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THE IMPLEMENTATION OF PUBLIC WORKS IN ITALY: INSTITUTIONAL FEATURES AND REGIONAL CHARACTERISTICS

by Audinga Baltrunaite*, Tommaso Orlando* and Gabriele Rovigatti*

Abstract

Project duration is an important metric in the assessment of public works procurement and consists of the time taken to complete the three major sub-phases (design, awarding and execution). The overall duration may be influenced by various factors such as project characteristics, local market conditions, and the features of the contracting authority. Italy is characterized by stark territorial differences, potentially encompassing all the above dimensions. This paper uses granular data on Italian procurement to investigate public works' completion times in the last decade. We unveil performance differentials across macro-areas and analyse possible drivers. We find that i) Southern regions underperform with respect to those in the Centre-North, in particular in phases characterized by a greater intensity of administrative tasks; ii) durations are significantly correlated with the features of the contracting authority, such as workforce composition, workload and experience, and administrative efficiency; iii) these factors, however, explain the North-South divide only partially, suggesting the need to further analyse the internal functioning of contracting authorities.

JEL Classification: L11, M4.

Keywords: firm size distribution, financial constraints.

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Contents

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1. Introduction[1]

Public procurement of works, services, and supplies constitutes an important share of overall public spending, amounting to 12% of global GDP on average each year (Bosio and Djankov, 2020). It is equally relevant in developed economies: in OECD countries, expenditure in public procurement amounts to around 13% of GDP, or 30% of total public spending. In Italy, both figures are slightly smaller; nonetheless, procurement is a major public budget item, as it accounts for 10% of GDP and 22% of total expenditure (OECD, 2021).

Public works, in particular, account for a substantial share of overall public purchases (between one fourth and one third, across various estimates), and their weight is going to increase due to the additional resources budgeted through the *National Recovery and Resilience Plan* (NRRP)[2] and destined to the improvement of infrastructure. In this context, EU directives put a substantial emphasis on improving the quality of public purchases - i.e., obtaining good value for public money. This may prove a challenging task for Italy, where the functioning of the public procurement system often receives unsatisfactory assessments, despite recent reforms adopted to improve its efficiency.

Italy ranks among the poorest-performing EU countries according to a comprehensive assessment by the European Commission.[3] In particular, Italy stands out for the worse in the "decision speed" index, with an average 216-day period between the deadline for receiving offers and the awarding, compared to a EU average of 120 days. Similarly, according to the World Bank survey-based index on the procurement system,[4] the length of the administrative phases are among Italy's major weaknesses. For instance, the length of the awarding phase is estimated[5] at 340 days in Italy, against the OECD average of 255 and the EU average of 270. Furthermore, the indices used for cross-country comparisons mask a great deal of subnational heterogeneity. Within Italy, there exists a North-South divide in the deployment of infrastructural investment and in the functioning of procurement systems that is still under-studied (Bucci et al., 2021; PromoPA, 2020). Arguably, the behavior and action of public administrations plays a role in determining these differences. For example, survey-based evidence indicates that private firms view the unsatisfactory functioning of public administrations among the main obstacles to an efficient contracting with the government, and this factor displays a stronger incidence in the Southern regions of the country.[6]

Numerous policy interventions aimed at improving the functioning of the Italian public procurement system have been introduced in recent years (e.g., see Bank of Italy, 2021; Gori et al., 2020). The legislative action further intensified after the onset of the Covid-19 pandemic at the beginning of 2020: the Government introduced temporary rules allowing simpler, faster and more discretionary procedures in the awarding of public procurement contracts. Very recently, these measures were strengthened and their validity was

[1] The authors wish to thank Giuseppe Albanese, Fabrizio Balassone, Silvia Giacomelli, Adele Grompone, Sauro Mocetti, Giacomo Rodano, Giovanni Paolo Sellitto, and Luca Sessa for their precious advice.

[2] The NRRP allocates additional €62 billion to infrastructure investment until 2026 – 56% of which to be spent in Southern regions – as a countermeasure to the Covid-19 shock.

[3] See https://ec.europa.eu/internal_market/scoreboard/performance_per_policy_area/public_procurement/index_en.htm.

[4] The latest version of the indicator is available at https://www.doingbusiness.org/en/data/exploretopics/contracting-with-the-government.

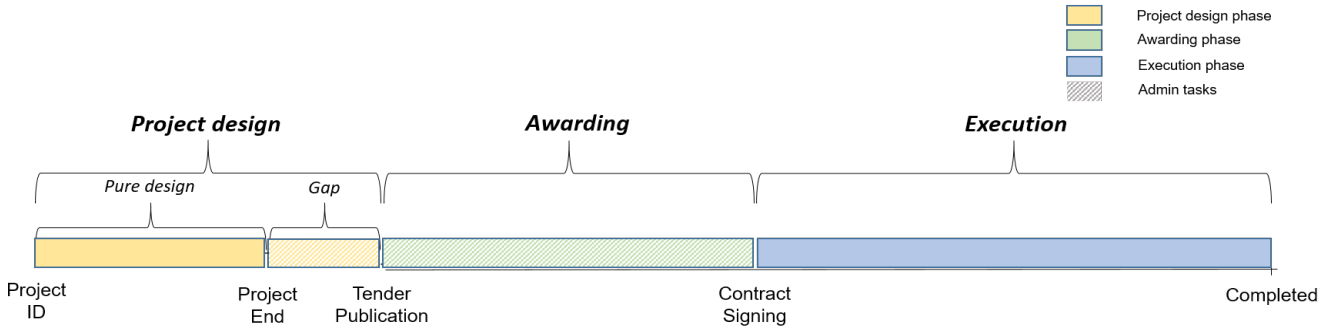
[5] These estimates are based on expert assessment of a case study. For procurement variables, the case study involves a contract whose value is $2.5 million, which is a sizeable contract for Italian standards.

[6] The Bank of Italy *Invind* survey on medium-sized firms in the construction industry carried out in spring 2021 reveals that firms view the lack of competence within the public administration and bad coordination among public offices as important obstacles to the swift execution of project design. The territorial divide in the importance of these factors is pronounced: 15% of firms in the North and Center indicate low competence as a critical point, while in the South and Islands this number rises to 24%.

extended in the context of the NRRP. In the light of the intense regulatory activity and in the presence of an expected increase in resources dedicated to infrastructural investments, a comprehensive review of the available evidence on Italian public works' procurement seems appropriate.

In this paper, we analyze public works contracts tendered in Italy between 2012 and 2020, and we empirically tackle questions related to the performance of the procurement system. More specifically, the present analysis serves three major purposes: (i) providing a comprehensive picture of the dynamics of public works in Italy in the last decade,[7] focusing in particular on their completion times; (ii) unveiling performance differentials across regions; and (iii) analyzing factors that may drive such differentials, with a particular focus on features of the procuring agencies.

Figure 1 – Public works life cycle



Notes: timeline of a typical public work life cycle in Italy. Grid-fill bars refer to phases mainly consisting of administrative tasks largely managed by the public administration; solid-fill bars denote phases in which the administration may be required to coordinate with contractors.

Our analysis focuses on the durations of the different phases of public works' life cycle (i.e., project design, awarding, and execution), and on their geographical heterogeneity, as well as on the features of procuring agencies that may affect their length. Figure 1 shows a typical public work life cycle timeline, divided into phases managed either mostly by the administrations themselves (grid-fill bars), or in combination with external actors (solid-fill bars). We distinguish among three main phases: i) *project design*, lasting from the attribution of a project ID to the publication of the tender; ii) the *awarding phase*, which includes all activities carried out by the procuring agency since the publication of the tender up to when the contract is signed (e.g., setting up the auction, sending invitations, awarding the contract); iii) the *execution phase*, which runs from the signing of the contract until the final completion date, when the finalized work is handed in or tested (whichever comes last: testing is not always required). Within the design phase, we distinguish between a "pure" design phase, covering project drafting and approval, and a design-tender "gap" phase, mostly made of administrative tasks – both within the procuring agency and between the latter and other administrations. Throughout this paper, we consider as "realization" of the procured project the total length of the awarding and execution phases. In order to shed light on the processes that weigh the most in terms of project completion length – and thus have the highest potential of being improved – we analyze each phase individually.

To this end, we propose a method to measure durations that overcomes the issues related to survival bias and date underreporting that affect our data. Briefly, we exploit observed completion of phases to produce reliable estimates of the share of phases that end within a certain horizon, as well as of the number of non-reported but concluded phases, and of phases that are apparently "abandoned". Using these, we make inference on the median value of the distribution of phase duration over subsets of the sample (e.g., over period of time, geographical area, type of procedure: section 2.3 describes the methodology in detail). We

[7] See Castellani et al. (2019) for a partial review of the evidence during the 2014-17 period.

are thus able to highlight the North-South divide for each phase, and investigate how durations relate to major tender characteristics (e.g., type of awarding procedure, contract size) as well as to different types of procuring agencies - in terms of size, workforce demographic characteristics, experience, and administrative efficiency.

We document that Southern regions typically underperform compared to Northern ones in terms of the duration of public procurement processes. Such divide is particularly evident in mostly administrative phases, such as the design-tender "gap" and the awarding phase, and is often relevant in works managed by local government entities (regions, provinces, and municipalities). Importantly, contract level observables - such as tender size, object and nature of the project, type of awarding procedure – explain only a part of the differences in completion times. In other words, characteristics that go beyond the observed features of the individual contract evidently play a role in the laggard performance of the South.

Motivated by these considerations, we narrow down our focus on local government bodies, for which we gather information on proxies of administrative capacity. In particular, we investigate the role of the composition of their workforce, their expertise in tendering - which we measure by previous procurement experience - and an indicator of their administrative efficiency. The results of our analyses show that both experience in public procurement and administrative efficiency matter for the performance in managing public works. Moreover, some demographic characteristics of their workforce display some importance, such as a higher presence of women and young workers, possibly due to different attitudes or higher, more up-to-date education and skills. These factors appear to have a favorable relationship with public works' durations and may provide policy relevant insights (e.g., investing in human capital in the South to foster catching up). Nevertheless, not even their inclusion can fully account for the North-South gap, leaving space for several alternative factors to explain the residual part. First, the general economic environment – e.g., firms in charge of public works execution – possibly differs to a large extent along the North-South gradient. Yet, this factor may hardly influence the administrative phases and thus appears unlikely to be the major determinant. Second, other public administration characteristics we are unable to account for, mainly because of limited data availability, may be crucial. In fact, when we saturate our regression model by including public administration fixed effects that absorb all time-constant characteristics, the explanatory power of the model goes up sharply, and to a much larger extent than after including other observable administration characteristics. Although this exercise naturally no longer allows us to assess North-South differences, it clearly signals that a great deal of the performance in public works' realization length is determined by the organization quality, or other peculiarities of the procuring agency in charge.

This paper contributes to the debate on the regulatory as well as contextual drivers of public works performance. Besides numerous policy reports issued by national and international institutions, such debate is also informed by a corpus of scholarly research. Within the latter, most contributions focus on completion times and total costs of procurement processes, with special emphasis given to institutional frictions, market structure characteristics, and public administrators' skills in efficiently dealing with contractors. Specific factors studied by the literature include – but are not limited to – public officers' discretion in choosing contractors (Bandiera et al., 2009, Baltrunaite et al., 2021, Coviello et al., 2018a), publicity requirements (Coviello and Mariniello, 2014), the use of e-procurement (Lewis-Faupel et al., 2016, Andrenayov et al., 2018), insurance requirements (Giuffrida and Rovigatti, 2020), reputational mechanisms (Spagnolo, 2012), bureaucrats' competence (Decarolis et al., 2020), and external audits (Olken, 2007; Colonnelli and Prem, 2021).

With regard to the Italian context specifically, and focusing on local administrations, Gori et al. (2017) find that the procuring entity's experience and specialization is associated with fewer and shorter delays in

realization. Chiappinelli (2020) finds that the municipal administrations obtaining the lowest rebates are also those that feature the lowest levels of competence and specialization. Cavalieri et al. (2019) estimate how characteristics of the design phase influence the execution of public works. They find that, given the insufficient in-house expertise, smaller municipalities are disproportionately affected by negative spill-overs of design upon execution. Concerning more general traits of the Italian context, Coviello et al. (2018b) show that court inefficiency is related to longer delays and higher shares of the payment being postponed after delivery, while Ravenda et al. (2020) show that mafia infiltrations in firms that are awarded public contracts lead to higher cost overruns.

Specifically turning to completion times, Carlucci et al. (2019) follow an approach similar to ours. They estimate the length of phases of public works' life cycle using survival analysis techniques, and relate them to characteristics of the procuring agencies. They also analyze the role of administrative activities in shaping the completion times of public works.[8] The main difference between their paper and ours lies in the sample used: their empirical analysis is based on a very specific subset of contracts (i.e., public works managed under the EU Cohesion Policy) which display peculiar structural traits, such as external funding, larger average size, and especially a predominant concentration in the South. This allows the authors to exploit variation only within Southern municipalities. We extend the analysis to a much wider sample of public works, resulting in a more balanced dimensional and geographic distribution of projects, through which we are able to perform a meaningful and comprehensive comparison between Northern and Southern Italy.[9]

Also related to our paper is the work by Bentivogli et al. (2010). Using both institutional and survey data from the period 2000-07, the authors analyze infrastructure realization with a special focus on Southern regions, providing rich evidence of issues relating to durations, delays, and cost overruns. Our data allow us to improve much in terms of representativeness of the sample of contracts and of contract-level information. We also use a more reliable measure of duration for the different phases of projects' life, and we can investigate several contract- and administration-specific factors to highlight their relationship with public works' completion times.

The structure of the paper is as follows. Section 2 introduces the data that underlie our analysis, and illustrates the methodology used to compute the length of individual phases. Section 3 presents the results of our empirical exercises, while in section 4 we discuss some possible policy implications. Section 5 concludes.

2. Data and empirical approach

2.1. Data sources

Our analysis requires a very fine level of detail on public procurement tenders and contracts.[10] To this end, we use two main sources of data on Italian procurement of public works, one from the National Anti-Corruption Authority (*Open Data ANAC*), the other from the State General Accounting Department of the Ministry of Economy and Finance (*Open BDAP*). Despite both being structured as tender- or contract-level datasets, the two differ in many dimensions, mainly due to their underlying institutional goals. While ANAC

[8] This is a feature shared by many of the recent policy analyses on the procurement of public works. See, among others, ACT (2018) and Promo PA (2020).

[9] See section 2 for the full description of the data that we use in the analysis.

[10] The tender is the administrative act by which a public administration, acting as procuring authority (i.e., as buyer of works, services or supply), awards a contract to a private subject, the contractor. In most cases, each tender is used to award *one* contract. More rarely, one tender is used to award more than one contract. Our analysis is carried out at the contract level: when more than one contract corresponds to a unique tender, each contract is attributed the corresponding tender's characteristics.

collects data in order to supervise procurement process and prevent corrupt behavior and misconduct, the Ministry is mainly interested in monitoring public works' life cycle, so to overview the conversion of public funds into infrastructure, keeping tracks of the delays, extra-costs and other weaknesses of the system.

In September 2020, ANAC has released a large amount of previously unpublished data on Italian public procurement in open format. The information contained in the new ANAC database provides reliable coverage at least since 2012 and constitutes the most complete source of this type of data to have ever been available in Italy. It includes the universe of tenders with base price above €40,000,[11] all awarded contracts linked to them, the winners' identity and main features, plus a number of additional information related to the procurement process. More in detail, ANAC data tables report information on: i) tender characteristics – such as base price, the type of awarding procedure, the object of the tender, the contracting authority, and the source of funding; ii) various features and events characterizing the realization of awarded contracts, and pertaining to its different phases. In particular, the dates of several relevant events are reported, providing us with the means to compute and/or estimate the duration of the most important phases of the life cycle of each project.

ANAC supervision, though, starts only when the public administration publishes a tender,[12] while it does not cover the project design phase, which precedes the tendering process and may involves multiple tenders/contracts. Thus, in order to analyze the design phase, we rely on the BDAP database, which reports additional information on the design phase at the project level, including all relevant dates.

2.2. Variables

In Table 1 we report descriptive statistics of the ANAC variables we use in the empirical analysis, with the exception of duration variables, which are described in section 3.3. We only consider the sample related to public works (i.e., we exclude procurement for supplies and services) with tenders published[13] in the period 2012-20, whose base price is at least equal to €150,000. This restriction selects about one third of all tenders registered by ANAC (corresponding to almost 95% of total base price), and is motivated by the fact that contracting authorities are required to report information on the execution phase only for contracts above this threshold. Information on the project design phase is available from the BDAP dataset for a subset of public works contracts requiring a project ID.[14] These amount to roughly 37% of overall tenders in the sample.

[11] This is the base price threshold above which each tender must be recorded within the ANAC dataset.

[12] More specifically, each administration has to request a tender ID (*Codice Identificativo Gara*, CIG) before publishing the tender. From that moment on, ANAC keeps track of all developments related to the tender.

[13] In fact, the Italian procurement regulations allow for contracts to be awarded without the actual publication of a tender (this is, for instance, the case for some negotiated procedures). Public administrations are however required to publish notices and documents on the awarding process. In this case, the "tender publication date" coincides with the date in which such notices are published. In what follow, we will generally refer to "tender publication" for these instances as well.

[14] The procurement regulatory system requires public administrations to request, for each public work *requiring project design*, a project ID (the *Codice Unico di Progetto* – CUP), which is then linked to any individual tender needed to carry out project (each project may require many tenders). We identify public works by their project ID in the BDAP database, from which we derive information about the design phase. However, this is possible only for works that do require a project design (mostly those concerning with the realization of new infrastructure or other projects with a reasonable level of complexity).

Table 1 – Descriptive statistics

	Mean	Median	Min	Max	St. Dev.	N
Base price (€ths)	1,531	364.0	150	3,922,000	19,694.8	175,402
Base price (€ths.) - 2012	1,629	346.2	150	3,922,000	34,452.6	20,245
Base price (€ths.) - 2020	2,400	403.2	150	2,470,000	29,086.6	21,790
Base price class						
€150k-€1mln	0.83		0	1	0.37	175,402
€1mln-EU threshold	0.14		0	1	0.34	175,402
≥EU threshold	0.03		0	1	0.18	175,402
Contract Object						
Buildings	0.27		0	1	0.45	175,402
Roads	0.23		0	1	0.42	175,402
Special sectors	0.17		0	1	0.38	175,402
Other sectors	0.33		0	1	0.47	175,402
Contract Nature						
Construction	0.92		0	1	0.28	175,402
Associated services	0.04		0	1	0.28	175,402
Associated supplies	0.04		0	1	0.20	175,402
Awarding Procedure						
Competitive	0.32		0	1	0.47	175,402
Negotiated/Direct	0.68		0	1	0.47	175,402
Administration Type						
Central government	0.12		0	1	0.32	174,899
Local government	0.50		0	1	0.50	174,899
Other local	0.38		0	1	0.49	174,899
Area						
North-West	0.23		0	1	0.42	165,700
North-East	0.24		0	1	0.43	165,700
Center	0.23		0	1	0.42	165,700
South	0.30		0	1	0.46	165,700

The base price[15] is reported for the full sample (first row) and for both the first and last year in the sample: while the average value is increasing with time,[16] the median values show a smaller difference. As expected, in all periods the distribution of base prices is strongly right-skewed, with median values sensibly smaller than averages – which are driven by rare, but quantitatively important, individual contracts above the EU threshold.[17] The latter represent 3% of all tenders and 59% of total spending; most tenders lie between 150,000 and 1 million euros (83%).

[15] The base price indicated in tender documentation is the largest amount the contracting authority is willing to spend for procuring the tender's object: contracts are typically awarded at a price smaller than the base price. However, the awarding price does not necessarily correspond to the actual expenses of the administration, as the amount required for the completion of operations is often reviewed *in itinere* (giving rise to cost overruns).

[16] The reported values are nominal, and do not take into any account the (modest) inflation.

[17] The threshold for EU contracts changed every two years throughout the period, moving from €5,000,000 in 2012 up to €5,350,000 in 2020.

"Contract object" qualifies the type of final product to be obtained. The largest categories covered in our data are buildings (27%) and roads (23%). Special sectors, which comprise works related to sectors of general economic interest, such as the supply of energy and transportations, account for 17% of the observations in our dataset. Within the residual category "other sectors", a relative majority refers to hydraulic and hydrogeological infrastructures, followed by interventions on buildings of historical and cultural interest. In most of our regression analyses, the "Object fixed effects" are a set of indicators identifying 52 different object categories, which are here grouped for simplicity.

"Contract nature" qualifies the type of intervention to be carried out. For example, the "Construction" category contains every infrastructural intervention, including restructuring and maintenance. The data also covers some contracts directed at procuring services or supplies that are instrumental to "proper" public works. These account for about 8% of the sample. Throughout the analysis, the "Nature fixed effects" identify 42 separate categories (e.g., preparation of the construction site, ex novo construction, building renovation, machinery rental).

Contracts are awarded either through competitive (32%) or negotiated and direct (68%) awarding procedures. Direct awards are typically used for very small contracts, and our focus on works with base price above €150,000 makes them a minority in our dataset (4%). However, their frequency has been increasing in the last few years, due to the regulatory changes mentioned in section 1. As for administration type, *Central government* includes central public administrations (e.g., Ministries) as well as state-owned companies (e.g., railway and road operators); *Local government* includes regions, provinces, and municipalities; *Other local* include all other contracting authorities acting at a local level, such as hospitals, schools, and providers of local public services. Half of the contracts are tendered by local government agencies, and close to 40% by other local entities. Central administrations manage only 12% of public works in our sample, but these are typically larger in size.

Finally, the geographical distribution of tenders shows that a relative majority of them takes place in the South and Islands (30%), with similar shares of slightly less than one quarter in North-Western, North-Eastern and Central regions. We build the project location variable by combining information from two sources: first, we assume that works carried out by local administrations are located in the same area where the contracting authority's seat lies. For the remaining contracts – awarded by central authorities, hence not geographically imputable by the previous method – we exploit the presence of a project geolocation variable in the original data. The two steps combined allow us to establish the geographical localization of 94% of the tenders in our sample. The remaining projects are likely cross-regional (and cannot therefore be associated with a single location) or lack the information.

About 70% of tenders reported in Table 1 are awarded; only about a half of the awarded contracts are followed by a complete execution phase; information on project design can be retrieved for less than 40% of the tenders. For awarding and execution, this is in part due to the phases still being under way at the end of 2020 or to the relevant information not having been communicated to ANAC *yet* (naturally, this gets increasingly more common as more recent projects are considered; see section 2.3). There are, however, groups of "old" tenders that have never been awarded, and groups of "old" awarded contracts that have never been executed (or for which information on awarding or execution was never communicated). In Table 2, we analyze the drivers of the selection into the *ever awarded* (column 1), *ever executed* (i.e., with a valid completion date – column 2) and *BDAP* samples (i.e., with a project ID that allows to retrieve information on design, column 3). This is necessary as works with specific characteristics may be systematically less likely to appear and/or to carry meaningful information in our dataset: their exclusion from our analysis should be taken into account when evaluating the representativeness of the results.

For the *ever awarded* and *ever executed* variables, we restrict the analysis to tenders old enough that it is plausible to assume that a lack of reported end date means that those phases are not meant to end (as opposed to being ongoing). More specifically, we use tenders published in the 2012-15 period (74,312 observations) to analyze the selection into the *ever awarded* sample, while we must rely on the 2012-13 period only (22,533 observations) for the *ever executed* sample. We run a series of linear probability models, regressing binary indicators for the tender being awarded, the contract being fully executed, or the tender matching with the BDAP dataset, against several characteristics. The results indicate that southern administrations are, *ceteris paribus*, less likely to award a tender and/or to communicate awarding information. Contract size is only marginally relevant. What matters the most for the awarding stage is the type of administration: compared to the central government, local entities tend to award significantly fewer published tenders, even after controlling for several factors that may correlate with administration-specific procurement activities (e.g., contract object or awarding procedure).

When looking at the rate of execution completion (column 2), the results show a few notable features. First, larger (and probably more complex) contracts are *less* likely to be completed;[18] second, local government bodies show a higher completion rate than central administrations; contracts awarded by negotiated procedures are less likely to ever be completed; compared to other sectors, buildings and roads have a higher completion rate. The probability of matching with the BDAP dataset follows roughly the same patterns as the completion of execution.

Finally, the regressions include a control for the *Cohesion* parameter that indicates the subset of contracts under the EU Cohesion Policy, for which EU-level funding is conditional to certain, pre-specified socio-economic goals. The coefficient is positive in all specifications (evidence not reported in the table), possibly reflecting higher incentives for public agencies to report due to the possibility of ex-post controls by supranational administrations or to conclude the project within the end of the programming period.

[18] However, this may also reflect the possibility that, even shrinking the dataset to early years, we may be including in this analysis a certain share of contracts whose execution is in fact ongoing.

Table 2 – Selection into the sample

	(1)	(2)	(3)
	Ever awarded	Ever executed	BDAP
South	-0.096***	-0.101***	-0.081***
	(0.003)	(0.007)	(0.003)
log(Base price)	0.005***	-0.078***	-0.005***
	(0.002)	(0.004)	(0.001)
Local government	-0.209***	0.040***	0.152***
	(0.005)	(0.010)	(0.005)
Other local	-0.118***	-0.203***	-0.030***
	(0.006)	(0.011)	(0.005)
Negotiated/Direct	0.042***	-0.033***	-0.038***
	(0.004)	(0.007)	(0.003)
Roads	0.061***	-0.005	-0.007*
	(0.004)	(0.008)	(0.004)
Special sec.	0.056***	-0.024**	-0.044***
	(0.005)	(0.010)	(0.004)
Other sec.	0.011***	-0.137***	-0.070***
	(0.004)	(0.008)	(0.003)
Year FE	X	X	X
Nature FE	X	X	X
Cohesion FE	X	X	X
Observations	74,312	22,533	120,729
Adjusted R^2	0.049	0.128	0.236

Notes: LS estimation, standard errors in parentheses (* .1 ** .05 **.01). *Nature* indicates whether the contract mainly refers to construction works, or to services and supplies associated with the realization of other projects. *Cohesion* indicates whether the project is undertaken within the EU Cohesion Policy. The first two columns restrict the analysis to samples "ancient" enough that lack of an end date presumably means that the awarding or execution phases will never come to an end.

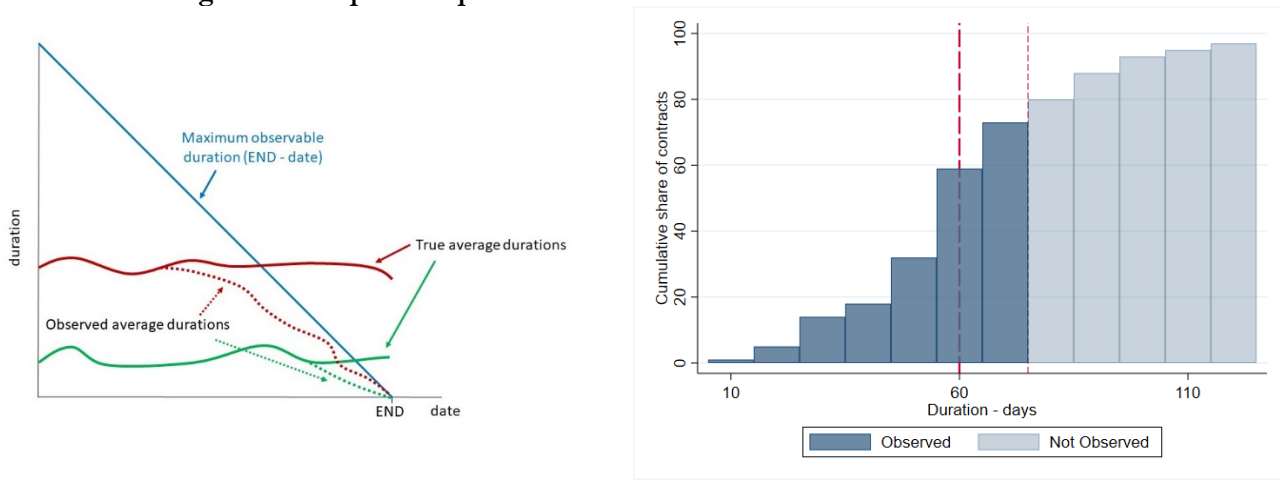
2.3. Measuring durations

The measurement of the length of phases is straightforward only when both a starting and an ending date are observed (in which case we say the phase is *complete*). However, for many phases we only observe the starting date, as they are still under way. As a result, a measurement of duration based only on complete phases suffers from the so-called *survival bias*.

Indeed, the likelihood that a phase is complete decreases as the starting date moves closer to the latest point of observation (the end of 2020 in our sample). For instance, a phase lasting 2 years would appear as complete in our dataset only if it had started before the end of 2018. If we ignored the survival bias, we would observe the average phase duration decrease as we move closer to our last point of observation. In Figure 2, left panel, we report a graphical representation of such effect. Consider a simplified setting with only two phases, either *Short* (green line, typically short in length) or *Long* (red line, typically lengthier). By assumption, the *true* average durations of both phases (solid lines) remain stable over time. However, *observed*

average durations (dotted lines) of *complete* phases decrease as one gets closer to the last point of observation (END), as fewer phases are completed – precisely only those whose length is short enough as to lie below the blue line. As clearly depicted, such bias is stronger, and starts earlier, for the lengthier phase.

Figure 2 – Graphical representation of survival bias and ex ante duration



Notes: illustrative representation of survival bias in duration data (left panel) and of the cumulative distribution of observed/unobserved durations (right panel). In the right panel, the dashed red line represents the median duration of the phase, and the dotted line represents the maximum observable duration.

A simple approach to solve this otherwise problematic issue is to compute what we call *ex ante* duration measures.[19] Consider the execution phase of a contract, starting on 31st December 2019. If the execution lasts up to 366 days, the completion date is observable in our dataset and we are able to measure its length directly. Conversely, if it lasts more than 366 days, we do not observe its completion and cannot compute the duration straightforwardly. However, we can always tell, for any horizon less than 366 days, that this execution did not end by that horizon. In fact, for every phase starting at least *n* days before the end of 2020, we can always say whether the phase ended within 1, 2, …, *n* days. Therefore, our ex ante duration measures for the execution phase in our example are *binary indicators* of whether the phase lasted less than – for instance – 1 month, 1 quarter, or 1 year.

These indicators also allow to compute estimates of the *median* duration of a certain group of phases. As a follow up to the previous example, consider all executions starting in December 2019. As seen above, for all of them we can say with certainty whether they ended within every horizon up to 1 year. Out of all horizons such that half of all phases have ended within that horizon (if they exist), the shortest one is the median length of execution phases starting in December 2019. However, if by 1 year less than half of all executions have been completed, then no median duration can be estimated for this group, and we need a longer maximum horizon (e.g., we might be able to provide a median duration for phases starting in December 2018, for which the maximum horizon is 2 years). This is why, for longer phases, the median duration cannot be estimated for periods too close to the end of the data. Figure 2, right panel, represents a fictitious group of phases for which the maximum time horizon (dotted red line) is large enough to allow for estimation of the median (around 64 days, dashed red line).[20]

[19] The same approach has been used, for instance, by Giacomelli et al. (2018) to estimate the duration of the phases of foreclosure procedures in Italy.

[20] In our data, things are complicated by the fact that a missing completion date can indicate not only that the phase is ongoing, but also that (i) the phase has been "abandoned" and will never end, or (ii) the phase has been completed but the completion has not been reported to ANAC yet. Our ex ante duration measures attempt to take into account these facts, by rescaling the shares of phases ending by any horizon, within any group. Such corrections, however, impact only on the computation of aggregate

3. Main results

This section analyzes the time required for the completion of phases of public works' life cycle in Italy, highlighting its dynamics and investigating the presence of territorial differences. To shed light on the factors that contribute to completion times, we examine heterogeneity based on geographical location of public work, size of the contract, the type of awarding procedure and the type of administration. Finally, we analyze all factors jointly by performing a regression analysis that also accounts for a number of structural characteristics of the contract and of the procuring agency. In particular, we focus on characteristics of local administration, such as workforce composition, tendering experience and workload, and administrative efficiency.

3.1 How long does the realization of public works take in Italy?

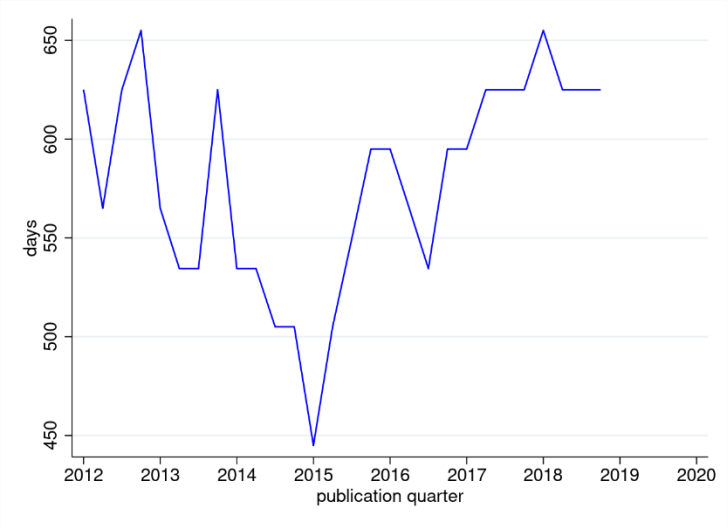
We start by examining the overall time taken to deliver a typical public works contract in Italy. In Figure 3, we plot the ex ante median duration in days of the entire realization of the contract, which runs from the start of the tender to the finalization of the execution (as defined in section 1).[21] The duration of the whole realization shows a U-shaped dynamics, appearing to have decreased in the period 2012-15, only to revert back to the initial level in 2016-18, stabilizing at just over 600 days. Such dynamics may be associated with various explanations. First, an important change in regulation, in the form of a new Public contract code, was introduced in 2016. Such event may have slowed down some procurement processes, offsetting the downward trend observed in previous years. Contemporaneously, however, resources dedicated to the public sector – e.g., in terms of available workforce – were also on the downward trend, both in quantity and "quality" (Rizzica, 2020). Such combination – fewer public employees in charge of an increasing procurement workload – may have also contributed to the rise in realization times in recent years. Indeed, in section 3.3 we show that the current workload of the procuring agency is positively related to the duration of both the awarding and the execution phase. Finally, we also note that part of the 2015 plunge may be driven by works realized under the EU Cohesion Policy, whose execution was accelerated by deadlines related to the 2007-13 planning period (see section 3.2 for further details). Such works are mostly located in Southern regions.[22]

durations (by quarter, geographical area, …) and not on individual-level regression analyses. The latter, therefore, are characterized by abandoned and non-communicated phases being classified as not yet complete. We run alternative analyses to make sure that such bias does not change our results qualitatively (see footnote 25).

[21] The analysis only refers to awarded contracts, as considering contracts not yet awarded (as we do for the awarding phase in section 3.2) would require imposing further corrections on our duration measure.

[22] The pattern in Figure 3 is not driven by changes in the composition of tender contracts: it is confirmed once we account for a number of tender characteristics, such as geographic area, tender base price, the type of the procuring agency and the awarding method and the type of public works procured.

Figure 3 – The realization of public works (*ex ante median duration, by quarter*)



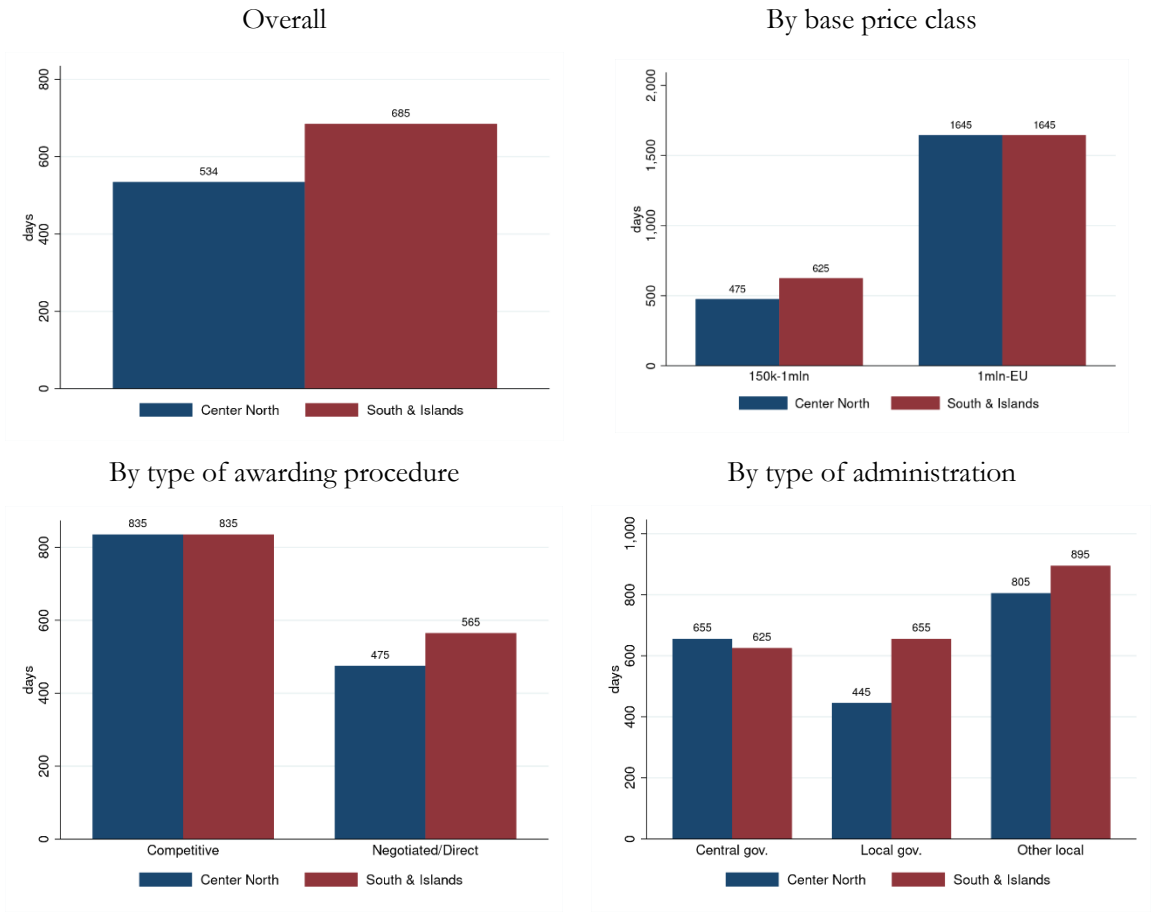
Notes: authors' calculations based on ANAC data. The sample is composed of awarded contracts only. Ex ante median duration can be estimated up to 2018Q4.

Realization times display substantial geographical heterogeneity. Realization takes around 530 days in the North and Center of the country, and nearly 700 days in the South and Islands (Figure 4, upper left panel). Times are longer in the South in particular for smaller contracts, while the median duration is the same within the 1mln€-EU threshold range (Figure 4, upper right panel).[23] Similarly, the divide disappears when we consider only contracts awarded by competitive procedures (Figure 4, lower left panel). Perhaps surprisingly, works located in each geographical area, but managed by central administrations, reveal a slight advantage of the South (Figure 4, lower right panel). On the contrary, the North-South divide is particularly evident for works managed by local government entities (as defined in section 3.2). This suggests that the characteristics or the behavior of specific procuring agencies may play an important role. Plausibly, the actions of the procuring administration deeply affect phases in which administrative tasks predominate. However, they may also extend to the more technical phases that administrations preside over and monitor.[24] We further investigate the relationships between characteristics of the tendering administration and time to completion in detail in section 3.3.

[23] Median realization time for contracts with base price above the EU threshold in Southern regions cannot be estimated by the method we adopt. We can nonetheless be sure that such median is larger than approximately 3,200 days, which is the maximum time horizon for which ex ante estimation is meaningful in this setting.

[24] Notice that the consequences of choices of the procuring agencies include the selection of the contractor, whose "quality" is likely to affect the duration of the execution phase. Local administrations might more often find it convenient to select local contractors, and therefore geographical divides in works managed by such administrations may also reflect the "quality" of the locally available potential contractors. However, that fact that the geographical divide in the execution phase is mostly concentrated in works tendered through negotiated procedures, which attribute more discretion to the procuring agency, suggests that the administration's choices, rather than the quality of the available bidders, might be the dominant force behind the phenomenon.

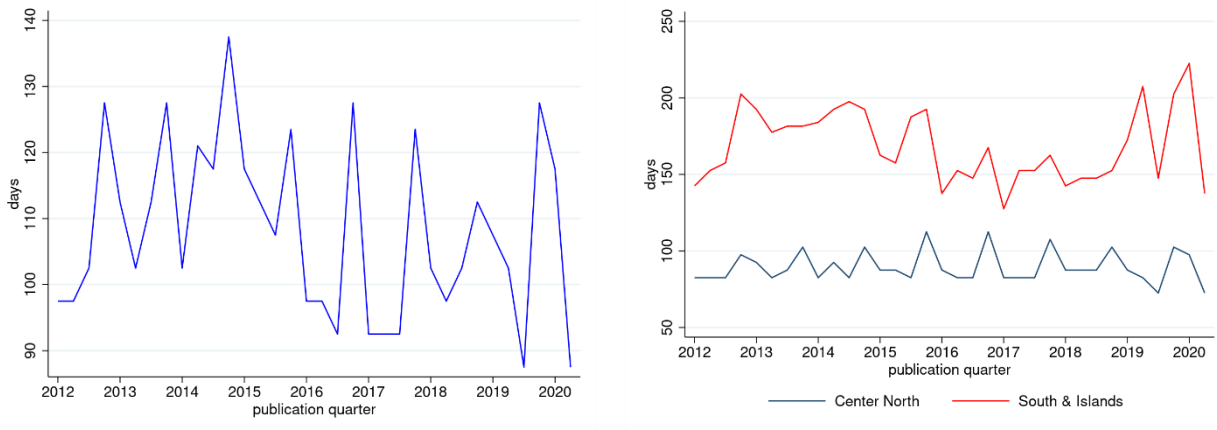
Figure 4 – The North-South divide in the realization of public works (*ex ante median duration)*



Notes: authors' calculations based on ANAC data. Ex ante median durations cannot be estimated for works above the EU threshold (upper right panel), due to the excessive length of these phases.

3.2 The awarding and execution phases

Figure 5 – The awarding phase (*ex ante median duration, by quarter)*



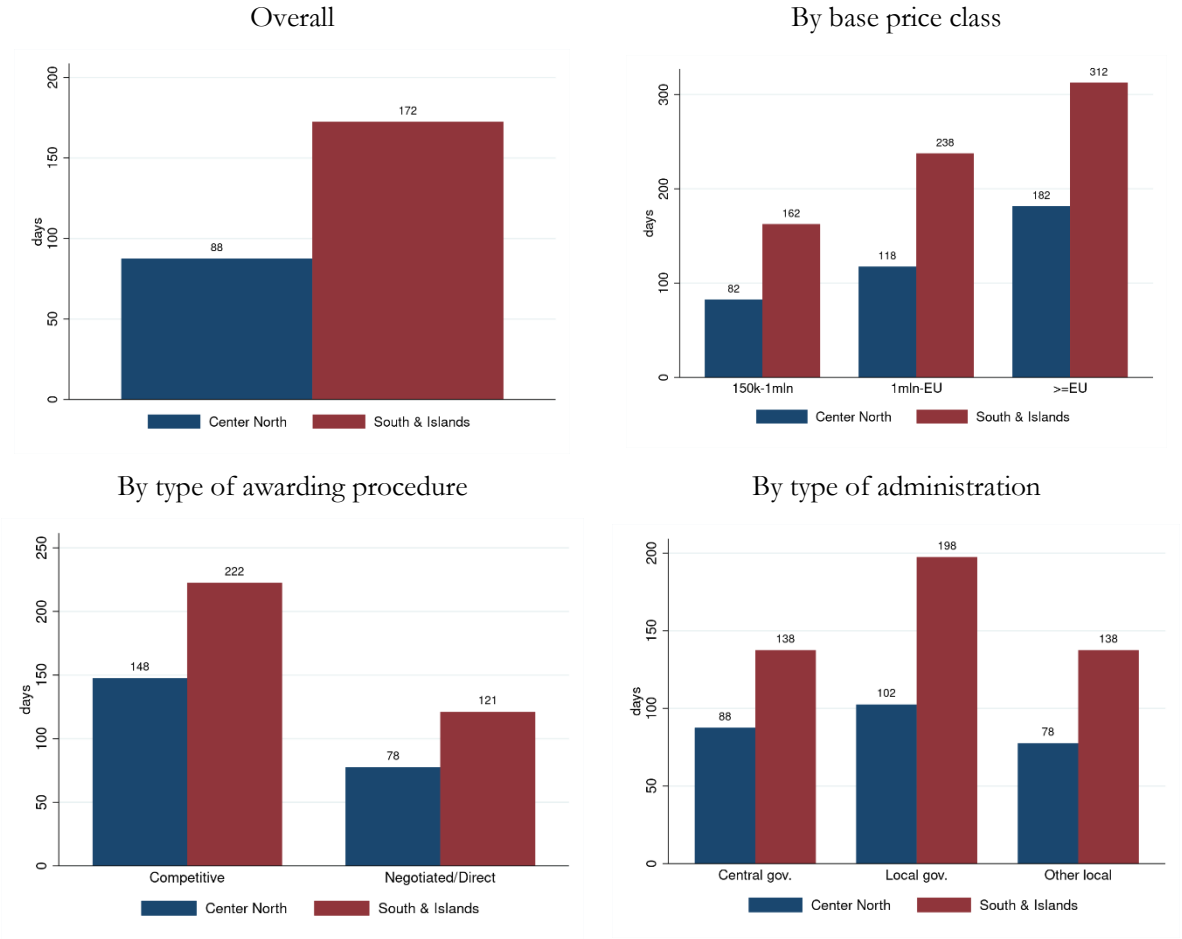
Notes: authors' calculations based on ANAC data. Ex ante median durations can be estimated up to 2020Q2.

The awarding phase is defined as the time elapsed between the publication of the tender and the signing of the contract by the selected contractor. Compared to the overall realization, this is a relatively short phase, with a median duration of around 110 days (Figure 5, left panel). Over time, the awarding process has become mildly shorter. There are substantial North-South differences that have only shown moderate

convergence in time (Figure 5, right panel): while in the Center and North of the country the awarding phase lasts roughly three months, in the Southern regions it usually takes over five months (Figure 6, upper left panel).

The North-South divide persists also within categories of comparable contracts, as illustrated in Figure 6. It is slightly milder among very large tenders: the median duration of the awarding phase for contracts below the EU threshold (around 5 million euros) is about twice as long in the South of Italy; and 70% longer when contracts above the EU threshold are considered. Both competitive and negotiated/direct procedures display a roughly 50% longer median duration in the South. Finally, tenders in Southern regions take longer independently of the nature of the contracting administration. However, the North-South gradient is the largest among local government bodies, with the awarding time taking nearly twice as long in those located in the South, and is instead the narrowest (57%) for central administrations. This evidence points to a substantial potential relevance of the characteristics of the procuring agency in explaining duration differentials. Moreover, as shown later, the North-South divide is starker in the awarding phase than in the subsequent execution phase, characterized by a less direct involvement of the procuring administration.

Figure 6 - The North-South divide in the awarding of public works (*ex ante median duration*)



Notes: authors' calculations based on ANAC data.

Since pairwise correlations in Figure 6 may not capture the full interactions across observable contract characteristics (e.g., the norms typically prescribe the use of competitive procedures for contracts of larger size), we examine multivariate correlations between all variables in a regression framework (Table 3). Odd columns report a "parsimonious" model reflecting the raw North-South difference, while the specifications in even columns account for the most important contract-level observables. The dependent variable is an

indicator function for the awarding phase being completed in 2 (columns 1 and 2), 4 (columns 3 and 4) and 6 months (columns 5 and 6). At the level of individual contracts, ex ante durations obtained by the method described in section 2.3 are a set of indicators for whether the phase under analysis is concluded within a given horizon. Here the three horizons are chosen to roughly match the first, second and third quartile of the distribution of awarding phase length.[25] At all time horizons, the *South* indicator displays a significant and sizeable effect. The coefficient magnitude is affected by the inclusion of contract-level observables. Conditional on these covariates, works in the South are 8 p.p. less likely to be completed within 2 months, 16 p.p. within 4 months, 19 p.p. within 6 months.

The coefficients on the included covariates are also informative. For instance, negotiated procedures appear to be faster, not only because they are used for smaller contracts, as our regression specifications control for tender size measured by the logarithm of the base price. Predictably, larger size is associated with longer duration.[26] As for the type of procuring administration, local government has a lower probability of completing the awarding stage within a given time horizon, relative to the excluded category of central authorities. However, other local administrations show a peculiar pattern, from favorable in short termination to unfavorable on longer horizons. One should nonetheless take into account that such category includes a wide variety of organizations, possibly managing contracts of disparate complexity, unevenly concentrated in different parts of the distribution.

We also point out that the inclusion of contract level characteristics affects the *South* coefficient in the specifications in even columns. At all horizons, the magnitude of this coefficient is much smaller in absolute terms than in the corresponding parsimonious specification with no control variables. Although contract-level observables clearly contribute to the explanation of the geographical divide – had Southern administrations procured the same type of contracts as Northern ones, their underperformance in terms of durations would have been milder - the inclusion of such covariates does not "close" the North-South gap (the coefficient remains statistically different from zero). Apparently, other factors are what explains the remaining quota of territorial heterogeneity.

Table 3 - Awarding phase and observable characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Awarding 2 months		Awarding 4 months		Awarding 6 months	
South	-0.142***	-0.084***	-0.246***	-0.165***	-0.252***	-0.186***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
log(Base price)		-0.033***		-0.050***		-0.048***
		(0.001)		(0.001)		(0.001)
Local government		-0.048***		-0.102***		-0.144***
		(0.004)		(0.005)		(0.005)

[25] As explained in footnote 20, individual regressions are not impacted by the corrections for "abandoned" and non-communicated phases, and are therefore subject to a bias due to considering such phases as not yet completed. To show that this bias does not affect our results to the point of qualitative distortion, we estimate two additional models: (i) a linear model with observed duration as dependent variable, over a period where survival bias and other distortions are not likely to matter much (as in Table 2); (ii) an ordered logit over the same years, in which non-complete phases are assigned to an "abandoned" category. All estimates from these alternative specification are qualitatively similar to the ones presented here.

[26] The duration may vary substantially with tender size also in a non-linear way. We replicate the analysis for the duration of the awarding, execution and design phases using fixed effects for the deciles of the base price distribution instead of controlling for its logarithm. The results are confirmed, both qualitative and quantitatively, and are available upon request.

Other local		0.027***		0.005		-0.047***
		(0.004)		(0.005)		(0.005)
Negotiated/Direct		0.146***		0.223***		0.191***
		(0.002)		(0.003)		(0.003)
Year FE	X	X	X	X	X	X
Object FE		X		X		X
Nature FE		X		X		X
Cohesion FE		X		X		X
Observations	161,075	160,631	157,322	156,886	153,803	153,369
Adjusted R^2	0.029	0.096	0.058	0.148	0.066	0.135

Notes: OLS estimation, standard errors in parentheses (* .1 ** .05 ***.01). *Object* indicates the main object according to the OG*/OS* classification available in ANAC data: this identifies, for instance, different types of buildings and infrastructures. *Nature* indicates whether the contract mainly refers to construction works, or to services and supplies associated with the realization of other projects. *Cohesion* indicates whether the project is undertaken within the EU Cohesion Policy.

The execution phase runs from the contract signing date to the date when the finalized work is handed in or tested (whichever comes last: testing is not always required). It accounts for the largest share of the total time needed to deliver a project. The median duration of this phase over the period 2012-19 is around 440 days (Figure 7, left panel), and its series displays the U-shape dynamics which then reflects into that of realization times, already shown in Figure 3. As previously mentioned, the time trend highlights a marked drop in execution duration in 2015 for public works implemented in Southern Italy (Figure 7, right panel). That period coincides with the term to close projects financed by the EU within the 2007-13 planning period of the Cohesion Policy. Such funds are primarily allocated to Southern regions and, plausibly, project implementation was accelerated in the South due to the urge to allocate the funds and exhaust the budget before the relevant terms expired (see, for instance, Liebman and Mahoney, 2017).

In particular, the descending trend observed in the 2012-2015 period abruptly reversed in 2015Q2 and followed a mildly increasing trend (with stark seasonal variations). A closer look at the regional differences (Figure 7, right panel) though, shows that the country-level dynamics is mostly driven by the Southern regions, whereas fluctuations in median durations are much narrower in the Center-North.

Figure 7 – The execution phase (*ex ante median duration, by quarter)*

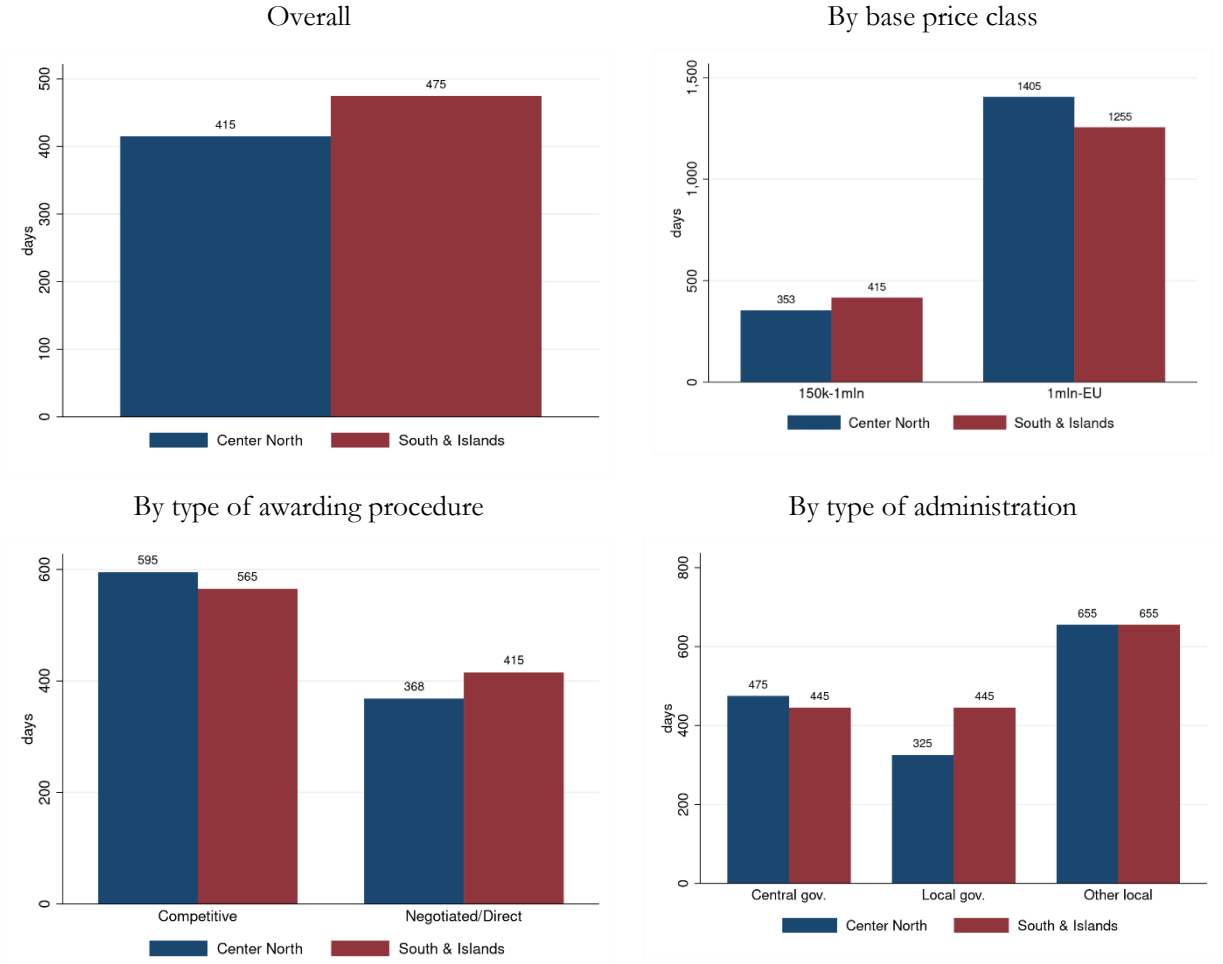
Notes: authors' calculations based on ANAC data. Ex ante median durations can be estimated up to 2019Q4.

Like the awarding phase, execution takes longer in the South, with a median value of 475 days against 415 in the North. However, the magnitude of the North-South divide in the duration of the execution phase is smaller than that relative to the awarding phase, as previously anticipated. In particular, for several sub-

categories of public works, the North-South divide appears much attenuated and sometimes even reversed. For example, the execution of contracts between 1 million euros and the EU threshold lasts longer in the North than in the South (Figure 8, upper-right panel), and so does that of contracts awarded using competitive procedures (Figure 8, bottom-left panel). Yet, the execution of contracts awarded by negotiated or direct procedures is lengthier in the South. While execution certainly depends extensively on the contractor's behavior, this result points to the possibility that administrations may also impact execution through the choice of the contractor: competitive procedures may enhance the likelihood of a "good" bidder being awarded the contract, compared to the situation where the tendering administrations would have made poor contractor choices through a more discretionary procedure.[27] Last, the execution of public works in the South is shorter than in the North when tenders are run by the central administration, whereas local administrations slightly slow off the execution processes with respect to their Northern counterparts. This may reflect better ability by central authorities to select "appropriate" economic operators to carry out their public works in any part of the country.

[27] Indeed, as anticipated in footnote 24, the fact that the divide does not appear in competitive procedures could be interpreted as a signal that the main mechanism behind the phenomenon is not a lower quality of potential bidders in the South, but poorer choices by administrations, when they are allowed to select discretionally. However, the former channel cannot be thoroughly excluded, as competitive procedures are used for larger tenders, and may attract more non-local bidders.

Figure 8 - The North-South divide in the execution of public works (*ex ante median duration*)



Notes: authors' calculations based on ANAC data. Ex ante median duration cannot be estimated for works above the EU threshold, due to the excessive length of these phases.

As done for the awarding phase, in Table 4 we examine the extent to which observable contract characteristics may account for the overall North-South difference, with different time horizons chosen to approximate the first, second, and third quartile of the overall duration distribution. In line with the descriptive evidence, the coefficient associated with the *South* indicator is smaller than for the awarding phase, with Southern contracts being 1.3 p.p. less likely to be executed by 8 months, 4 p.p. by 1 year, 8 p.p. by 20 months. As expected, larger contracts are less likely to be finished quickly but, unlike for the awarding phase, local public administrations appear to execute public works faster than their central administration counterparts, while other local entities procure public works that appear to be the slowest to come to completion. Notice that the central-local administration pattern is reversed with respect to that seen for the awarding phase. Although at the first glance this may appear counterintuitive, such pattern is consistent with a rather different role the tendering body plays in the execution phase. In particular, smaller administrations may have difficulties in dealing rapidly with intensely bureaucratic processes, such as contract awarding, but in phases where the largest burden of activity is born by the private contractor (such as project execution), they exhibit swifter execution because the projects they demand and manage may be less operationally complex, even conditional on size.

Differently from the evidence on the awarding phase, the inclusion of contract-level control variables (even columns) does not alter much the magnitude of the *South* coefficient with respect to the "raw" specification (odd columns). In fact, this mimics the previous evidence (see Figure 8) showing that the relationship

between contract characteristics and execution times depends much less on geographical localization than that between contract characteristics and awarding times. Apparently, the territorial divide in execution times only marginally depends on contract characteristics. Therefore, unpacking the black-box of the existing North-South differences requires an analysis that incorporates other factors, accounting for the characteristics of the procuring agency or the broader economic context.

Table 4 - Execution phase and observable characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Exec. 8 months		Exec. 1 year		Exec. 20 months	
South	-0.015***	-0.013***	-0.039***	-0.040***	-0.069***	-0.081***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
log(Base price)		-0.048***		-0.081***		-0.103***
		(0.001)		(0.001)		(0.002)
Local government		0.014***		0.038***		0.093***
		(0.003)		(0.004)		(0.005)
Other local		-0.018***		-0.022***		-0.024***
		(0.003)		(0.004)		(0.005)
Negotiated/Direct		0.038***		0.054***		0.055***
		(0.002)		(0.003)		(0.003)
Year FE	X	X	X	X	X	X
Object FE		X		X		X
Nature FE		X		X		X
Cohesion FE		X		X		X
Observations	111,499	111,282	108,113	107,898	98,114	97,918
Adjusted R^2	0.008	0.066	0.011	0.106	0.013	0.147

Notes: OLS estimation, standard errors in parentheses (* .1 ** .05 ***.01). *Object* indicates the main object according to the OG*/OS* classification available in ANAC data: this identifies, for instance, different types of buildings and infrastructures. *Nature* indicates whether the contract mainly refers to construction works, or to services and supplies associated with the realization of other projects. *Cohesion* indicates whether the project is undertaken within the EU Cohesion Policy.

3.3 Determinants of duration: the role of procuring agency characteristics

The evidence in section 3.2 highlights the presence of territorial differences[28] in the speed of procuring public works across different types of public administration and suggests that contract characteristics such as contract size or object can only partially explain this gap. Thus, in this section we explore the role of public administrations and their characteristics in determining procurement outcomes. In particular, we focus on workforce demographic characteristics, their experience and current workload, and their efficiency and investigate their impact on public works' completion times in a multivariate regression analysis framework.[29] The goal of this exercise is two-fold. First, we assess to which extent the unexplained North-South divide depends on territorial differences in such features of procuring

[28] One may argue that public works' duration may differ across different areas of the country also because of differences in purely geo-morphologic features between the South and the North. To examine this, we replicate the regressions in a sample of contracts managed by Italian municipalities only, controlling for municipal area, population density, altitude and ruggedness. The coefficient on the South indicator is only slightly affected, suggesting that such factors do not drive the North-South gradient.

[29] Since these factors are likely highly correlated, they are included separately in our specification for clarity of interpretation.

agencies. Second, we examine the relationship between the above mentioned features and public works' duration: identifying characteristics that positively relate to swifter procurement processes may be potentially useful for the policy maker to guide their regulatory interventions.

Table 5 - Awarding phase: characteristics of the procuring agency

	(1)	(2)	(3)	(4)	(5)	(6)
	Awarding within 4 months					
South	-0.165***	-0.183***	-0.141***	-0.183***	-0.158***	-0.148***
	(0.003)	(0.004)	(0.005)	(0.004)	(0.006)	(0.006)
Local gov.	-0.102***					
	(0.005)					
Other local	0.005					
	(0.005)					
Province		0.054***	0.055***	0.055***		
		(0.011)	(0.011)	(0.011)		
Municipality		-0.053***	-0.067***	-0.046***		
		(0.011)	(0.011)	(0.011)		
% Female employees			0.266***			
			(0.016)			
% Employees Under 35			0.147***			
			(0.038)			
Money so far				0.005**		
				(0.002)		
Yearly money				-0.014***		
				(0.003)		
High efficiency						0.028***
						(0.005)
Controls	X	X	X	X	X	X
Local gov. only		X	X	X		
Municipalities only					X	X
Observations	156,886	58,673	58,673	58,673	36,834	36,834
Adjusted R-squared	0.139	0.137	0.142	0.138	0.101	0.102

Notes: OLS estimation, standard errors in parentheses (* .1 ** .05 **.01). *Controls* include all additional controls used in columns 2, 4, 6 of Table 3. Columns 2-6 in addition include the logarithm of resident population.

In Table 5, columns 1 and 2, we examine whether the probability of completing the awarding phase within 4 months (approximately the observed median duration of such phase) differs across types of public administration, distinguishing as before between central government, local government entities (regions, provinces, and municipalities) and other public entities. Column 1 replicates the analysis in Table 3, column 4, highlighting that, on average, local public administrations are particularly slow in awarding public works contracts: the probability of completing the awarding phase within 4 months is estimated to be around 10 p.p. lower than in central administrations. However, other local public organizations, such as hospitals and schools, award as quickly as central administrations, perhaps due to lighter bureaucratic overload or to superior managerial competences.

Next, we turn to analyzing local government agencies only. We are particularly interested in those administrations as they are more likely to face difficulties in attaining sufficient specialization in public

procurement, due to organizational features and lack of resources. Among local bodies, we specifically focus on local government as this category includes only three types of administrations (regions, provinces, and municipalities) that, albeit on different scales and with different scopes, share a relatively common function of territorial government (e.g., in comparison to the "other local" category which includes an extremely heterogeneous set of procuring agencies). This allows us to investigate the role of administration characteristics within a relatively homogeneous set of procuring bodies.

In column 2, we control for indicators for the three different levels of local government. The North-South gap remains substantial among these administrations, and amounts to roughly 18 p.p.. Precisely because the specification includes controls for different tiers of local government, the difference between macro-areas does not depend on the potentially heterogeneous composition in terms of governmental levels at which public works are procured in the South and in the North. Moreover, it appears that, on average, compared to regional public administrations, provinces fare better than regions in terms of awarding time, while municipalities display the worst overall performance.

Next, in column 3 we study how the demographic composition of the workforce of local government agencies relates to awarding duration. In particular, we focus on the share of women and of young individuals – i.e., those younger than 35, potentially indicating the presence of employees with higher educational attainments or, more generally, a "modern set of skills". The North-South divide shrinks – although moderately – when these measures are included (the coefficient is equal to 14 p.p., against 18 p.p. of column 2, where these controls are excluded). Interestingly, both variables are positively related with the probability of completing the awarding stage quickly. This suggests that territorial disparities in the selection of workers to the public sector contribute to the laggard performance in procurement outcomes. More granular data on workforce allocation to specific procurement offices within individual administrations would allow a more in-depth understanding of the underlying channels.

In column 4 we examine whether the experience of local public administrations, and the workload they are exposed to, matters for the duration of the awarding phase. To proxy for the former, we include the logarithm of the cumulative amount of funds spent by the administration on public works up to the year prior to that of the current tender (*Money so far*), a variable which we interpret as a measure of "experience".[30] For the latter, we use the logarithm of the total amount of purchases for public works to be made in the year of the current tender (*Yearly money*), which we interpret as a quantification of the public procurement workload the administration is subject to in a given year. The negative coefficient on the *Yearly money* variable indicates that, *ceteris paribus*, heavier workload is associated with a longer duration of the awarding phase, possibly due to the higher burden of the workload associated with the management of public works projects. The coefficient on the *Money so far* variable is instead positive, suggesting that experience acquired during the previous awarding of public procurement works may be associated with higher competences of public administration in awarding contracts swiftly. These factors may be closely related to several policy levers discussed by policy makers (such as centralizing procurement purchases); interestingly, however, the gap between North and South remains virtually unchanged once these measures are accounted for; in other

[30] Although this measure, due to its backward-looking nature, relies on a shorter time series for the years in the beginning of our sample, the inclusion of year fixed effects neutralizes such distortion. We note that we add a unity to the entire series in order not to drop observations with no money spent in a particular year. We also adopted an alternative definition of experience and workload measures, defining them in terms of the total and yearly number of public works contracts tendered by the administration, rather than the total and yearly amount of money spent on such purchases. The results are robust to using this alternative measure and are available upon request.

words, territorial gaps in, for example, public administrations' experience, do not seem to "responsible" for the laggard performance of the South.

Next, we focus on municipal administrations only (also in this sample, the raw *South* coefficient remains high, as shown in column 5). In column 6, we control for the impact of administrative efficiency on awarding duration. We proxy efficiency by a measure that reflects the administration ability to meet administrative deadlines. Following De Angelis et al. (2020), we compute the time span between the submission of the decision on municipal-level tax rates and its deadline, set in advance by the Ministry of the Economy each year. The underlying assumption is that efficient administrations are able to compute the appropriate tax rate and set all the necessary paperwork in advance of the deadline. For this reason, for each year we generate an indicator variable (*High efficiency*) for administrations that submit the new tax rates faster than the median. The positive estimate of the coefficient associated with this variable indicates that more efficient administrations seem to be faster in completing the awarding phase.

The comparison of columns 5 and 6 in particular shows that administrative efficiency certainly impacts the duration of awarding times and may also explain part of the North-South gap. Overall, however, in all specifications, the *South* coefficient remains significantly different from zero and of considerable magnitude. Hence, even the heterogeneity in observable administration-specific characteristics is unable to fully explain geographic heterogeneity. We further discuss this topic in section 4.

Table 6 – Execution phase: characteristics of the procuring administration

	(1)	(2)	(3)	(4)	(5)	(6)
	Execution within 1 year					
South	-0.040***	-0.075***	-0.057***	-0.074***	-0.056***	-0.047***
	(0.003)	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)
Local gov.	0.038***					
	(0.004)					
Other local	-0.022***					
	(0.004)					
Province		0.044***	0.045***	0.046***		
		(0.011)	(0.011)	(0.011)		
Municipality		0.0119	0.006	0.023**		
		(0.011)	(0.011)	(0.012)		
% Female employees			0.117***			
			(0.018)			
% Employees Under 35			0.097**			
			(0.045)			
Money so far				-0.002		
				(0.002)		
Yearly money				-0.018***		
				(0.003)		
High efficiency						0.024***
						(0.006)
Controls	X	X	X	X	X	X
Local gov. only		X	X	X		
Municipalities only					X	X
Observations	107,898	44,514	44,514	44,514	24,334	24,334

Adjusted R-squared	0.106	0.105	0.106	0.106	0.095	0.095

Notes: OLS estimation, standard errors in parentheses (* .1 ** .05 **.01). *Controls* include all additional controls used in columns 2, 4, 6 of Table 3. Columns 2-6 in addition include the logarithm of resident population.

Table 6 replicates the same specifications of Table 5 for the duration of the execution phase. In particular, column 1 replicates the analysis in Table 4, column 4, indicating that public works procured by local government agencies are 4 p.p. more likely to be completed within 1 year than central public administration bodies; while other non-governmental local procuring agencies are 2 p.p. less likely than central administrations to complete execution within this horizon.

Next, we focus on local public administrations only and examine execution length for contracts procured by regions, provinces, and municipalities (column 2). As with the awarding phase, execution is faster when the managing authority is a province than when it is a regional administration. However, unlike before, municipalities do not appear to be slower than regions.

In column 3 we turn to examining the role of the workforce composition, detecting a pattern in line with the one observed for the duration of the awarding stage: local administrations with higher share of female and young employees exhibit a higher probability of completing the execution stage of public works within 1 year. These features contribute to explain a part of the North-South divide (the relevant coefficient is 5.7 p.p., down from 7.5 in absence of these controls in the same set of administrations).

In column 4, like for the analogous analysis for the awarding phase, we include variables aimed at capturing overall experience (*Money so far*) and overall current workload (*Yearly money*) of the procuring agency. The coefficient on the latter variable is significantly negative, suggesting that workload is associated with lengthier execution phases (perhaps due to lower slack time to monitor the firm implementing public works). However, unlike what seen in the awarding phase, the coefficient on tendering experience is virtually zero: previous experience in preparing calls for tenders does not seem to influence the duration of the execution phase. This could signal that tendering experience is not a good proxy for the kind of expertise that may improve the administration's ability to manage and monitor the execution phase.

Finally, columns 5 and 6 restrict the analysis to municipal administrations. Column 5 testifies that the raw North-South divide remains sizable even in this particular category of administrations. Column 6 adds the control for administrative efficiency: in line with the result on the awarding phase, being efficient seems to shorten execution times too. As before, this variable alone seems to explain a non-negligible part of the gap represented by the North-South divide. Yet, a significant and sizable portion of the North-South divide remains, clearly implying that observables we are able to consider in our analysis, both related to the contract and to the administration characteristics, are not the sole drivers of territorial differences in both awarding and execution speed.

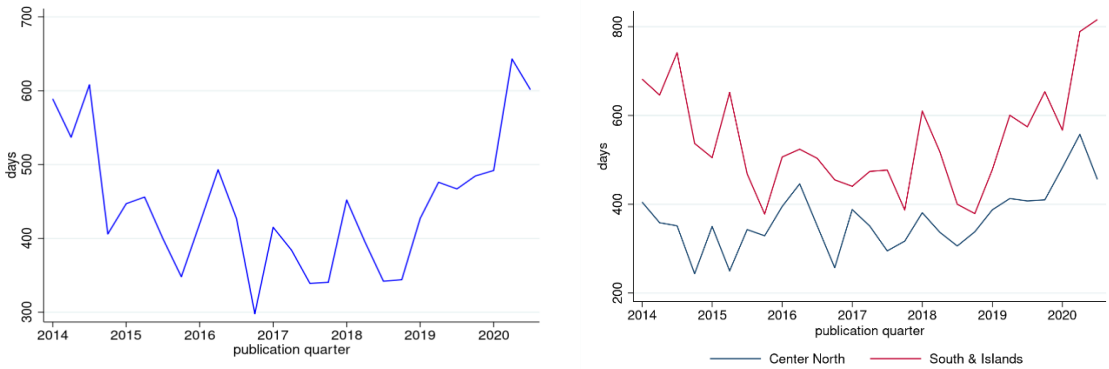
3.4 Design phase of public works

Some public works need to be designed before they are awarded and executed. In this subsection, we focus on this design phase and – symmetrically to the previous analysis – investigate its duration, the presence of North-South differences, and then examine how it correlates with contract characteristics as well as features of the contracting authority. These data primarily come from a different source - the BDAP database - than the one used in the previous analyses (see section 2.1 for more details), and they cover public works tendered between 2014 and 2020. Note that the reference year for the analysis in this subsection is, for each work, that of the tender, that is the year in which the design phase *ends*. For this reason, in this section durations are computed in the straightforward way, as the construction of ex ante durations is not required. On the

downside, this discourages the inclusion in the analysis of variables with substantial yearly variation (e.g., our experience and workload measures).

The median duration of the design phase (Figure 9, left panel) is around 400 days in the period 2014-18, and it increases in 2019 and 2020. Geographical differences are in line with the evidence on the awarding and the execution phases: designing public works takes significantly longer in Southern regions (Figure 9, right panel). Interestingly, this gap seems to have widened in recent times, after a period of convergence. The early effects of the Covid pandemic may be the main reason behind the strong increase in design times for phases ending in 2020Q2 and 2020Q3.

Figure 9 - The design phase of public works (*median duration, by quarter)*

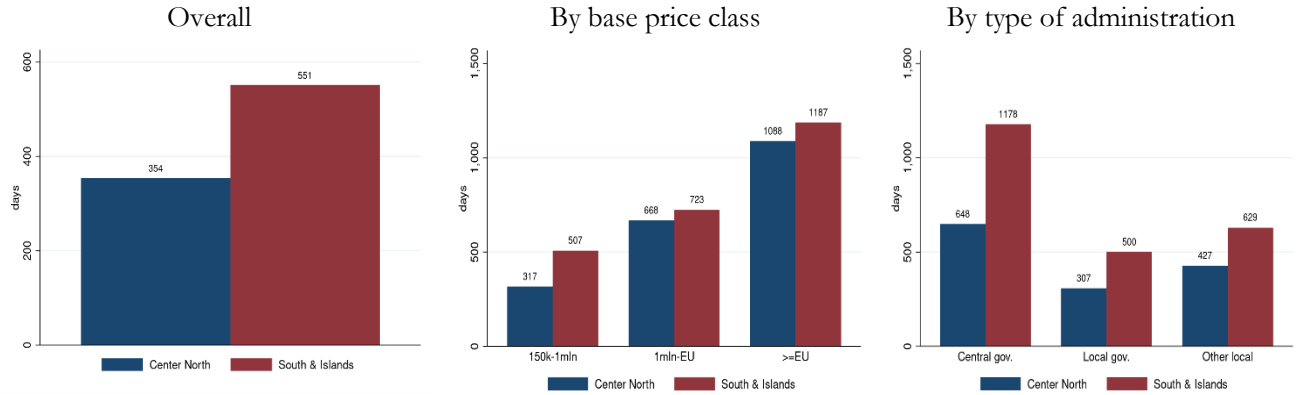


Notes: authors' calculations based on BDAP, ANAC data.

Overall, the design phase takes about 1 year in the North and about 1 year and half in the South. Figure 10 examines the geographical differences in contract sub-categories based on their size and the type of procuring agency.[31] The panel in the center illustrates that the North-South gradient is more pronounced for contracts with base price below 1 million euros. The design duration is, on average, longer for public works procured by central government, plausibly due to the larger size and higher complexity of these projects. Furthermore, the duration differences between project design in the South and the North are stronger for this category even if the (same) central administration is in charge.

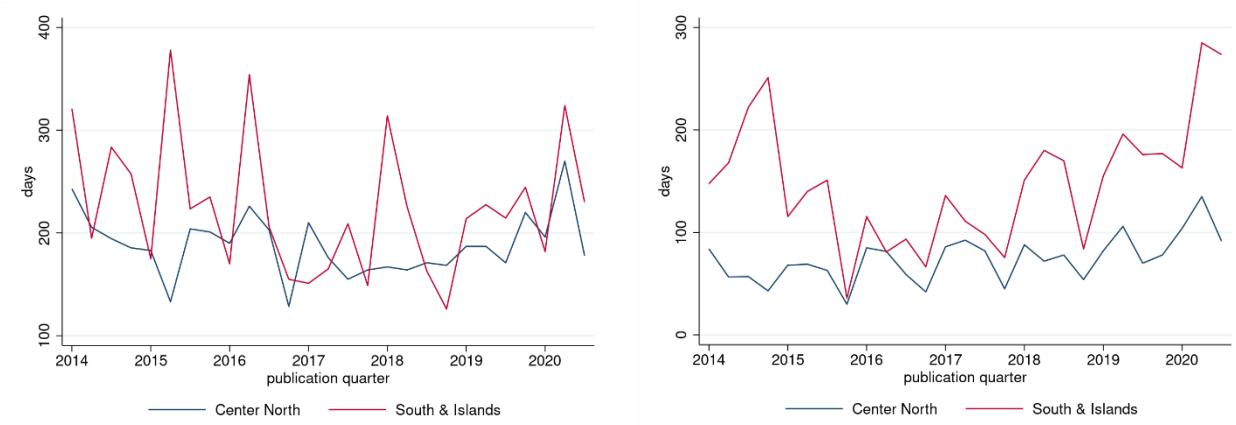
[31] Differently from what has been done for the awarding and execution phases, we do not perform a split on type of awarding procedure, as this should not affect the design phase directly. Any differences should be interpret as indirect effects (e.g., through size or project complexity) and would be hard to interpret.

Figure 10 – The North-South divide in the design of public works (*median duration*)



Notes: authors' calculations based on BDAP, ANAC data.

Figure 11 - The pure design phase and the "gap" phase (*median duration, by quarter)*

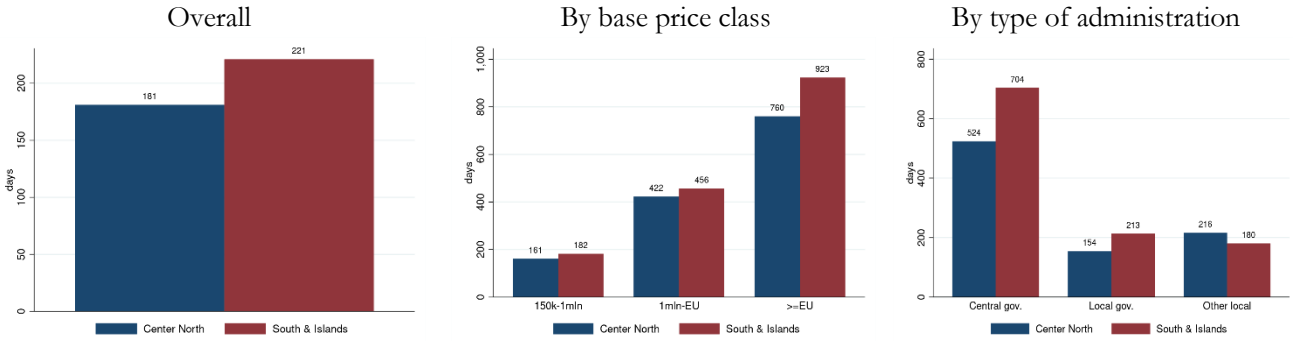


Notes: authors' calculations based BDAP, ANAC data.

We further decompose the entire design phase into the "pure design" phase, when the project itself is programmed and designed, and the "gap" phase, during which the last relevant authorizations are obtained and the administration prepares the tender. Notice that Figure 11 reveals that most of the North-South difference appears to pertain to the duration of administrative procedures that take place after the design is completed and before the public tender is opened. This is particularly true in the second half of the period of observation: the "pure" design phase for tenders published since 2016 has essentially the same length in the North and in the South of Italy. In the same period, the two macro-areas differ instead in the duration of the "gap" phase, and such divide opens up from 2018 onwards, after a period of convergence.

Figures 12 and 13 separately illustrate the differences between the South and the North of Italy in the length of the design sub-phases, overall and within contracts in each size class and type of procuring agency. First, the "pure" design lasts around 180 days in the North and around 220 days in the South (Figure 12, left panel). Such divide is much wider for the "gap" phase, which lasts nearly twice as many days in the South compared to the North (Figure 13, left panel). The duration of the "pure" design phase increases with the tender size (and, very plausibly, the complexity of the project), but the North-South divide remains rather stable in relative terms (Figure 12, center panel). An advantage of the North appears in works procured by both the central government and by local government agencies, while the length of this phase is slightly shorter in the South as far as other local entities are concerned.

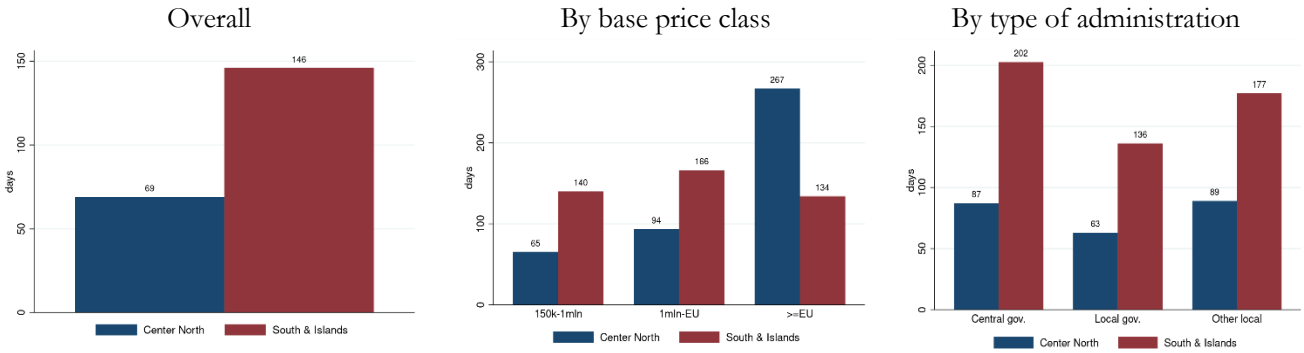
Figure 12 – The North-South divide in the "pure" design of public works (*median duration*)



Notes: authors' calculations based on BDAP, ANAC data.

The North-South gradient in the "gap" phase, instead, is rather marked for public works with lower base price (Figure 13, center panel). Contracts above the EU threshold show a shorter "gap" in the South, mostly due to a markedly faster tendering in the years 2014-15, around the end of the 2007-13 period of the EU Cohesion programs. Such North-South heterogeneity is instead of similar relative magnitude for public works procured by different types of procuring agencies (Figure 13, right panel).

Figure 13 – The North-South divide in the design-tender "gap" (*median duration*)



Notes: authors' calculations based on BDAP, ANAC data.

We next turn to regression analysis to investigate the multivariate correlations between the duration of the overall design phase, and then separately, the "pure" design and the "gap" phases, and the role of observables in explaining the North-South divide. Since the project design duration measure does not suffer from survival bias, the dependent variable here, differently from the previously used indicator function, is an actual (log) duration, in days. Accordingly, the direction of the estimated parameters is reversed – in a sense that a positive parameter indicates lengthier phases.

Columns 1 and 2 in Table 7 focus on the total length of the design phase and show that the lengthier duration in the South is to a large extent influenced by observable differences in tender characteristics. In particular, once control variables are included in the regression, the gap drops substantially from 36 p.p. to only 6 p.p.. Strong heterogeneity emerges when we look separately at the time taken to prepare the project and the time taken to prepare the tender procedure. First, the raw gap in the "pure" design phase changes its sign moving from column 3 to 4, tilting in favor of public works in the South. This evidence is consistent with the possibility that structural differences in projects designed for Southern regions is what drives Southern underperformance in the design – defined in the narrow sense - length. Second, columns 5 and 6 instead confirm that the "gap" phase is primarily responsible for the overall North-South difference, both unconditionally and accounting for several contract characteristics. The inclusion of such characteristics

does reduce the magnitude of the *South* coefficient, but to a lesser extent than for the pure design phase. This is in line with the intuition that features internal to the procuring agency, rather than contract characteristics, are what matters to a greater extent in phases where the procuring agency is more actively involved – even though, as previously remarked, in the design-tender "gap" phase administrations other than the procuring agency also intervene. Finally, we note that local government agencies are typically faster than either central administrations or other local bodies or both in all sub-phases of the design phase.

Table 7 – Design phase and observable characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Design		Pure design		Design-tender "gap"	
South	0.356***	0.057***	0.251***	-0.137***	0.542***	0.395***
	(0.017)	(0.018)	(0.020)	(0.021)	(0.021)	(0.024)
log(Base price)		0.206***		0.253***		0.037***
		(0.009)		(0.011)		(0.013)
Local government		-0.710***		-0.982***		-0.308***
		(0.034)		(0.041)		(0.059)
Other local		-0.582***		-0.841***		-0.058
		(0.037)		(0.044)		(0.061)
Negotiated/Direct		-0.090***		-0.133***		-0.070***
		(0.018)		(0.021)		(0.024)
Year FE	X	X	X	X	X	X
Object FE		X		X		X
Nature FE		X		X		X
Cohesion FE		X		X		X
Observations	29,390	29,329	25,514	25,462	26,243	26,190
Adjusted R^2	0.030	0.131	0.017	0.146	0.055	0.081

Notes: OLS estimation, standard errors in parentheses (* .1 ** .05 ***.01). *Object* indicates the main object according to the OG*/OS* classification available in ANAC data: this identifies, for instance, different types of buildings and infrastructures. *Nature* indicates whether the contract mainly refers to construction works, or to services and supplies associated with the realization of other projects. *Cohesion* indicates whether the project is undertaken within the EU Cohesion Policy.

Similar to the analysis in subsection 3.3, we shed light on the role of procuring agencies in determining the duration differences in the design phase of public works. Table 8.A, column 1 replicates Table 7, column 4, remarking how, conditional on other characteristics, "pure" design is faster in the South and in local procuring agencies. The sample in columns 2 and 3 includes only local government: these specifications show no difference in performance across types of local government. Although accounting for North-South differences in the workforce demographic composition explains a (relatively small) portion of the territorial divide in "pure" design durations (column 4), such characteristics themselves do not appear to significantly relate to the length of such phase. In a similar fashion, focusing on municipalities only, administrative efficiency does not seem to account for the North-South divide, nor to influence "pure" design duration directly (column 5).

The evidence, however, indicates significant heterogeneity for the more administrative design sub-phase. Table 8.B replicates the analyses for the duration of the design-tender "gap", where a clear disadvantage emerged for the South from unconditional comparisons (Figure 13). Such divide is evident also in the regression analysis. As before, local procuring authorities appear to fare generally better (column 1). Within local government, both provinces and municipalities do better than regions at the national level (column 2). In line with the evidence on the awarding and the execution phases, the duration of the design-tender "gap" is shortened in public administration with more female and young employees (column 3), and for highly

efficient municipalities (column 5). Following our interpretation of the role of administrations in the awarding and execution phase, this pattern reflects the higher intensity of administrative activity in the design-tender "gap", rather than in the "pure" design phase. However, the comparison between column 4 and column 5 indicates how even a significant measure of efficiency only partially reduces the size of our estimate of the territorial divide.

Table 8 –Design phase: characteristics of the procuring administration

A) "Pure" design					
	(1)	(2)	(3)	(4)	(5)
	(Log) Duration of the "pure" design phase				
South	-0.137***	-0.116***	-0.094**	-0.211***	-0.205***
	(0.021)	(0.034)	(0.037)	(0.035)	(0.037)
Local gov.	-0.982***				
	(0.041)				
Other local	-0.841***				
	(0.044)				
Province		0.040	0.043		
		(0.094)	(0.094)		
Municipality		0.096	0.089		
		(0.098)	(0.098)		
% Female employees			0.134		
			(0.122)		
% Empl. Under 35			0.495		
			(0.330)		
High efficiency					0.016
					(0.032)
Controls	X	X	X	X	X
Local gov. only		X	X		
Municipalities only				X	X
Observations	25,462	10,949	10,949	10,619	10,619
Adjusted R^2	0.146	0.125	0.125	0.114	0.114
B) Design-tender "gap"					
	(Log) Duration of the design-tender "gap"				
South	0.395***	0.396***	0.326***	0.516***	0.455***
	(0.024)	(0.038)	(0.041)	(0.038)	(0.040)
Local gov.	-0.308***				
	(0.059)				
Other local	-0.0576				
	(0.061)				
Province		-0.357***	-0.357***		
		(0.094)	(0.094)		
Municipality		-0.371***	-0.332***		
		(0.098)	(0.099)		
% Female employees			-0.572***		
			(0.134)		
% Empl. Under 35			-0.831**		
			(0.386)		

High efficiency					-0.167***
					(0.034)
Controls	X	X	X	X	X
Local gov. only		X	X		
Municipalities only				X	X
Observations	26,190	11,367	11,367	11,213	11,213
Adjusted R^2	0.081	0.048	0.050	0.055	0.057

Notes: OLS estimation, standard errors in parentheses (* .1 ** .05 ***.01). *Controls* include all additional controls used in columns 2, 4, 6 of Table 3. Columns 2-5 in addition include the logarithm of resident population.

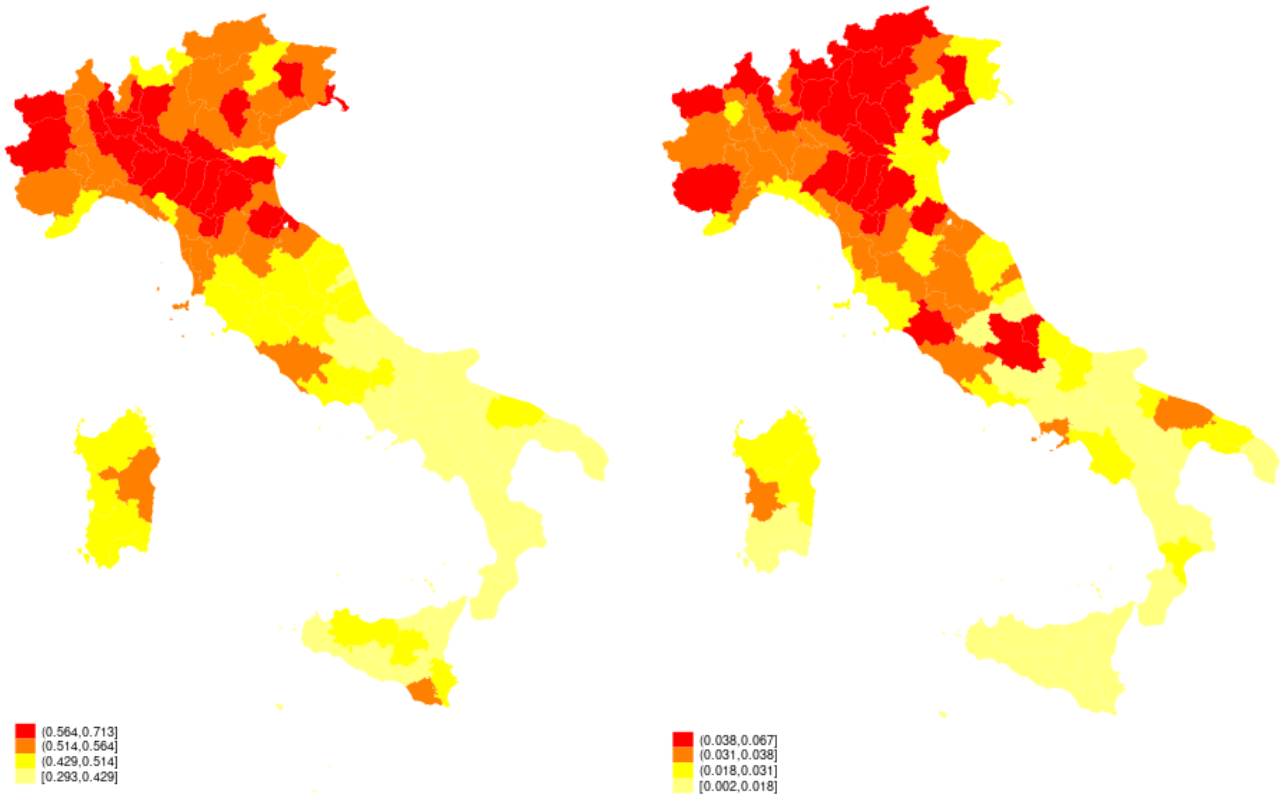
4. Discussion and policy implications

The previous analysis identifies a set of local government characteristics that relate to project duration and explain (to a lesser or larger extent) a portion of the territorial divide. In particular, we discuss four measures: two of them refer to workforce composition in terms of employees' characteristics (presence of female and young employees); the other two concern the administration's operational behavior (efficiency and tendering experience / workload). The natural question that follows is then how to use these analyses to derive some policy-relevant insights. First, we argue that identifying public administration characteristics that favorably relate to public works' completion time provides guidance for policy-makers on potential areas of intervention. For example, rejuvenating the workforce (or updating its skill composition) could benefit project execution times. Second, if Southern regions of the country exhibit structural differences in these indicators, targeted policy interventions (in terms of resources, regulation, or incentives) seem appropriate as potential "cures" against territorial disparities.

To shed some light on the latter possibility, we inspect the territorial heterogeneity in the four indicators we previously considered. Figure 14 plots the share of female employees (left panel) and young employees (right panel) per municipal administration, averaged at the provincial level. The female presence exhibits a pronounced North-South gradient, with a substantially lower share of women in the South. For example, 78% of municipal administrations do not reach gender parity in their workforce against 24% in the North. A similar – perhaps milder – picture emerges when we consider young employees. This evidence highlights the Southern "underperformance" in dimensions that are found to positive correlate with faster project realization, a potentially useful insight to guide policy makers' actions. Yet, the channels through which these features affect public works may not be obvious and, unfortunately, the lack of more detailed administrative data does not allow us to analyze them more in depth.[32] Nonetheless, backed by the existing literature one may argue that younger employees facilitate the efficient utilization of new technologies and digital resources. Similarly, some recent contributions highlight gender differences in dealing with bureaucratic tasks, such as women's higher diligence (Decarolis et al., 2021) and lower likelihood of being corrupt or vulnerable to political opportunism (Baskaran et al., 2021).

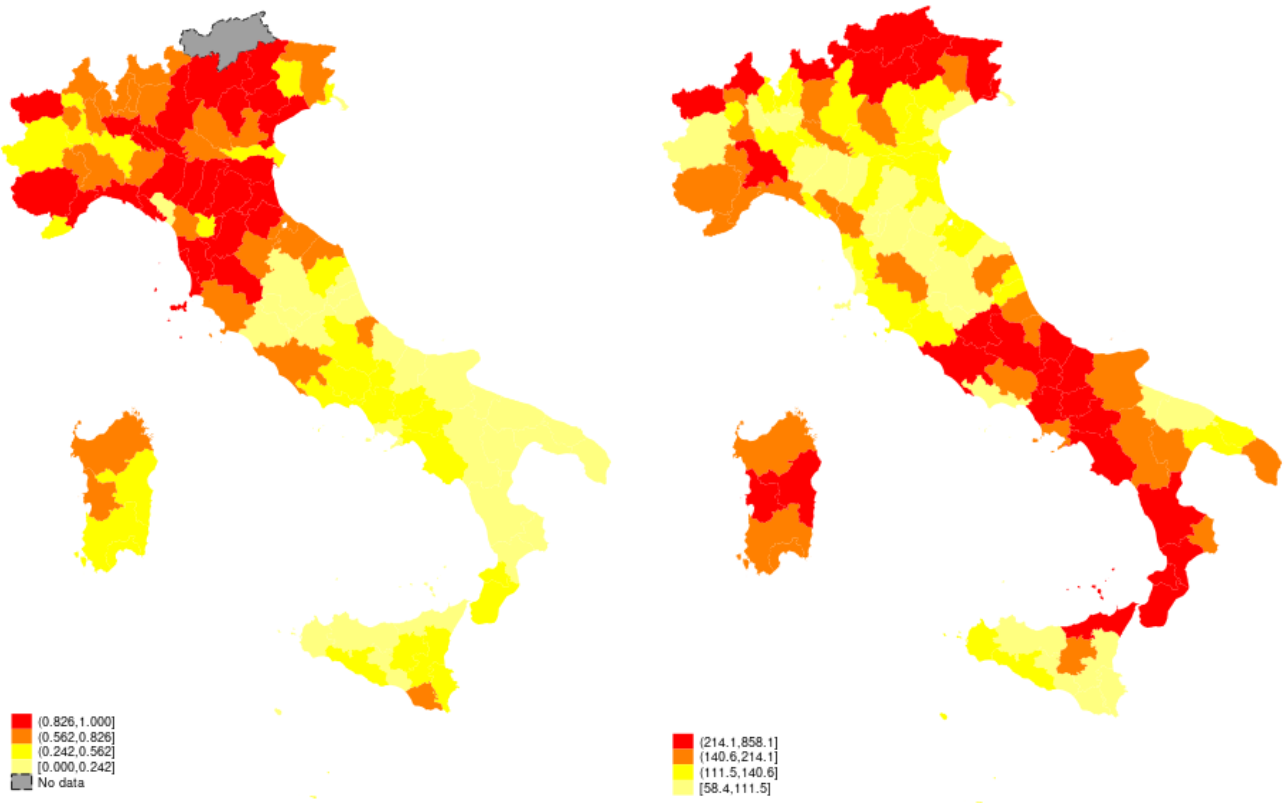
[32] ANAC data, in fact, do not report the name or identification number of the public official responsible for the tender, nor any of their observable characteristics such as gender, age or education, or their skill composition, for instance in terms of digital knowledge.

Figure 14 – Workforce composition variables: share of female (left) and young (right) employees



A striking North-South divide also emerges in terms of our proxy for administrative efficiency (Figure 15, left panel). By construction, the variable captures the extent to which administrations "move in advance" in completing tasks before pre-specified deadlines. On top of this literal interpretation, this measure may have a broader meaning - one may expect it to be highly correlated with other dimensions of efficient functioning of an organization. The wide North-South divide, therefore, highlights the importance of focusing policy action on organizational features of public administrations, for example by improving management quality, investing in human capital or training, or supporting the adoption of productivity-enhancing organizational structures. The geographic distribution of our measure of experience, on the contrary, displays a different pattern: public administrations are typically more "experienced" in the South (Figure 15, right panel). Such pattern, first, explains why the inclusion of experience-related variables left our estimate of the territorial divide rather unaffected: the variation in these measures does not closely follow the geographical North-South gradient under study. Second, we recognize that the experience measure may be more pronounced in the South by construction: we proxy tendering experience by the amount of resources spent on public works and Southern administrations typically spend relatively more on public procurement (with respect to their output or population) than Northern ones. Nonetheless, while using tendering experience of public administrations to explain the North-South divide may be cumbersome in our data, our regression analyses indicate its positive link with project realization durations. The latter evidence suggests that if more public works were tendered by administrations with more extensive tendering experience (and supposedly expertise), administrative phases would likely be shorter. Even though these phases contribute relatively little to the overall duration, this area is relatively easy to target with policy intervention. For example, this piece of evidence may be used to sustain the idea of centralizing public procurement purchases, whereby fewer but more qualified procurement agencies purchase on behalf of several public buyers.

Figure 15 – Administrative behavior variables: share of highly efficient municipalities (left) and average experience (right)



Last, but not the least, we acknowledge that even with the rich procurement data at hand, combined with several additional data sources, we are unable to map out the set of factors that fully explain the geographical divergence in public works' completion times. We find that both contract level observables and certain public administration characteristics matter for the observed North-South gap; yet, a non-negligible part of the variation appears to be linked to factors that remain in a "black box" to the researcher. We pursue one last attempt to dwell into the question of what factors might this box contain, by testing whether public works' realization performance is related to other structural traits of individual administrations, both observable and not. Table 9 contrasts the adjusted R^2 obtained through a specification with all administration-specific variables introduced in the previous analyses (columns 1 and 4) against the analogous one augmented with province fixed effects (columns 2 and 5) and the one with municipal administration fixed effects (columns 3 and 6). For all phases, the model fit increases substantially when province fixed effects are included, suggesting that important contextual (time invariant) factors, common to public administrations operating in close geographic proximity, are at play (e.g., the structure of local economy, geo-morphology, incidence of shadow economy or organized crime, etc.). Most important, the explanatory power of the model rises further – and to a larger extent – when fixed effects for each public administration are included. Such pattern suggests that features specific to a given municipality – rather than the ones varying at a broader level within provincial boundaries – bear additional and substantial explanatory power in determining public works' realization durations. Our interpretation is that digging deeper in administrations' individual characteristics – such as their internal organization structure and workforce allocation within it, as well as their management and broader organizational practices – may be a fruitful avenue in the future exploration of the remaining drivers of procurement performance. In fact, providing evidence more directly relevant to policy action would require

data that are currently unavailable at a large scale, such as granular information on the management of tenders, or on individual public procurement offices within administrations.

Table 9 – Explanatory power of administration fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Awarding 4 months			Execution 1 year		
Controls	X	X	X	X	X	X
Province FE		X			X	
Administration FE			X			X
Observations	31,926	31,926	30,482	23,488	23,488	22,067
Adjusted R^2	0.118	0.170	0.271	0.096	0.116	0.199
	"Pure" design			Design-tender "gap"		
Controls	X	X	X	X	X	X
Province FE		X			X	
Administration FE			X			X
Observations	10,640	10,640	9,405	9,529	9,529	8,345
Adjusted R^2	0.094	0.144	0.244	0.057	0.118	0.210

Notes: OLS estimation. The sample consists of public works tendered by municipalities for which all administration-specific variables used in Table 5 are available. *Controls* include all contract-level covariates used in Table 5, as well as workforce composition (Table 5, column 3) and efficiency variables (Table 5, column 6). Columns 1-6 of the upper panels also include experience measures (Table 5, column 4).

5. Conclusions

Our analysis shows that the durations of the phases constituting the life cycle of public works in Italy display substantial within-country heterogeneity. All phases typically last longer in the South and Islands than in the Center North of the country. This gap is particularly wide in phases characterized by a prevalent role of the contracting authority, such as the awarding phase and the immediately preceding design-tender "gap", in which the tender is prepared. The divide is lower when the actual execution of works is considered. Such evidence definitely points to difficulties in the management of the steps of the procurement process that require more intense bureaucratic intervention.

Although the current analysis is rich in detail and presents several heterogeneity specifications, we believe it is necessary to devote more attention to a few specific aspects of the impact of administrative action and behavior on the duration of public works' realization. Local government bodies (the large majority of which is constituted by municipalities) typically do worse than central administrations when managing bureaucratic steps of the process. Equipped with additional data, we therefore analyze several features of these administrations, showing for instance that procuring agencies with younger labor force perform better, possibly reflecting higher education levels and more "modern" skills. Furthermore, the current workload of public administrations is typically associated with a slower pace, and the overall tendering experience (possibly reflecting acquired competence in tendering) correlates with shorter awarding phases. Similarly, a measure of administrative efficiency appears to positively correlate with the swift realization of public works. These heterogeneities shed light on some of the mechanisms at work behind the phenomena we observe and quantify, as discussed in section 4. Overall, our study takes a step closer to understanding the North-South divide; yet, it does also highlight the need to gain deeper knowledge on the specific features of administrations and their behavior that substantially affect the time of public works' realization, and so differently across its various stages and across areas.

A barrier to a better understating of these phenomena is given by the absence of statistically operational data on the internal structure of individual procuring authorities and on their actions throughout the procuring process. Many suggest, even with repercussions on recent legislative decisions, that competence and specialization within administrations would lead to better procurement outcomes. However, such features can at present only be captured by proxy variables, and we provide such an attempt in this paper. Centralization has been sought as a way to improve procurement performance and reduce waste, but doubts remain on whether the aggregation of a – supposedly – ill-prepared and perhaps scarce workforce can provide actual benefits. Data on individual competence and human capital, as well as on the presence of dedicated organizational units within public administrations, would allow to further investigate these aspects in more detail.

As final considerations, one must first keep in mind that our work only deals with durations. Durations are particularly important because they determine the pace at which public expenditure translates into infrastructure and services to the benefit of citizens and firms, and therefore ultimately supports economic growth. This aspect is gaining particular relevance as lager expenditure capacity, provided in the context of the NPRR, must be converted into economic recovery as quickly as possible. Yet, an overall assessment of the public works' system must be based on several other dimensions, such as the efficiency of the allocation of public resources to private contractors and – most importantly – the quality of the final product. The latter dimension is certainly the hardest to assess quantitatively.

Second, our analysis only considers public works, excluding procurement of services and supplies, which constitute the majority of public purchases. Our attention falls onto this category mainly because of capital expenditure's primary contribution to economic growth, and because of its importance for economic recovery, as already remarked. However, from the public finance point of view of the efficient use of public resources, current expenditure is obviously equally important.

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