compliance variable that combines the information on the titles, the “truncated” tenure and the age. Regarding the latter, we assume that public employees are hired when they turn 30. Therefore, when the tenure requirement is longer than the longest observable in our data we base the compliance assumption on age - e.g., a RUP with a technical diploma dealing with a €150,000-1,000,000 contract in 2017 must have 10 years of experience: we consider all 40+ individuals with a technical diploma as compliant.

We use the “truncated” compliance measure to test whether, and to what extent, the reform may bind the selection of RUPs at different thresholds. In order to do that, we plot the quarter averages of the “truncated” compliance share below and above the €150,000 and €1,000,000 thresholds for all contracts for which we could retrieve the RUP’s educational level.¹⁸ The results indicate that, for the €150,000 threshold (figure 1, panel (a)), the share of compliance for contracts above the threshold was already high before the reform (maroon line). Most important, there is a visible increase in the period between the introduction of the new code, and its enactment, consistent with the impact of the reform. The compliance below the threshold (navy line) instead remains flat over time. Around the €1,000,000 threshold, in contrast, there is no detectable dynamics regarding compliance (figure 1, panel (b)). Therefore, we expect the estimated ITT to be noisier in the latter case.

¹⁷ The qualification requirements imposed by the reform include educational attainments and tenure (see Section 2). We are currently unable to measure the latter, though, as we cannot access data on the work history of these employees.

¹⁸ This reduces the sample to the contracts for which we could find a valid match between ANAC and *Telemat* datasets – hence, we restricted the attention to the public works awarded by the municipal administrations only – and to the subset of RUPs for which *Telemat* reported a valid title. This further restriction allows us to reduce the measurement error due to misreporting (i.e., an architect or engineer reported without the appropriate title).

Figure 1: Average synthetic compliance rate, below and above the thresholds



Estimation samples. In order to keep a balanced sample and to avoid multiple treatments, we generate two subsamples of contracts from the main dataset based on the contract amount and the time window around the regulation changes. Specifically, we keep all public works tenders between €50,000 and €250,000 published between June, 2017 and December, 2018 (*DiD Sample 1*) to study the effects around the €150,000 threshold and all tenders between €700,000 and €1,300,000 published between June, 2017 and December, 2019 (*DiD Sample 2*) to study the effects of the €1,000,000 threshold.¹⁹ In Table 3 we report the main characteristics of the two samples, compared to the full sample. The distribution in terms of *price class* are rather similar between the DiD samples and the main one – for the first subsample, 67% of tenders lie below the threshold compared to 70% of the main one for the same price classes, while regarding the second DiD sample 85% of contracts below €1,000,000 correspond to 83% of the main sample.

The unequal distribution in terms of price class across samples is reflected by the differences in i) the sample size, ii) the aggregate shares of awarding procedure types, and iii) the administration types. The number of published tenders strictly depends on their value, with their frequency decaying fast as the value increases (e.g., in the full sample the first two classes encompass around 160k contracts, while the €150,000-300,000 class amounts to 34k only). Hence, the sizes of the two DiD samples differ - the second amounting to around one fourth of the first. In addition, low- and medium-sized tenders are relatively more likely to be awarded through negotiated or direct procedures, and the opposite holds for medium-to-large sized ones. Accordingly, the share of negotiated and direct procedures amounts to 87% of total tenders in Sample DiD 1, while the same figure is 67% for the Sample DiD 2. The same applies to the share of central/local administrations: the former tend to publish larger tenders, on average, and this generates the differences in the shares of central administrations, much larger in the Sample DiD 2.

¹⁹ The time span of the sample is cut in December, 2018 and December, 2019 for the 150 thousand and 1 million euros cut-offs, respectively, due to the entry into force of other normative changes for such contracts after these dates.

Table 5: Descriptive Statistics - samples

	Full sample		DiD Sample 1		DiD Sample 2	
	Share	N	Share	N	Share	N
Base price class (thousands €)						
<150	0.48	110,936	0.73	24,032		
150 - 250	0.21	47,366	0.27	8,982		
250 - 700	0.15	33,934				
700 - 1,000	0.08	19,489			0.81	5,745
1,000 - 1,300	0.02	3,743			0.19	1,405
1,300 - EU Thr	0.06	14,616				
Awarding Procedure						
Competitive	0.22	47,551	0.12	3,900	0.34	2,248
Negotiated/Direct	0.78	173,488	0.88	28,294	0.66	4,358
Administration Type						
Central government	0.18	39,759	0.15	4,773	0.35	2,414
Local government	0.59	131,649	0.63	20,218	0.35	2,427
Local public entities	0.08	17,001	0.07	2,364	0.07	528
Other	0.16	34,941	0.14	4,622	0.21	1,423
Area						
North-West	0.26	54,492	0.27	8,534	0.23	1,368
North-East	0.24	52,266	0.26	8,069	0.24	1,441
Center	0.20	42,791	0.21	6,639	0.22	1,301
South	0.30	63,316	0.24	7,647	0.30	1,790

Notes: descriptive statistics relative to the composition of the full sample (columns 1-2), Sample DiD 1 (columns 3-4) and Sample DiD 2 (columns 5-6). For each sample are reported the average values (shares) and numerosity of base price class, awarding procedures, administration type and geographical area.

6. Results and Discussion

In Table 6, we report the DiD results for the (log) awarding duration (columns 1 to 3) and for the execution duration (columns 4 to 6), from models with an increasing number of controls around the €150,000 (panel a) and the €1,000,000 thresholds (panel b). Panel (a) indicates that larger contracts take longer to award and to execute, possibly because of their higher complexity: we estimate significant differences of around 25% and 44% in terms of award and execution duration, respectively, between contracts below and above the 150K threshold. Most important, there is evidence that RUPs' professionalization significantly reduces the awarding time by around 8 days on an average of 106 days in the estimation sample, which corresponds roughly to a 7 percent decrease. The effect on the execution time is negative, but smaller in absolute size and not statistically significant in the more stringent specifications. These results are in line with the fact that RUPs can exert greater influence on the administrative phases before the contract signing than during the execution phase that follows. In panel (b) the coefficients of interested *Treated* are all negative, yet none of them

appears to be statistically significant. As argued in the previous section, this is likely due to the fact that the treated group was already compliant with the regulation.²⁰

Table 6: DiD regressions – awarding and execution duration

	Log(Awarding Duration)			Log(Execution Duration)		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel (a): €150,000 threshold						
AboveXpost	-0.057 (0.036)	-0.065* (0.035)	-0.073** (0.035)	-0.046 (0.045)	-0.042 (0.041)	-0.039 (0.041)
Above 150K	0.250*** (0.035)	0.105*** (0.037)	0.102*** (0.037)	0.443*** (0.037)	-0.016 (0.045)	-0.014 (0.045)
N	21,362	21,362	21,362	14,118	14,118	14,118
R ²	0.037	0.115	0.124	0.052	0.104	0.108
Panel (b): €1,000,000 threshold						
AboveXpost	-0.046 (0.091)	-0.060 (0.104)	-0.039 (0.101)	-0.160 (0.130)	-0.115 (0.136)	-0.130 (0.138)
Above 1M	0.152* (0.082)	0.030 (0.120)	0.052 (0.117)	0.146 (0.113)	0.054 (0.110)	0.069 (0.113)
N	4,059	4,059	4,059	1,654	1,654	1,654
R ²	0.018	0.185	0.205	0.005	0.143	0.144
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Tender controls		Yes	Yes		Yes	Yes
Administration controls		Yes	Yes		Yes	Yes
Area FE			Yes			Yes

Notes: regression of awarding duration (columns 1 to 3) and execution duration (columns 4 to 6) on various models. The estimation is run on public works tenders only. Tender Controls include the number of accepted bids, the awarding procedure type, the object as classified within the Common Procurement Vocabulary (CPV), whether the tender is funded through EU cohesion funds and the public works category. Administration Controls include the geographic area of the contracting authority and the public administration type. The standard errors are clustered at the administration level and the dependent variable is expressed in days.

RUPs selection. Due to the lack of data and the fact that compliance was conditioned on the combination of two characteristics, we cannot investigate the RUP's selection criteria that were directly targeted by the reform (see also the evidence on the indirect compliance in Section 5) to assess the compliance with the reform. We, nevertheless, investigate whether there is some evidence that the observed RUP's characteristics (*gender, age, Workload, Specialization* and *Experience*) change in the DiD exercise in isolation. Table A.1 in the Appendix shows that there is no significant impact of the reform on any of the relevant observable measures. This, in fact, is line with the fact that those measures do not capture the source of the estimated effect as the selection of RUPs apparently is based on the (unobserved to the researcher) combination of dimensions.

²⁰ In a similar way, the law may not be binding for very small municipalities – namely those with less than 3,000 residents, as they are more likely to be exempt from the reform requirements due to the lack of qualified personnel. In our preferred specification, we already account for the potential differences across administrations through fixed effects. However, we further test the robustness of our results to the exclusion of such localities in a series of unreported exercises (available from the authors upon request), finding no changes with respect to the baseline results.

Table 7: DiD regressions – RUP characteristics

	log(Workload)	log(Experience)	Workload-spec	
	(1)	(2)	(3)	(4)
Panel (a): €150,000 threshold				
AboveXpost	-0.010 (0.023)	-0.057* (0.031)	0.021*** (0.007)	0.022*** (0.008)
Above 150K	0.007 (0.027)	0.022 (0.030)	-0.026*** (0.007)	-0.017** (0.007)
N	28,068	26,467	28,161	25,567
Adj R ²	0.549	0.680	0.440	0.570
Panel (b): €1,000,000 threshold				
AboveXpost	0.004 (0.087)	-0.021 (0.142)	0.027 (0.021)	0.043* (0.026)
Above 1M	-0.012 (0.094)	-0.029 (0.125)	-0.013 (0.020)	-0.013 (0.021)
N	4,761	4,502	4,821	5,303
Adj R ²	0.481	0.581	0.542	0.689
Month FE	Yes	Yes	Yes	Yes
Type of procedure	Yes	Yes	Yes	Yes
Tender controls	Yes	Yes	Yes	Yes
Geographic FE	Yes	Yes	Yes	Yes
Administration FE	Yes	Yes	Yes	
RUP FE				Yes

Notes: regression of several RUP characteristics variables on various models. The estimation is run on public works tenders only. Tender Controls include the number of accepted bids, the awarding procedure type, the object as classified within the Common Procurement Vocabulary (CPV), whether the tender is funded through EU cohesion funds and the public works category. Administration Controls include the geographic area of the contracting authority and the public administration type. The standard errors are clustered at the administration level.

Furthermore, we attempt to shed some light on how public administrations allocate RUPs in reaction to the reform in Table 7. We re-run the regressions on the RUPs' workload, experience and specialization dependent variables in a specification that substitutes public administration control variables with administration fixed effects. In this way, we are able to “net out” all time constant public administration unobservable characteristics and with these “within-organization” estimates measure how public organization react to the reform in their internal allocation of resources (e.g., more expert RUPs receive more contracts above the threshold, etc.).

The results reported in Table 7, column 1, illustrate that while, on average, the workload of an average RUP is not significantly affected (this may also be interpreted as evidence in favor of SUTVA), treated tenders are more often run by RUPs' with less experience in tendering (column 2). This pattern is consistent with assigning public employees without prior experience in procurement, but with the required qualifications along other dimensions, to manage these public tenders. At the same time, column 3 shows that an average RUP within a public organization seems to be managing more tenders of public works (i.e., becomes more specialized in public works rather than other categories). This may suggest that RUPs working on “treated” tender contracts are discharged from the tasks in tendering public goods and services, possibly with the goal to avoid excessive workload. Such work re-organization apparently helps to maintain manageable workloads and translates into swifter tendering, as shown in Table 6.

Finally, in column 4 we include RUPs fixed effects in order to investigate how RUPs allocate their time. These “within-RUP” estimates show that after the reform, a given procurement manager spends more time tendering contracts in public works (as opposed to services and goods) above the threshold. All in all, there is evidence that procuring agencies react to the reform by assigning relatively less experienced procurement managers - supposedly, with the necessary qualifications - to the affected tenders, and also shifting the existing (supposedly, qualified) workforce towards a higher specialization on contracts of (larger) public works.

7. Conclusions

This paper studies whether the characteristics of procurement managers influence the effective execution and implementation of tenders for public works in Italy. To this end, we use novel fine-grained data on the universe of procurement tenders and on the public officials responsible for awarding and supervising these tenders. Our descriptive evidence illustrates the importance of procurement managers’ experience and the effect of excessive workload. For identification, we exploit the 2017 Italian reform that raised the qualification requirements for officials eligible to manage public works tenders. The results suggest that the qualifications of procurement managers are important for the swift awarding of tender contracts, while they are somewhat less important for the speed of the contract execution.

Our results illustrate that the professionalization and continuous training of procurement managers may increase the effectiveness of the tender process, at least in terms of duration. These elements are, in fact, incorporated in the new Italian Public Procurement Code (D.Lgs. 36/2023), which entered into force in July 2023. In addition, our findings shed light on the importance of the allocation of sufficient resources to manage the present workload levels.

References

- Baltrunaite, A., Giorgiantonio, C., Mocetti, S., and Orlando, T. (2021). *Discretion and supplier selection in public procurement*. The Journal of Law, Economics, and Organization 37.1 (2021): 134-166.
- Baltrunaite A., T. Orlando and G. Rovigatti (2021) “The implementation of public works in Italy: institutional features and regional characteristics, Bank of Italy, Occasional Paper n. 659 (QEF 659/2021)
- Bandiera, Oriana, Michael Carlos Best, Adnan Qadir Khan, Andrea Prat (2021). *The Allocation of Authority in Organizations: A Field Experiment with Bureaucrats*, The Quarterly Journal of Economics, Volume 136, Issue 4, Pages 2195–2242
- Best, Michael Carlos, Jonas Hjort, and David Szakonyi (2017). *Individuals and organizations as sources of state effectiveness*. No. w23350. National Bureau of Economic Research.
- Bloom N. and J. Van Reenen (2007), *Measuring and Explaining Management Practices Across Firms and Countries*. The Quarterly Journal of Economics, 122, 4, pp 1351–1408.
- Bloom N., Lemos R., Sadun R., Scur D. and J. Van Reenen (2014) *The New Empirical Economics of Management*. Journal of the European Economic Association, 12, 835–76.
- Buccioli, A., R. Camboni, and P. Valbonesi (2020). *Purchasing medical devices: The role of buyer competence and discretion*. Journal of Health Economics, 74.
- Decarolis, Francesco, Raymond Fisman, Paolo Pinotti, and Silvia Vannutelli (2020). *Rules, discretion, and corruption in procurement: Evidence from Italian government contracting*. NBER WP N. w28209. National Bureau of Economic Research.
- Decarolis, Francesco, Fisman, Raymond, Pinotti, Paolo, Vannutelli, Silvia, & Wang, Yongxiang (2021). *Gender and bureaucratic corruption: evidence from two countries*, NBER WP N. w28397. National Bureau of Economic Research.
- Decarolis, Francesco, Giuffrida, Leonardo, Iossa, Elisabetta, Mollisi, Vincenzo, & Spagnolo Giancarlo (2020). *Bureaucratic Competence and Procurement Outcomes*, The Journal of Law, Economics, and Organization, Volume 36, Issue 3, Pages 537–597.
- Chiappinelli O. (2020), *Decentralization and public procurement performance: new evidence from Italy*. Economic inquiry, 58,2, pp.856-880.
- Giuffrida, L. M., and Rovigatti, G. (2022). *Supplier selection and contract enforcement: Evidence from performance bonding*. Journal of Economics & Management Strategy 31.4 (2022): 980-1019.
- Janke, Katharina, Carol Propper, and Raffaella Sadun. 2019. “The Impact of CEOs in the Public Sector: Evidence from the English NHS.” National Bureau of Economic Research Working Paper 25853
- Limodio N. (2021). *Bureaucrat Allocation in the Public Sector: Evidence from the World Bank* . The Economic Journal, 131, 639, pp 3012–3040.
- Spiller, P. T. (2009). *An institutional theory of public contracts: Regulatory implications*. In Regulation, deregulation, reregulation. Edward Elgar Publishing.
- Tirole, J. (1986). *Procurement and renegotiation*. Journal of Political Economy 94.2: 235-259.

Appendix

Table A.1: DiD regressions – RUP characteristics

	log(Workload)	Title	log(Experience)	Female	Young	Seasoned	Workload-spec	Experience-spec
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel (a): €150,000 threshold								
Treated	0.002 (0.029)	-0.012 (0.014)	0.007 (0.043)	-0.008 (0.013)	-0.004 (0.004)	0.003 (0.013)	0.013* (0.007)	-0.010 (0.009)
Above 150K	0.028 (0.048)	-0.026 (0.021)	0.029 (0.061)	0.024 (0.016)	0.005 (0.004)	-0.016 (0.015)	-0.020** (0.008)	0.028*** (0.010)
N	32,033	32,128	30,067	32,128	32,128	32,128	32,128	30,774
R ²	0.118	0.166	0.120	0.012	0.004	0.017	0.093	0.078
Panel (b): €1,000,000 threshold								
Treated	-0.005 (0.094)	0.066 (0.042)	-0.077 (0.140)	0.058* (0.034)	-0.001 (0.010)	0.022 (0.035)	0.007 (0.023)	0.014 (0.030)
Above 1M	-0.051 (0.104)	-0.045 (0.047)	-0.034 (0.126)	-0.012 (0.037)	0.004 (0.013)	0.001 (0.035)	-0.015 (0.024)	-0.033 (0.033)
N	7,275	7,336	6,878	7,336	7,336	7,336	7,336	7,015
R ²	0.217	0.221	0.194	0.020	0.028	0.024	0.149	0.169
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of procedure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tender controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Administration controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes