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Administrative capacities that matter

Organisational drivers of public procurement competitiveness in 32 European countries*

Working Paper series: GTI-WP/2019:01

March 2019, Budapest, Hungary

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Administrative capacities that matter: organisational drivers of public procurement competitiveness in 32 European countries

In spite of the many efforts in the pursuit of a European single market, many barriers continue to lie ahead, as the field of public procurement illustrates. In 2015, around 40% of all high-value procurement tenders in a large pool of European countries attracted only 2 bidders or less, and only 3% of all winning companies had their offices outside the procuring country. This paper explores a rather unaccounted dimension behind the competitiveness of tenders: the administrative capacities of contracting authorities. For this, we first build a theoretically-informed multidimensional framework of administrative capacities and subsequently test the effect of these capacities on competitiveness, by using a comprehensive and curated database of more than 120.000 procurement contracts in 32 European countries. The findings show that most administrative measures robustly explain a portion of competitive- ness, in particular administrative aspects related to the choice of instruments and procedures to conduct the bidding calls, such as electronic procurement. Findings also show that the behaviour of these relationships is counterintiuitive at times, and highly dependent on the national context, suggesting that organizational path-dependency undermines convergence under EU regulation.

1 Introduction

From its early creation, the goal of the European single market has been to integrate national European markets through the progressive elimination of barriers to the flow of goods, services, capital and labor in order to foster growth and competition (Smith, 2010). Since governments are core purchasers of these resources –with public procurement accounting for up to 13% of EU national gross domestic products or 29% of public spending–, the European Union has sought to create a common set of rules and procedures for higher value tenders among member states, in line with the aspirations of the single market. But the premise of lowering barriers to mobility can be called into question when observing the actual patterns in public procurement in the region. An analysis of Tenders Electronic Daily data for 2015 shows that about 40% of large value tenders attracted 2 or less bidding companies per contract. Moreover, as little as 3% of all winning companies were located outside the country where the bidding process took place, in what could be deemed as 'the ever incomplete single market' (Howarth and Sadeh, 2010).

In this context, it is possible that local and national contracting authorities have struggled to harmonize EU-centred top-down demands for convergence and integration with their idiosyncratic and path-dependent practices in the area of procurement. These contrasting pressures may have created capacity bottlenecks that have hindered the openness of purchasing processes in the public sector.

Yet, the importance of achieving best value-for-money is a core principle of public procurement in a well-functioning state (Dimitri et al., 2006). Best value-for-money involves three principles: economy (acquiring resources in the right quantity and quality), efficiency (minimum cost for the same service) and effectiveness (achievement of intended outcomes) (McKevitt, 2015).

The literature on value-for-money and competitiveness in public procurement provides a number of hints in regards to the factors that help achieve these principles. Two main streams of research exist in this respect. Literature coming from economics has focused on the role of process design and compliance incentives such as the rules that determine winning bids in auctions (e.g. Albano et al., 2006; Decarolis, 2014), the transaction costs associated to different kinds of procurement channels (e.g. Coviello and Mariniello, 2014; Lewis-Faupel et al., 2014a; Yakovlev et al., 2014, the impacts of performance-related pay (Rasul and Rogger, 2013), audits and monitoring (Di Tella and Schargrodsky, 2003; Olken, 2007) and preferential treatment of bidder classes such as SMEs (Marion, 2007; Nakabayashi, 2013). Another stream coming from political science places the focus on corruption and uses the number of bidders as a proxy measure. For this set of scholarly works, the number of bidders is determined by the role of political competition and electoral accountbility (Coviello and Gagliarducci, 2017; Klaˇsnja, 2015), and the impact of political connections and party finance contributions (Boas et al., 2014; Goldman et al., 2013).

However, there are virtually no academic works that place the focus on the organizational and managerial aspects of contracting authorities themselves. Only a small number of practitioner-led works have systematized insights on the organizational drivers of competitiveness, as we will see in the next section.

Our article aims to provide a substantial contribution in that respect, first by developing a parsimo- nious and theoretically-informed framework to measure the administrative capacities of contracting authorities, and subsequently by testing which capacities matter the most when increasing the level of

competitiveness of tendering processes. To the best of our knowledge, no scholarly work exists which has robustly tested these relationships from an empirical and comparative EU-wide per- spective. We posit that better-endowed contracting authorities are able to make more informed decisions about the right setup for a tender to attract multiple bidders and at the same time are able to signal a more professional and credible handling of the procurement process.

With this in mind, the next section offers an overview of the existing frameworks of administrative capacities, both generic and for the field of public procurement in particular. Section 3 presents our own framework of administrative capacities, seeking to follow the work of other scholars and practitioners, but also tailoring it in order to maximise the opportunities provided by the exis tence of (big) data on public procurement in Europe. Section 4 explains how the database was compiled and shows some basic descriptive patterns. Section 5 shows our estimation results. Sec- tion 6 presents a number of robustness checks and extensions that generalise our understanding of competitiveness. Section 7 concludes.

2 Administrative capacities: dimensions and measurement

In contexts of increasing uncertainty, governments are particularly expected to provide quick solu- tions to pressing and unpredictable phenomena. It has been claimed, however, that while multiple solutions are usually presented in the format of well-informed policy design, much less attention is given to the underlying administrative capacities needed to sustain this problem-solving capacity (Lodge and Wegrich, 2014a :10). Moreover, states are required to develop multiple types of capac- ities, where it may well be the case that some are in tension with others (Cingolani, 2013). Taking detailed stock of governments' administrative capacities is of crucial importance to complete the picture of public problem-solving. For the purpose of this study, we define administrative capacities as the structural and contingent organisational features that enable the adaptation needed in order to reach efficiency, transparency and inclusiveness at once. This choice of organisational features is purposefully broad in order to accommodate a wide array of administrative elements.

This section sets out to provide an overview of the conceptual frameworks of administrative ca- pacities that have been most frequently used by scholars and practitioners. Our overview does not abound with the specifics of these frameworks but shows their overall conceptual structure. A summary of the most encompassing approaches can be found on Table 1[1].

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[1] Although we focus on the concept of administrative capacities, the scholarly literature on public management has often used the concepts of administrative capacity and administrative quality as synonyms. In Le Grand, 2007, for example, administrative quality is defined in terms of either the inputs, outputs, or processes that are involved in delivering public services. As our work shows, a literature review on administrative capacities displays a very similar classification for administrative capacity elements. However, as Le Grand, 2007 also points out, the idea of administrative quality has mostly focused on the outcomes part. So in other words, the focus on administrative capacities is more encompassing and allows richer analyses without excluding the analysis of outcomes (in our framework the quality of the outputs of the procurement process).

2.1 Generic administrative capacities frameworks

Several international organisations have envisioned a systematic way to assess the administrative capacities of their stakeholders, with the main ambition of minimising fraud risks when providing assistance. While these approaches use different jargon and entail different levels of precision, they are, for the most part, remarkably similar.

The International Development Research Centre Canada (IDRC) first brought forth a systematic framework to assess the organisational capacities of their partners around the world –mostly research institutes concerned with development issues– in order to address capacity gaps and delineate better strategies for investments in international assistance. The report from 1995 acknowledges that structural organisational issues have been much less addressed than specific project evaluations (Lusthaus et al. 1995). Hence their methodology serves as a profiling mechanism for organizations, where multiple dimensions are addressed and accounted for through a mix of qualitative and quantitative tools. The four overarching components IDRC's framework are: a) external environment conditions; b) organizational motivation; c) organizational capacity and d) organizational performance.

TABLE 1: ADMINISTRATIVE CAPACITIES FRAMEWORKS

	← More structural	More contingent →	
Author	**Background**	**Inputs**	**Outputs**
IDRC Lusthaus et al (1995), ; IADB, Lusthaus et al (2002)	External environment: admin/legal, technological, political, economic, social and cultural factors	Organisational motivation; organisational capacity	Organisational performance
USAID, Brown (2001)	System-level variables	Organisation level, human resource level, individual level variables	
CAF Resource Centre (2013)		Capacity enablers: leadership, strategy and planning, people, partnerships and resources, processes	Citizen-oriented results, people results, social responsibility results, performance results.
World Bank, Verheijen (2007)	Systems level	Policy and People levels	

This four-dimensional assessment underwent slight reforms and was later adopted by the Inter-American Development Bank (IADB) Lusthaus et al. (2002). The reformed version does not change the core dimensions but generalizes the scope beyond research centres and non-governmental organisations.

Another framework that is worth illustrating is that of the American development agency USAID, specifically tailored for the healthcare sector. This methodology is based on the idea of a four-level nested system ranging from more general to more contingent subsystems, namely: a) the health system level; b) the organizational level; c) the human resource level (health programme personnel) and d) the individual or community level Brown et al. (2001). In each of these subsystems a number of particular items are analysed, and all subsystems are thought to interact when explaining overall capacity.

Similarly, in the late 1990s, European Union member states developed the Common Assessment Framework (CAF) as a quality management self-assessment tool targeted to the public organisations in the EU and beyond. The European Institute for Public Administration (EIPA) reports that the CAF was first adopted in 2001 and applied in a narrow context, but subsequently expanded across multiple countries. Its most updated version of 2013 covers more than 800 public sector organisations in the region[2]. The CAF consists of two main components, one concerning the enablers of capacity, which include a) leadership, b) strategy and planning, c) people, d) partnerships and resources, and e) processes; and a second one guiding the criteria upon which subsequent results should be assessed: e) citizen-oriented results; f) people results; g) social responsibility results and h) performance results CAF Resource Centre 2013.

Also in the context of European integration, a report commissioned by the World Bank, Verheijen (2007) takes on the challenge of benchmarking the administrative capacities of new EU member states along the lines of three organizational dimensions: a) policy, b) people and c) systems. Policy refers specifically to performance management, strategic planning and coordination. For the people dimension, the study looks at human resource management practises such as recruitment, career management and incentive mechanisms. In terms of systems Verheijen assesses to which extent these Member States have introduced e-Governance systems that enhanced the business environment. The study identifies a series of good practices and measures all dimensions using a combination of the previously outlined CAF, the Metcalfe Coordination Scale (Metcalfe 1994), the Global Information Technology Report[3] and the OECD-Sigma project, which we will address shortly.

With a more universal perspective, the United Nations Development Programme (UNDP) launched in 2008 its Capacity Assessment Framework as part of a broader strategy to build capabilities for change in the most deprived parts of the world. This framework outlines a roadmap to organisational and institutional capacity as a 3-dimensional process. The first step is to address the core issues of capacity, namely: the institutional arrangements, the leadership, the knowledge and the accountability. The second is to deal with more specific functional and technical capacities in order to: 1) engage stakeholders; 2) assess a situation and define a vision and mandate; 3) formulate policies and

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[2] Eipa website: http://www.eipa.eu/en/topic/show/tid=191
[3] https://www.weforum.org/reports/the-global-information-technology-report-2016/

strategies; 4) budget, manage and implement; and 5) evaluate. The above two dimensions, in turn, can be applied to three "points of entry": the environment, organizations and individuals (UNDP 2008).

The OECD-Sigma project (Support for Improvement in Governance and Management) is a joint initiative by the OECD and the EU geared towards monitoring and improving the quality of public administration in EU Enlargement countries and EU Neighbourhood countries[4]. In order to classify the different measurements and initiatives involved, the Sigma project uses six public administration dimensions, called 'principles': a) the strategic framework of public administration reform on which a country relies, b) the capacity for policy development and co-ordination, c) the standards for public service and human resource management, d) the quality of accountability, e) service delivery and f) public financial management, external audit and public procurement. The project relies on a series of internal and external indicators to measure each of the six principles (OECD Sigma 2014).

In 2014 the Hertie School of Governance launched the 2014 Governance Report with the theme the problem-solving capacities of public administrations (Lodge and Wegrich 2014b; Hertie School of Governance 2014). There, at least two academic frameworks are proposed to capture administrative capacities in a similar vain from previous works. One, aims to capture a highly structural and comprehensive set of capacities, including delivery, regulatory, coordination and analytical ca- pacity (Lodge and Wegrich 2014a). The dimensions outlined in this special report are admittedly difficult to measure, but some ideas and a rich array of measures are proposed in Stanig (2014) and Hertie School of Governance (2014). Another approach that cuts across these four capacities and exclusively takes a managerial perspective is offered in Hammerschmid et al. (2014). There, the authors conceptualize and measure Administrative Management Capacity, which is understood as the combination of six dimensions: strategic capacity, human resources, organizational culture, performance-orientedness, leadership capacity, coordination capacity.

Other similar approaches exclusively focused on management have been built for the areas of education and healthcare. Two of them contain a large list of management dimensions, clustered along four main elements: operations (policies and processes), monitoring, target setting and people (Bloom et al., 2015, Bloom et al., 2013).

2.2 Administrative capacities in the field of public procurement

For the specific area of public procurement, the study of administrative capacities has been more limited, with few initiatives purposefully designed to inform the determinants of efficient tendering processes. Yet, a number of empirical scholarly works point at the impressive weight of authority-level characteristics when explaining procurement competitiveness, as illustrated, for ex- ample, by the work of Best et al. (2016) on Russian procurement, or Fazekas and Tóth (2016) on state capture in Hungary[5]. In what follows, we illustrate some of the most recent practitioner- oriented approaches on administrative capacities for procurement, followed by a number of academic works.

A recent report by the European Commission presents an actionable framework to assess a number of organisational dimensions that are deemed to matter for competitive procurement around European Structural and Investment funds European Commission (2016). This report understands administrative

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[4] http://www.sigmaweb.org/about/

[5] For an overview of procurement-related transparency measurements at the organizational level, see Fazekas et al. (2016)

capacities for procurement as "the available resources in central bodies responsible for drafting and implementing the procurement policies as well as in contracting authorities at all levels which carry out tender processes" (p. 30). Capacities are captured through five dimensions: a) the number of procurement staff at key procurement organizations (legislative, central purchasing authority, procurement oversight, etc.) relative to the quantity and value of procurement managed; b) the number of contracting authorities relative to total procurement in the country; c) the types of qualification required from procurement expert officials; d) the number and nature of trainings and e) the existence of different tools, such as IT systems, risk management tools, templates, guidance materials or standardized tender documentation.

Also, within the Principles of Public Administration by the OECD-Sigma project jointly under- taken by the OECD and the European Commission, one specific dimension refers to financial management and public procurement in Europe and neighbouring countries (OECD Sigma 2014). In particular, this framework looks at a) to which extent procurement regulation is aligned with EU standards and regulations; b) whether there is a central authority that coordinates, implementsand monitors procurement effectively; c) whether there is a competent and harmonized legal sys- tem to handle procurement appeals and complaints; d) whether procurement processes comply with the principles of equal treatment, non-discrimination, proportionality and transparency, and e) whether contracting authorities have appropriate skills and resources to handle procurement processes across its whole cycle.

The OECD has more generally addressed the standards behind efficient and -especially- transparent procurement for several years. OECD (2008) outlines a number of principles for high integrity pro- curement in the format of 'checklist', including transparency, good management, risk-management, high collaboration with the private sector, monitoring mechanisms and accountability. These are further expanded and more precisely defined to cover a wide array of organizational aspects in OECD (2015), which include: sufficient staff and tools, skills, merit-based officials, collaborative approaches with third parties, performance measurement, risk assessment tools, mechanisms for oversight, complaints and sanctions, and multi-year budgeting.

Other academic works have focused on a number of clear-cut policy and management dimensions that, they argue, make a difference for procurement quality and efficiency. Bandiera et al. (2009) shows that variation in the price of standard goods purchased by Italian procurement authorities can be largely attributed to so-called 'passive waste', understood as non-corruption related ad- ministrative inefficiencies. The work highlights the role of central purchasing bodies in lowering prices, and the importance of the organizational structure chosen, with semi-autonomous agen- cies achieving the most competitive prices and national ministries at the opposite end. Electronic procurement is also here considered a relevant area for the competitiveness of tenders. The work of Lewis-Faupel et al. (2014b) shows that e-procurement improves the quality of infrastructure in India and Indonesia by attracting more qualified companies, although it does not reduce prices. Neupane et al. (2015) find that e-procurement improves public trust in the transparency of pub- lic procurement in Nepal, while Singh et al. (2010) finds similar results for India, Ethiopia and Fiji. Sargiacomo et al. (2015) study the effects of accounting-based transparency measures on the probabilities of particularistic tendering in Italy over a 22-year period following the Mani Pulite affair.

For the specific area of infrastructure, Haber (2016) proposes a framework to capture the latent administrative ability of 34 OECD countries to undertake efficient procurement processes. This latent ability is captured through five key dimensions using a variant of the item-response theory methodology: a) transparency, b) eProcurement, c) the participation of small and medium enterprises and d) central procurement bodies and e) green procurement. Interestingly, the results show that countries fare very differently in all different dimensions, which supports the argument in favor of a multi-dimensional approach to capacity.

Finally, the last two works focus exclusively on the role of human resource management and bureaucratic autonomy. Charron et al. (2015) explore how different accountability mechanisms between politicians and civil servants affect corruption risk in procurement. Meritocratic recruitment of civil servants, in particular, is a mechanism by which bureaucrats and politicians coexist and hold diverging interests, which minimizes corruption risk. This idea is tested with data from 212 European regions. On a similar vein, the work by Parrado et al. (2016) points at the overall importance of bureaucratic autonomy in lowering corruption risks in subnational level public procurement. The authors' study compares the procurement processes and outcomes of two municipalities in Spain, that resemble on multiple institutional features but differ on the degree of influence of procurement "trustees" (i. e. civil servants that do not officiate as mere implementers of political preferences but are responsive to social preferences as well). Where trustees had more capacity to exert checks in a number of different ways, procurement outcomes proved to be of higher quality.

3 Our model

In this section we build a parsimonious model that seeks to strike a balance between the importance given to multidimensionality in the literature of administrative capacities, and solving the technical difficulties of finding administrative measures that are comparable across time and space, given how heterogeneous and context-dependent administrations are (Fukuyama, 2013; Cingolani et al., 2015). In this sense, we aim to keep the consistency of the comparisons by extracting the information from a single database that treats all tendering processes falling within EU regulations on procurement equally, while at the same time exploit as much granular data on organizational dimensions as possible.

In order to mirror some of the existing frameworks, we include three distinct components of administrative capacity, namely: a) structural organizational features; b) administrative inputs; c) administrative outputs. Each dimension has, in turn, a number of sub-components, as detailed on Table 2. Following other salient approaches, the combination of all three dimensions is deemed here the most comprehensive way to get to the underlying capacity of agencies, which by definition is not accessible if not through approximate measures. Moreover, we share the opinion that measurements focused only on the output or input sides are both imperfect (Lodge and Wegrich, 2014b: 15).

We choose to keep the three dimensions separate instead of aggregating them into one index of administrative capabilities. There are two main reasons for this: one, the structural organizational features take the form of categorical variables that cannot be ordered, and two, administrative inputs and outputs behave rather differently and are therefore individually informative.

TABLE 2: THREE-DIMENSIONAL APPROACH TO ADMINISTRATIVE CAPACITY

Dimension	Concept	Items
Structural factors	Organizational structure	• Organization type (central, subnational, executive agency, etc.) • Policy area of organization
Administrative inputs	Connectedness & Innovation	• Centralized purchasing • WTO framework • Electronic procurement • English as foreign language
Administrative outputs	Missing information Administrative errors	• Number of key missing fields in form • Number of duplicated announcements per contract • Discrepancies between call for tender and award
Dimension	Concept	Items

With this conceptual structure in mind, we aim to estimate the following baseline model:

$$\text{Competitiveness}_i = \alpha + \beta_1 \text{OrgStructure}_i + \beta_2 \text{AdmInputs}_i + \beta_3 \text{AdmOutputs}_i + \beta_4 \text{Industry sector}_i + \beta_5 \text{Type of contract}_i + \beta_6 \text{Type of procedure}_i + (1)\ \beta_7 \text{Eu funds}_i + \beta_8 \text{Country}_i + \varepsilon_{i,t}$$

Where Competitiveness$_i$ is our main outcome variable of interest, and is represented by a direct measure of the number of bidders per contract, or alternative scalar transformations of it; OrgStructure$_i$ contains two variables capturing the structural profile of the contracting authority, namely the legal standing of the organization (e. g. whether it belongs to the central or subnational governments) and the main policy area in which the authority reportedly operates; AdmInputs$_i$ combines items relevant to the degree of connectedness and innovation during the tendering processes such as whether it is undertaken by a central purchasing authority, whether it is covered by the WTO international agreement on procurement, whether the tender involves electronic procurement modalities, and whether the tender accepts bids in English as a foreign language; AdmOutputs$_i$ captures the quality of results of the tendering process and includes a measure of administrative errors and a measure of the quality of information management and transparency.

Our estimations shown in section 5 involve both the role of each individual item as well as a number of composite measures along the input and output dimensions. For the input dimension, the com- posite is constructed as a weighted and normalized sum of all five items. Within the administrative outputs dimension, the behaviour of the items is discovered to follow very different patterns with regards to their explanatory power over the number of bidders, as will be shown in the next section. Given this

information, we choose to preserve the item around missing information as a single dimension, and construct a second dimension with a composite indicator of administrative errors by computing the unweighted and standardized sum of the number of duplicated announcements and the number of discrepancies between calls for tenders and awarded tender announcements.

Among the set of explanatory variables, our estimation also includes a regressor for the type of procurement contract, i.e. whether it is a works, supplies or utilities contract, the type of procedure used[6], whether the tender involves funds from the European Union, and a series of country-dummies in order to control for other unobserved country fixed effects.

The next section describes the data sources from which the terms of the model will be constructed and Appendix B describes the formulas for each administrative capacities dimension.

4 Database and descriptive statistics

Our assessment draws on an originally-compiled database on public procurement processes in 32 European countries for the year 2015, derived from the open database Tenders Electronics Daily (TED). The latter is created and maintained by the European Commission, in particular the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROWTH). The TED platform is the online version of the Supplement to the Official Journal of the European Union (OJEU), and represents a complete repository of tender information for contracts surpassing estimated values above the thresholds defined by the EU directives on public procurement[7]. The TED database mainly reports information belonging to two types of announcements: invitations to present bids (calls for tenders) and information about tendering results (awarded tenders).

Although TED contains errors and omissions attributable to the original contracting authorities' reporting process, it has been subject to a number of quality checks and enhancements by the European Commission, resulting in a suitable and reliable database for research.

Given that the TED database publishes calls for tenders and awarded tender announcements separately, we proceed to a careful process of matching the corresponding two, through a thoughtful decision-tree algorithm that detects and decides upon duplicated identifiers. Moreover, TED pub- lishes results for each lot as if they were individual contracts. In order to avoid artificially inflating the measurement of contracting authorities' organisational features that are common to all lots in one contract, we apply a selection process that randomly retains one lot per contract in the case of multiple lots in place. After this process is completed, our database retains a total of 126,311 tender contracts for the year 2015 for 32 European countries[8].

Figure 1 below displays mean and dispersion measures for some of the most relevant variables regarding procurement competitiveness in our sample.

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[6] Which involves the following options: a) accelerated negotiated, b) accelerated restricted, c) award without prior publication of contract notice, d) competitive dialogue, e) negotiated with call for competition, f) negotiated without call for competition, g) open and h) restricted.

[7] For the year 2015 these amounted to 134.000 euros for supply and services contracts for central governments and 200.000 euros for subnational governments, 5 million euros for works contracts, while other thresholds applied for utilities and special sectors such as defense and security. For a detailed list see: https://ec.europa.eu/growth/ single-market/public-procurement/rules-implementation/thresholds_en

[8] The single observation found for Lichtenstein is dropped.

FIGURE 1: AVERAGE NUMBER OF BIDDERS FOR EU CONTRACTS AND CONFIDENCE INTERVALS BY GROUPS - 2015
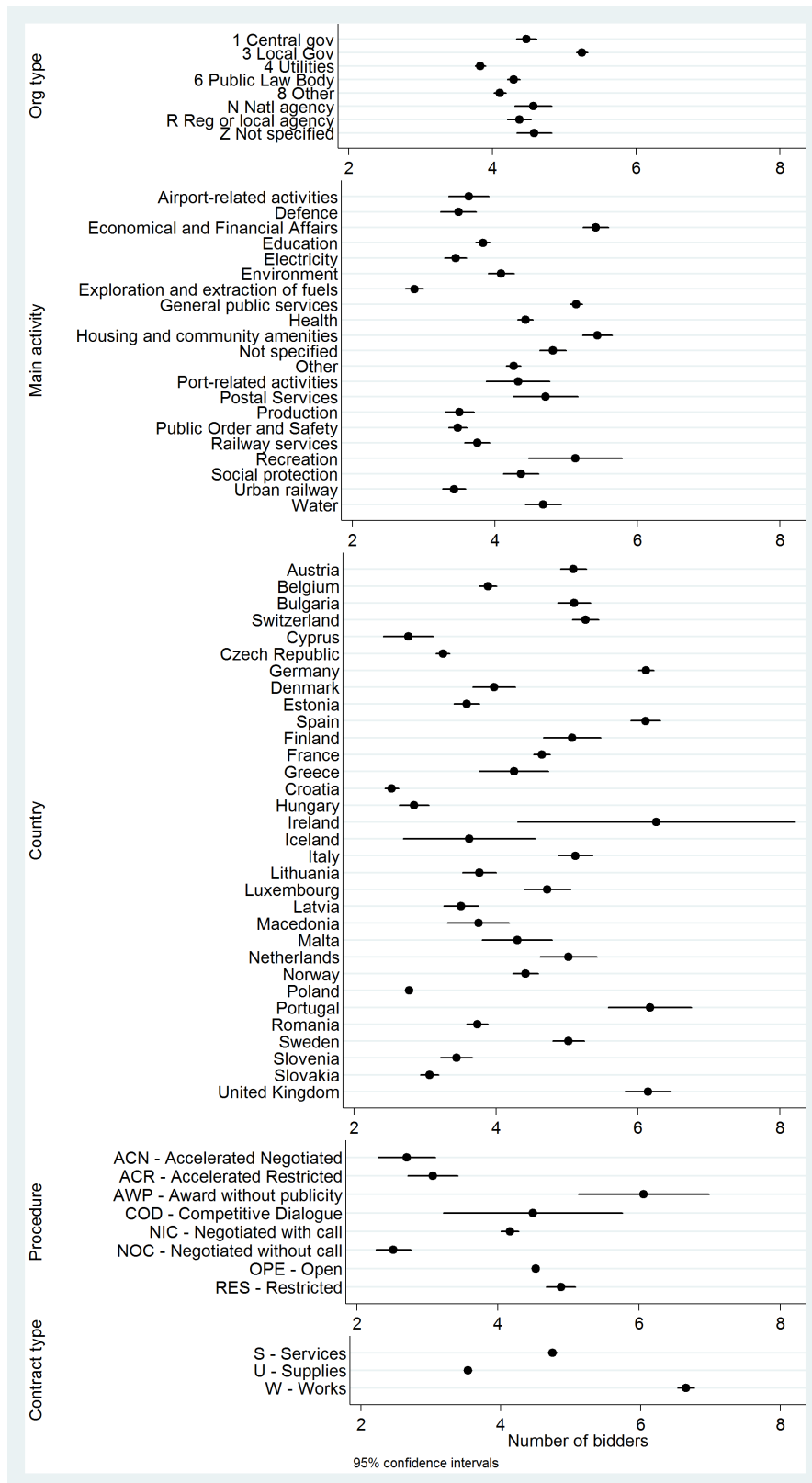
Details on all variables and descriptive statistics are provided in Appendix A.

5 Results

In this section we present a series of estimation results that seek to unravel the factors explaining the level of competitiveness in public contracting processes across Europe. These estimations will consider those dimensions marked by the literature as important and put a special focus on our hypothesised explanatory factors around administrative capacities.

Table 3 offers an overview of the extent to which the specific proxies for administrative background, inputs and outputs feature prominently when explaining the degree of competitiveness in each individual contract publicised in the TED database. Competitiveness is measured through the log of the number of bidders per contract in order to control for the severe skewness of the distribution. Column 1 estimates the role of our two background organizational features: the legal type of public organization and its respective policy area, which is here not reported in order to avoid an impractically long regression table, although a few notes on the findings will be made[9]. Column 2 shows the individual items of our administrative input dimension, innovation and connectedness: a) whether the contracting is undertaken by a central purchasing body; b) whether the procedure falls within GPA standards; c) whether English as a foreign language is an eligible bidding language; and d) whether the process is carried out through electronic means. Column 3 presents a measure of missing information in the tender, our first administrative output proxy. Column 4 adds an exponential factor of missing information, given the observed behaviour this variable, as we will explain next. Column 5 includes our two items corresponding to the second dimension of administrative outputs: administrative error. Column 6 combines all the previous administrative features without any controls, while column 7 further adds country fixed effects.

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[9] Full estimations with all regression coefficients including policy area, country and industry sector can be requested to the authors.

TABLE 3: ADMINISTRATIVE CAPACITIES AND COMPETITIVENESS, INDIVIDUAL ITEMS

Dep var: Log of nr bidders	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ref Cat: Central gov							
Local Gov	0.127***					0.200***	0.0605***
	(0.000)					(0.000)	(0.000)
Utilities	0.0548*					0.0170	0.0190
	(0.030)					(0.641)	(0.597)
Public Law Body	-0.0439***					0.00884	-0.0264*
	(0.000)					(0.430)	(0.022)
Other	-0.0642***					0.0104	-0.0210
	(0.000)					(0.358)	(0.072)
Natl agency	0.0522**					0.0505*	0.0732***
	(0.006)					(0.018)	(0.001)
Reg or local agency	0.0163					0.0772***	0.0342
	(0.358)					(0.000)	(0.104)
Not specified	-0.0390*					0.0188	-0.0340
	(0.011)					(0.453)	(0.173)
On behalf of other authority		0.0566***				0.0339**	0.0553***
		(0.000)				(0.003)	(0.000)
Covered by GPA		0.136***				0.0731***	0.00715
		(0.000)				(0.000)	(0.294)
English as foreign		0.0956***				0.0733***	-0.167***
		(0.000)				(0.000)	(0.000)
eProcurement		0.288***				0.254***	0.106***
		(0.000)				(0.000)	(0.000)
Info missing			0.680***	1.914***		2.603***	1.072***
			(0.000)	(0.000)		(0.000)	(0.000)
Info missing (sqr)				-1.700***		-3.139***	-1.533***
				(0.000)		(0.000)	(0.000)
Info discrepancies					0.0360***	0.0109***	-0.0193***
					(0.000)	(0.000)	(0.000)
Nr Duplicates in CN					-0.157***	-0.152***	-0.138***
					(0.000)	(0.000)	(0.000)
Constant	1.013***	0.998***	0.943***	0.791***	1.050***	0.495***	1.337***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country dummies	No	No	No	No	No	No	Yes
Policy area dummies	Yes	No	No	No	No	Yes	Yes
Observations	105993	78185	105993	105993	105993	78185	78185
R^2	0.034	0.021	0.011	0.013	0.005	0.064	0.131

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results on Table 3 show a number of interesting findings. Firstly, the legal types of contracting authorities seem to make a difference for competitiveness. Local authorities and national semi-autonomous agencies rank at the top of competitiveness, with 6 to 8% more bidders on average than central bodies. A less robust pattern shows that public law bodies (mostly non-governmental bodies regulated by public law) rank at the other end of the spectrum, with the lowest number of participants per bidding process. The non-reported results on policy areas suggest small differences by area, with economic affairs, housing and postal services among the most competitive and public order and safety among the least. Also, there are robust indications that most of our innovation and connectedness

items positively and significantly affect the level of competition, although it can be seen that some of them are highly sensitive to the introduction of country fixed effects due to the collinearity problems that arise, in particular with English as a foreign language. Finally, of the two administrative output dimensions, missing information and administrative error, only the latter one behaves as expected (more errors decreasing competitiveness, although this result does not hold for higher levels of errors where the number of observations lowers dramatically), while the amount of missing information turns out to behave non-linearly, with competition increasing at lower-levels of missing fields, and decreasing at higher levels. This inverted-U shape might be signalling that more experienced authorities undergo a process of time-optimization where the least important fields for companies are simply omitted. All administrative dimensions together explain up to 6.5% of the total variance in the log of bidders, and with the addition of country fixed effects this explanatory power amounts to more than 13%, a certainly strong figure given that these are purely institutional dimensions.

Given the general consistency of both the concepts and empirical behaviour of our administrative items, we deem appropriate to condense all items of our input dimension into one composite indicator for innovation and connectedness. Similarly, we are able to condense the two administrative error item into one composite indicator. We opt, however, to treat missing information separately, given its non-linear behaviour. Table 4 shows a similar set of estimations, except that aggregated composite indicators are used when appropriate.

TABLE 4: ADMINISTRATIVE CAPACITIES AND COMPETITIVENESS, AGGREGATED ITEMS

Dep var: Log of nr bidders	(1)	(2)	(3)	(4)
Ref Cat: Central gov				
Local Gov	0.208***	0.125***	0.210***	0.0641***
	(0.000)	(0.000)	(0.000)	(0.000)
Utilities	0.0645	0.0516*	0.0296	0.0186
	(0.080)	(0.041)	(0.421)	(0.605)
Public Law Body	0.0114	-0.0446***	0.0157	-0.0258*
	(0.310)	(0.000)	(0.160)	(0.025)
Other	0.00622	-0.0644***	0.0177	-0.0175
	(0.581)	(0.000)	(0.117)	(0.134)
Natl agency	0.0520*	0.0512**	0.0487*	0.0723***
	(0.015)	(0.007)	(0.022)	(0.001)
Reg or local agency	0.0609**	0.0139	0.0864***	0.0378
	(0.004)	(0.432)	(0.000)	(0.072)
Not specified	0.0314	-0.0443**	0.0184	-0.0303
	(0.209)	(0.004)	(0.461)	(0.223)
Admin innov (weight, aggr.)	0.514***		0.480***	0.150***
	(0.000)		(0.000)	(0.000)
Admin error (aggr.)		0.994***	-0.363	-2.274***
		(0.000)	(0.071)	(0.000)
Info missing			2.441***	1.020***
			(0.000)	(0.000)
Info missing (sqr)			-2.866***	-1.481***
			(0.000)	(0.000)
Constant	0.847***	0.999***	0.517***	1.135***
	(0.000)	(0.000)	(0.000)	(0.000)
Country dummies	No	No	No	Yes
Policy area dummies	Yes	Yes	Yes	Yes
Observations	78185	105993	78185	78185
R^2	0.053	0.035	0.061	0.129

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 confirms the findings of Table 3, while the composite indicators solve some of the collinearity problems of the individual-item regressors. The findings in column 4 reveal that on average local governments attract about 6.4% more bidders than central governments, and national agencies about 7.2% more. The column also shows that a change from the minimum to the maximum value of innovation and connectedness attracts about 15% more bidders on average, and the same change in administrative errors lowers the amount of bidders by 70%, although as mentioned before there are much less observations at the maximum level of administrative errors. Regarding missing information, the inverted-U pattern suggests that more missing fields at lower levels of missing information increases the log of bidders, while at higher levels it lowers it. These findings also show that the size of the impacts of our administrative capacity variables are greatly sensitive to the addition of controls, and in particular of country dummies, suggesting that administrative features play in very different ways in different settings.

Table 5 repeats similar estimations using the composite indicators of administrative capacity, but imposing stronger constraints to the estimation by adding a number of covariates that are expected to

have an impact on the number of offers, as well as a long list of industry fixed effects determined by the first two digits of the Common Procurement Vocabulary (CPV) codes[10]. The main control variables included in the three models of Table 4 are: a) a dummy of whether the tendering process involves any type of funding by the European Union, b) the type of tendering procedure chosen by the organization, as described in the previous section and c) the nature of the contract, namely whether it is a works, services, or utilities contract envisioned.

The model in column 3 of Table 5 shows that most of our previous findings on the impact of administrative capacities are robust to the addition of multiple controls, and confirms the importance of country fixed effects. Local governments and national semi-autonomous agencies continue at the top of organization types attracting most bidders. The coefficient of public law bodies has changed signs and now central government organizations appear as the least competitive. The impacts of our administrative input and output variables remains robust. The coefficients on the type of tendering procedure chosen show significant differences, with the procedure of negotiated tendering without call for competition registering about 60% less bidders than its most competitive counterpart, open procedures. Even including a call for competition in a negotiated procedure in- stead of skipping this publicity increases the number of bidders by 40%! These unequivocal results demonstrate once again the importance of openness and publicity as core pillars of competitiveness (e.g. Coviello and Martinello 2014). Additionally, contracts that involve EU funds are on average 2% less competitive than their counterparts. Finally, the results also show important differences in the type of contract being sought by authorities. Works contracts are the most competitive (also of higher average values), while supply contracts attract the smallest number of bidders on average.

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[10] CPV codes can be consulted at https://ec.europa.eu/growth/single-market/public-procurement/ rules-implementation/common-vocabulary_en.

TABLE 5: ADMINISTRATIVE CAPACITIES AND COMPETITIVENESS, ALL COVARIATES

Dep var: Log of nr bidders	(1)	(2)	(3)
Ref Cat: Central gov			
Local Gov	0.109***	0.0955***	0.0266*
	(0.000)	(0.000)	(0.023)
Utilities	-0.0124	0.0274	0.0634
	(0.742)	(0.437)	(0.064)
Public Law Body	0.0239*	0.0357**	0.0267*
	(0.033)	(0.001)	(0.018)
Other	-0.000304	0.00717	0.0108
	(0.978)	(0.511)	(0.345)
Natl agency	0.0358	0.0352	0.0542**
	(0.081)	(0.077)	(0.007)
Reg or local agency	0.0494*	0.0602**	0.0347
	(0.018)	(0.003)	(0.091)
Not specified	0.0579*	0.0622*	0.0309
	(0.029)	(0.016)	(0.239)
Admin innov (weight, aggr.)	0.490***	0.532***	0.232***
	(0.000)	(0.000)	(0.000)
Info missing	2.037***	1.981***	1.012***
	(0.000)	(0.000)	(0.000)
Info missing (sqr)	-2.571***	-2.459***	-1.486***
	(0.000)	(0.000)	(0.000)
Admin error (aggr.)	-0.327	-0.167	-1.232***
	(0.107)	(0.401)	(0.000)
EU funds	-0.136***	-0.127***	-0.0187*
	(0.000)	(0.000)	(0.031)
Ref Cat: Restricted proced.			
Accelerated Negotiated	-0.390***	-0.350***	-0.320***
	(0.000)	(0.000)	(0.000)
Accelerated Restricted	-0.277***	-0.238***	-0.183***
	(0.000)	(0.000)	(0.000)
Award without publicity	0.151*	0.0130	-0.0243
	(0.035)	(0.843)	(0.692)
Competitive Dialogue	-0.258***	-0.171**	-0.174***
	(0.000)	(0.001)	(0.001)
Negotiated with call	0.000675	-0.0662***	-0.143***
	(0.969)	(0.000)	(0.000)
Negotiated without call	-0.574***	-0.556***	-0.536***
	(0.000)	(0.000)	(0.000)
Open	-0.00681	0.0172	0.0544***
	(0.600)	(0.181)	(0.000)
Ref Cat: Works			
Services	-0.453***	-0.306***	-0.250***
	(0.000)	(0.000)	(0.000)
Supplies	-0.703***	-0.399***	-0.310***
	(0.000)	(0.000)	(0.000)
Constant	1.196***	0.925***	1.275***
	(0.000)	(0.000)	(0.000)
Country dummies	No	No	Yes
Policy area dummies	Yes	Yes	Yes
Industry dummies	No	Yes	Yes
Observations	70974	70974	70974
R^2	0.142	0.184	0.221

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6 Robustness and extensions

In order to further test the robustness of the relationships found between administrative capacities and competitiveness, Table 6 sets out to test our model against two less preferable but still valid proxies for competitiveness: the number of bidders (not logged) and a binary variable registering whether only one bidder presented a valid offer (single bidding)[11]. Column 1 uses the number of offers reported without any scalar transformation. Although the skewness of the distribution results in a substantial loss in the explanatory power of the model (the R squared is now only of 7%), it can be observed that the proxies for administrative innovation and connectedness and administrative error continue to show the same trends, although the pattern for missing information diffuses. Columns 2 and 3 report two probabilistic models, Probit and Logit estimations respectively, assessing the increase in probabilities of single bidding of each of our hypothesised explanatory variables. The results show once again that higher administrative innovation and connectedness decreases significantly the probabilities of single bidding taking place, and similarly, more administrative errors increases it. Columns 4 and 5 reverse to the most preferred outcome variable (log of bidders) but add a clustering of standard errors for the coefficients based on the organizational ids of the contracting authorities. In other words, these columns control for the fact that each contract is not fully independent from each other, but in cases issued by the same organization. These organizational ids are not provided by the organizations themselves (with the exception of a few countries) and therefore had to be produced in the context of the DIGIWHIST project. The algorithm matched organizations' names based on small Euclidean distances between characters in the organizations' names. This clustering is perhaps too conservative and more re- fined identifiers are still needed for the future. Column 4 adds this organizational clustering to the most preferred estimation in Table 5 and Column 5 further adds a control for the value of the contract being bid upon. The results on both columns once again confirm the robustness of the previous findings, with the exception that EU funds no longer emerge as significant in this model. Figure 2 below illustrates the predicted marginal effect of each of the administrative capacities variables in the absolute number of biding offers according to the estimation in Column 5.

[11] For similar uses of this indicator, see Fazekas and T oth, 2016.

TABLE 6: ADMINISTRATIVE CAPACITIES AND COMPETITIVENESS: ROBUSTNESS CHECKS

	(1) Number of bidders	(2) Single bidding	(3) Single bidding	(4) Log of nr bidders	(5) Log of nr bidders
Ref Cat: Central gov					
Local Gov	0.120	-0.0370	-0.0592	0.0266	0.0071
	(0.316)	(0.122)	(0.166)	(0.169)	(0.731)
Utilities	-0.0201	-0.104	-0.161	0.0634	0.0364
	(0.920)	(0.221)	(0.293)	(0.146)	(0.471)
Public Law Body	0.218*	-0.00657	-0.0122	0.0267	0.0247
	(0.042)	(0.766)	(0.751)	(0.255)	(0.337)
Other	0.113	0.0123	0.0171	0.0108	-0.0033
	(0.235)	(0.579)	(0.655)	(0.612)	(0.880)
Natl agency	0.237	-0.0743	-0.128	0.0542	0.0494
	(0.138)	(0.080)	(0.084)	(0.084)	(0.121)
Reg or local agency	0.0352	-0.0600	-0.125	0.0347	0.0167
	(0.786)	(0.167)	(0.103)	(0.250)	(0.601)
Not specified	0.486	0.0132	0.0300	0.0309	0.0238
	(0.122)	(0.810)	(0.769)	(0.417)	(0.580)
Admin innov (weight, aggr.)	1.604***	-0.384***	-0.688***	0.232***	0.234***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Info missing	-1.204	0.914**	1.725**	1.012***	0.956**
	(0.843)	(0.003)	(0.002)	(0.001)	(0.002)
Info missing (sqr)	7.823	-3.763***	-6.882***	-1.486**	-1.256*
	(0.543)	(0.000)	(0.000)	(0.005)	(0.038)
Admin error (aggr.)	-6.188***	1.612***	2.861***	-1.379***	-1.438***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EU funds	-0.0872	-0.0199	-0.0313	-0.0187	-0.0201
	(0.338)	(0.262)	(0.306)	(0.196)	(0.167)
Ref Cat: Restricted proced.					
Accelerated Negotiated	-0.883***	0.626***	1.086***	-0.320***	-0.293***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Accelerated Restricted	-0.489*	0.420***	0.709***	-0.183***	-0.207***
	(0.043)	(0.000)	(0.000)	(0.001)	(0.000)
Award without publicity	1.431*	0.319***	0.614***	-0.0243	-0.327**
	(0.011)	(0.001)	(0.000)	(0.878)	(0.001)
Competitive Dialogue	-0.0538	-0.0906	-0.189	-0.174**	-0.102
	(0.956)	(0.474)	(0.434)	(0.002)	(0.125)
Negotiated with call	-0.376*	0.112**	0.187*	-0.143***	-0.183***
	(0.018)	(0.009)	(0.019)	(0.000)	(0.000)
Negotiated without call	-1.442***	0.939***	1.624***	-0.536***	-0.563***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Open	0.683***	0.0346	0.0557	0.0544**	0.033
	(0.000)	(0.294)	(0.365)	(0.008)	(0.198)
Ref Cat: Works					
Services	-1.356***	0.431***	0.867***	-0.250***	-0.270***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Supplies	-1.468***	0.469***	0.915***	-0.310***	-0.328***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Awarded contract value					-0.012 ***
					(0.000)
Constant	5.084***	-1.375***	-2.509***	1.275***	1.368***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country dummies	Yes	Yes	Yes	Yes	Yes
Policy area dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Organizational clustering	No	No	No	Yes	Yes
Observations	71037	78235	78235	70974	56758
R^2	0.069			0.221	0.222
Pseudo R^2		0.152	0.153		

p-values in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

19

FIGURE 2: MARGINAL EFFECTS AND CONIFIDENCE INTERVALS OF ADMINISTRATIVE CAPACITY VARIABLES ON PRO- CUREMENT COMPETITIVENESS
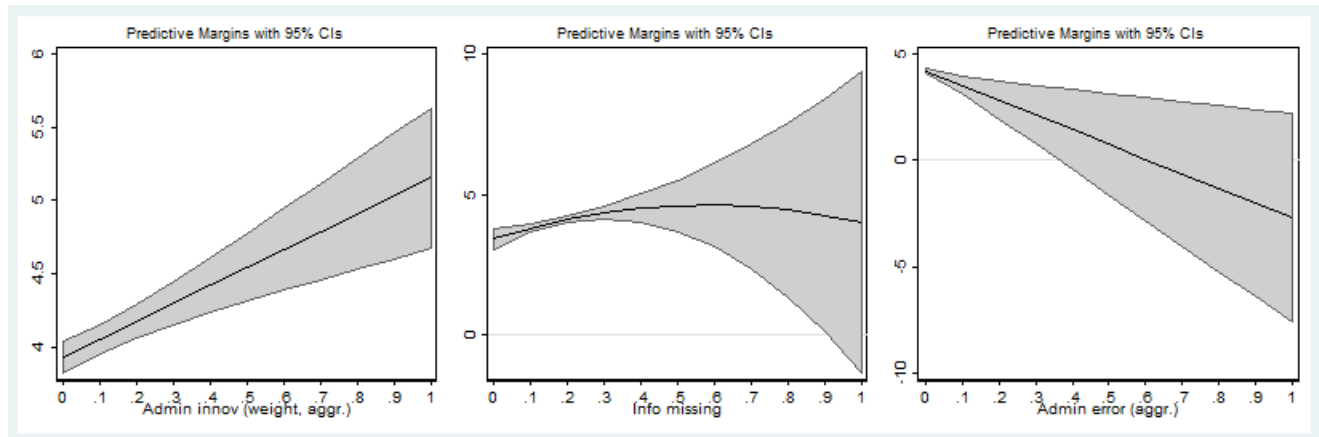
Finally, Table 7 shows extensions to the model in three particular directions. First, in column 1 we test which of our explanatory variables makes a difference in the amount of days-per-bid that organizations take to announce the winning company or companies. This outcome variable is not informative of the level of competitiveness, but it may be informative of the administrative capacities behind efficiency. We do not expect all administrative items to play a similar role, in fact, while some technical features might speed up the tendering process, more openness or a higher number of actors involved might slow the process down. In order to account for such potential tradeoffs we choose here to assess the role of all individual items instead of the aggregate measures. The results indeed show a very different, yet theoretically consistent, behaviour of each administrative item. When purchases are being channelled through a Central Purchasing Body, decisions take on average about 8 extra days per offer. Tenders under a General Procurement Agreement under World Trade Organisation regulations take more than 8 extra days per bid to be awarded. Remarkably, electronic procurement processes reduce decisions by about 12 days per bid.

The variable on missing information behaves as expected: increases in missing fields when information is generally complete accelerates the process, while the same change slows the process down when the baseline level of missing fields is high (a 10% drop in the ranking at low levels of missing information accelerates the process by about 4 and a half days).

Of the administrative error items, only discrepancies between what was reported in call for tenders and tender awards has a positive and significant on the number of days for processing each bid, while the number of duplicate announcements does not report to have any effect (this is, intuitively correct, as the decision time is taken from the final duplicated announcement which should be no different than any other announcement).

Beyond the administrative capacity items, other interesting aspects can be observed from column 1 of Table 7. First, contracts involving EU funds take an extra 11.5 days per offer to be decided upon. Second, the coefficients on procedure type show an interesting pattern. Both open procedures and their opposite, accelerated restricted and negotiated show the fastest processing time per bid, all taking between 109 and 113 less days per bid to be processed in comparison to restricted procedures. The slowest turns out to be the competitive dialogue modality. Third, supply contracts are decided

significantly faster than works and services, most likely since it is easier to pre-define the exact product and quality expected.

Column 2 of Table 7 assesses the role of each regressor on the probabilities of each tender reporting a final award price either higher/equal or lower than the initial estimated price in the call for tenders. Here the number of observations decreases dramatically, as only tenders with information on both these categories are considered, as well as only tenders without lots in order to be able to successfully compare the two estimations. Negative coefficients mean that the regressor is likely to help organizations pay less or equal than first estimated, signalling more efficiency. The administrative factors that help organizations pay less are Central Purchasing Bodies and electronic procurement. Administrative errors, on the other hand, increase the likelihood of paying more than first estimated. Procedures that are accelerated negotiated and awarded without prior publicity are the ones that increase the likelihood of paying less the most, with open contracts in third place. It should be noted at this point, however, that the way in which organisation estimate tender values in their initial call for tenders may or may not respond to a real willingness to report a market price. More discretional tender processes may very well benefit from higher initial estimations in order to conceal corrupt deals.

To finalize, Column 3 of Table 7 analyses how each variable plays out in the probabilities of a foreign company being awarded a tender. Of the administrative items, the GPA coverage and most notably English as foreign language increase the probabilities of a foreign company winning. A similar effect can be observed for one of the administrative error items, which is rather counter- intuitive and suggests further explorations should be conducted. The existence of EU funds also plays favourably to foreign companies. In contrast, electronic procurement reduces the probabilities of a foreign company winning.

TABLE 7: ADMINISTRATIVE CAPACITIES AND COMPETITIVENESS: EXTENSIONS

	(1 - OLS) Days per bid	(2 - Probit) Estimated value	(3 - Probit) Is winner foreign?
Ref Cat: Central gov			
Local Gov	-0.660	-0.0440	-0.284***
	(0.670)	(0.282)	(0.000)
Utilities	-17.60***	-0.175	-0.140
	(0.001)	(0.275)	(0.331)
Public Law Body	-7.911***	-0.0252	-0.0495
	(0.000)	(0.524)	(0.242)
Other	-13.43***	0.0357	0.00827
	(0.000)	(0.382)	(0.851)
Natl agency	-4.358	-0.0845	0.00913
	(0.081)	(0.161)	(0.898)
Reg or local agency	-12.95***	-0.208**	-0.180
	(0.000)	(0.005)	(0.052)
Not specified	-14.03***	-0.0953	-0.260*
	(0.000)	(0.431)	(0.022)
On behalf of other authority	7.954***	-0.117**	-0.0796
	(0.000)	(0.006)	(0.068)
Covered by GPA	8.303***	0.0126	0.0628*
	(0.000)	(0.614)	(0.020)
English as foreign	1.349	0.0500	1.236***
	(0.664)	(0.469)	(0.000)
eProcurement	-11.98***	-0.141***	-0.0811*
	(0.000)	(0.001)	(0.033)
Info missing	-45.28*	0.537	0.460
	(0.049)	(0.491)	(0.511)
Info missing (sqr)	99.80*	-4.061**	-1.057
	(0.025)	(0.010)	(0.387)
Nr Duplicates in CN	3.390	0.0993	0.0494
	(0.314)	(0.160)	(0.429)
Info discrepancies	8.093***	0.0198*	0.0398***
	(0.000)	(0.028)	(0.000)
EU funds	11.50***	-0.201***	0.176***
	(0.000)	(0.000)	(0.000)
Ref Cat: Restricted proced.			
Accelerated Negotiated	-109.9***	-0.586	0.784***
	(0.000)	(0.100)	(0.000)
Accelerated Restricted	-109.8***	0.0232	0.193
	(0.000)	(0.888)	(0.197)
Award without publicity	0.701	-0.533**	-0.217
	(0.959)	(0.009)	(0.346)
Competitive Dialogue	149.2***	0.0856	0.260
	(0.000)	(0.574)	(0.089)
Negotiated with call	-15.19***	0.0815	0.228***
	(0.000)	(0.235)	(0.000)
Negotiated without call	55.33***	-0.0623	0.294**
	(0.000)	(0.641)	(0.008)
Open	-112.4***	-0.160***	0.0531
	(0.000)	(0.001)	(0.309)
Ref Cat: Works			
Services	-24.12***	0.0736	0.0867
	(0.000)	(0.381)	(0.311)
Supplies	-32.02***	0.183*	0.367***
	(0.000)	(0.034)	(0.000)
Constant	197.1***	-0.121	-3.207***
	(0.000)	(0.554)	(0.000)
Country dummies	Yes	Yes	Yes
Policy area dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Observations	69315	20847	71740
R^2	0.295		
Pseudo R^2		0.14	0.21

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

22

7 Concluding thoughts

Governmental organisations across Europe are increasingly required to display the capacity to quickly adapt to changing environmental conditions. They also face pressures and legal constraints in order to converge with supranational standards and principles such as in the case of the European single market. The field of public procurement is particularly exemplary of these demands, as it has been subject to numerous policy reforms and technological transformations in the past years. This article profits from the generous state of information availability on public procurement contracts existing in Europe, in order to develop a number of measures of administrative capacity, together with a model explaining which administrative features increase the competitiveness of public purchasing processes, against the backdrop of "an ever incomplete single market" (Howarth and Sadeh, 2010). By carefully curating a large database on reported procurement procedures regulated by EU directives in 2015 and developing an estimation strategy for the determinants of competitiveness, this article is able to show a series of interesting findings that entail important policy implications.

First, we are able to construct a comprehensive framework of administrative capacities that fol- lows the core dimensions of most other frameworks in the field. It comprises three dimensions: a) the administrative organizational structure of contracting authorities, b) an input dimension that captures the resource and procedural aspects of procurement and c) an output measure that infers organisational capacity from the quality of procedural results. All three dimensions are proven to be relevant when explaining the level of competition that public buyers can attract. The results show in particular, that the level of innovation and connectedness of organizations is a strong and robust factor behind higher competition. The findings also advise against analysing administrative outputs too lightly, as they may or may not follow how we think about them intuitively. In par- ticular, our models show that while administrative mistakes are effectively signalling less capacity to conduct procurement processes competitively, the comprehensiveness of information behaves non-linearly, suggesting that organisations optimise the time they spend on procurement red tape and omit non-essential information. We choose to interpret these remarks as a sign that input and procedural measures are more reliable proxies than outputs, as the literature in the field has extensively claimed.

Second, our methodological approach teaches us that the way indicators are constructed can reveal very different stories. And while building composite indicators is a sensible decision when individual items bear conceptual and empirical coherence, in some situations testing individual items may be more informative of interesting treadoffs or point at more precise policy implications. We have observed this for the case of innovation and connectedness. While competitiveness is benefited by some items of the composite, such as the intervention of a central purchasing authority, the same intervention delayed the amount of time needed to make decisions around the award of a tender, perhaps also a desirable property. A composite indicator would have conflated the two aspects.

Third, in addition to the lessons learned around the capacity of the civil service, our models system- atically show that certain features matter for the competitiveness of procurement. For example, open competition procedures where every company meeting the eligibility requirements is allowed to participate attract between 20 and 50% more bidders than other more restricted procurement modalities. And the nature of the contracts matters greatly, with works contracts attracting the highest number of bidders and supplies contracts the least. Although we do not report the full listof coefficients for the country dummies, they also make a difference for the competitiveness of ten- ders. Eastern

European countries attract significantly less bidders in their procurement processes on average. Depending on the specification chosen, a country like Croatia can attract on average 60% less bidders than its most competitive counterpart, the United Kingdom.

Finally, the finding showed us that the results were highly sensitive to the introduction of country fixed effects. This suggests that country-level unobserved factors play an essential role in the competitiveness of procurement processes and that countries tend to have different informational quality and reporting standards. This should prompt us to conduct further explorations of the procurement-related national administrative traditions and practices in place, potentially also at the subnational level.

The proxy measures that were chosen in our models were limited by the variables that are required by European regulation on procurement. These variables, however, should be complemented with separate -yet comparable- alternative sources so that the robustness of explanatory models of competitiveness can be further illuminated.

8 Appendix A: Descriptive Statistics

Table 8: Summary statistics

Variable	Variable type	Obs	Mean	Std. Dev.	Min	Max
Number of offers	Continuous	106079	4.532	6.826	0	727
Log offers	Continuous	105993	1.131	.821	0	6.588
Administrative innovation (aggr.)	Continuous	87634	.178	.18	0	1
Administrative error (aggr.)	Continuous	126311	.017	.015	0	1
Information missing	Continuous	126311	.306	.151	0	1
Purchase on behalf of other authority	Binary	103759	.069	.254	0	1
Covered by GPA WTO agreements	Binary	98158	.611	.488	0	1
English as foreign language	Binary	126311	.062	.242	0	1
Electronic procurement	Binary	126311	.075	.263	0	1
Administrative discrepancies	Discrete	126311	2.387	1.564	0	14
Number of duplicates	Discrete	126311	.012	.137	0	13
EU funds	Binary	95401	.14	.347	0	1
Org type	Categorical					
Central gov		126,311	.1029839	.3039391	0	1
Local gov		126,311	.2760567	.447047	0	1
Utilities		126,311	.091243	.2879556	0	1
Public Law Body		126,311	.2225776	.4159786	0	1
Other		126,311	.1778784	.3824119	0	1
National agency		126,311	.0190878	.1368342	0	1
Regional or local agency		126,311	.0226267	.1487108	0	1
Not specified		126,311	.0875458	.2826344	0	1
Procedure type	Categorical					
Restricted		125,580	.0478181	.2133821	0	1
Accelerated negotiated		125,580	.0012661	.0355603	0	1
Accelerated restricted		125,580	.0037187	.0608683	0	1
Award w/o publicity		125,580	.0032091	.0565583	0	1
Competitive dialogue		125,580	.003026	.0549257	0	1
Negotiated w/call		125,580	.0629479	.2428702	0	1
Negotiated w/o call		125,580	.0054627	.0737079	0	1
Open		125,580	.8725514	.3334762	0	1
Contract type	Categorical					
Works		126,311	.1569539	.3637587	0	1
Services		126,311	.4348077	.4957337	0	1
Supplies		126,311	.4082384	.4915096	0	1

9 Appendix B: Administrative Capacities indicator construction

Administrative innovation and connectedness (AdmInn):

$$\text{AdmInn}_i = \sum_{j=1}^{n} a_{ij} w_j \tag{2}$$

$$\text{AdmInn}_i = eProc_i + (EnglFor_i * 0.8) + (OnBehalf_i * 0.7) + (GPA_i * 0.6) \tag{3}$$

$$\text{AdmInn}_{iNorm} = \frac{(AdmInn_i - MIN_{AdmInn})}{(MAXAdmInn - MIN_{AdmInn})} \tag{4}$$

Missing information in administrative processes (AdmMiss):

$$\text{AdmMiss}_i = \sum_{j=1}^{n} a_{ij} \tag{5}$$

Where j=[0,1] for missing categories: procuring entity address in contract and announcement notices; postal code in notice and award announcements; location NUTS in notice and award announcements; award criteria in notice and award announcements; award criteria code in notice and award announcements; contract number in award, title of tender in award; winning company name, address, town, postal code and country; number of offers on paper and electronic; estimated contract value; contract value; contract duration; administrative languages of tender; whether the contract is on behalf of another agency in notice and award announcements; GPA agreement in notice and award announcements; electronic auction in notice and award announcements; whether EU funds were used; date of award; framework agreement in notice and award announcements; dynamic purchasing in notice and award announcements; contract variants, options and renewals; date of contract start; date of contract completion.

$$\text{AdmMiss}_{iNorm} = \frac{(AdmMiss_i - MIN_{AdmMiss})}{(MAX\,AdmMiss - MIN_{AdmMiss})} \tag{6}$$

Administrative errors:

$$\text{AdmErr}_i = \sum_{j=1}^{n} a_{ij} \tag{7}$$

$$\text{AdmErr}_i = AdminDiscrZvalue_i + AdmDuplZvalue_i \tag{8}$$

$$\text{AdmErr}_{iNorm} = \frac{(AdmErr_i - MIN_{AdmErr})}{(MAX\,AdmErr - MIN_{AdmErr})} \tag{9}$$

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27

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