



European  
Commission



# ASSESSING THE QUALITY OF GOVERNMENT AT THE REGIONAL LEVEL USING PUBLIC PROCUREMENT DATA

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## Working Papers

A series of short papers on regional  
research and indicators produced by  
the Directorate-General for Regional  
Policy

**WP 12/2017**

*Regional and  
Urban Policy*

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*Luxembourg: Publications Office of the European Union, 2017*

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## > SUMMARY

Public procurement plays a crucial role in economic development and the quality of government across the European Union (EU): on average, it amounts to about 13 % of GDP or 29 % of government spending (European Commission, 2016; OECD, 2015). It is a genuinely cross-cutting government function concerning virtually every public body, and is also one of the principal means by which governments can influence growth rates and the quality of public services. However, our understanding of the quality of public procurement processes and outcomes is very much in its infancy, which limits governments' capacity to intervene in pursuance of specific public procurement as well as broader developmental objectives.

In order to enhance prosperity, human well-being and the territorial cohesion of the EU, the quality of governance (or quality of institutions) is a fundamental precondition. High-quality institutions are characterised by “the absence of corruption, a workable approach to competition and procurement policy, an effective legal environment, and an independent and efficient judicial system”, as well as “strong institutional and administrative capacity, reducing the administrative burden and improving the quality of legislation” (European Commission, 2014, p. 161). Such a broad understanding of institutional quality is also underpinned by influential academic thinking focusing on impartial policy implementation rather than the content of policies or democratic decision-making processes (Rothstein & Teorell, 2008). Building on this focus on policy implementation, good governance in public procurement is assessed according to four main dimensions:

- ▶ Transparency (e.g. amount of information published in procurement announcements);
- ▶ Competition (e.g. average number of bidders);
- ▶ Administrative efficiency (e.g. length of decision-making period); and
- ▶ Corruption (e.g. the use of non-open, opaque procedure types).

We use a unique database of the EU-wide Tenders Electronic Daily (TED) which describes public procurement activities across the whole EU-28 between 2006-2015, through more than 4 million records. Each dimension of good governance as well as a composite score are calculated and their validity tested by comparing them to widely used regional indicators such as GDP/capita, European Quality of Government Index (EQI), or public service meritocracy. All tests confirm that the indicators proposed, based on prior academic and policy literature, are valid.

The new indicators enable a detailed analysis of the quality of NUTS 3 and NUTS 2 regional public procurement governance according to the four above-mentioned dimensions, while changes over the last 10 years can also be explored. We find a mixed picture of regional convergence between 2006-2015 in the EU. While some Central and Eastern European regions have converged to the EU average, many Mediterranean regions have strongly diverged and, surprisingly, some well-governed Western and Northern European regions have also experienced a strong deterioration in governance quality. Overall, governance quality and competition in particular have deteriorated across the whole EU.

Based on novel findings, a small number of tentative policy recommendations are proposed:

1. Increase competition in public procurement by encouraging market entry of both local and non-local firms; for example, through: a) better use of e-procurement and especially the complete implementation of various electronic tools, such as e-submission, e-invoicing, or e-contract monitoring; b) a more extensive use of central purchasing bodies as well as framework agreements for homogenous, standard goods; c) improving auction and tender design by better accommodating bidder characteristics, such as the needs of SMEs; and d) reducing bureaucratic controls on public procurement processes combined with better monitoring of outcomes or incentives for administrators better aligned with public goals (e.g. pay for performance).
2. Understand the broader political and institutional antecedents of governance decay and design tailored solutions; for example, through: a) increasing pay for civil servants and political office holders and improving meritocracy in the public service; b) improving political competition; and c) better regulating political finance, campaign contributions, and personal connections between bidding firms and political office holders.
3. Understand better the contribution of procurement governance quality to the effectiveness of EU funds and regional convergence to boost critical functions.
4. Improve data quality and availability to support wider data use in ongoing policy implementation and design, through: a) improving data scope and quality via better legislation as well as investment in IT systems; b) combining TED data with national public procurement datasets in cases where the latter are of sufficient scope and quality; and c) encouraging the regular use of public procurement analytics in EU and national policy implementation and design (e.g. Tableau).

# 1. INTRODUCTION

Public procurement, that is the purchase of goods and services by public entities, plays a crucial role in the development and quality of government across the European Union (EU). On average, it amounts to about 13 % of GDP or 29 % of government spending (European Commission, 2016; OECD, 2015). It is a genuinely cross-cutting government function concerning virtually every public body from federal ministries to local state-owned utilities, making it broadly representative of the quality of government. Public procurement is also one of the principal means through which governments can influence growth rates and the quality of public services, for example, by investing in highways or government IT infrastructure. In addition, EU Structural and Cohesion Funds destined to improve the EU's territorial cohesion are also largely spent through public procurement.

However, our understanding of the quality of public procurement processes and outcomes is very much in its infancy, which limits governments' capacity to intervene in pursuing public procurement as well as broader developmental objectives. With the increased availability of tender and contract-level public procurement datasets, such as those unlocked by the EU-funded DIGIWHIST project<sup>1</sup>, it is possible to explore the quality of regional governance through public procurement.

The following working paper aims to:

1. Assess EU-wide procurement data in terms of its availability, quality, reliability and limitations for the purposes of analysing the regional quality of governance;
2. Assess public procurement performance at the regional level and interpret the results in light of existing regional indicators (e.g. the European Quality of Government Index);
3. Put forward recommendations on how the identified weaknesses in procurement performance and capacity could be addressed by the European Commission and Member States.

This working paper will address these questions using novel data: newly collected and cleaned public procurement data from the EU's Tenders Electronic Daily (TED) covering the period 2006-2015. This data, which covers the highest-value contracts across Europe, allows for a consistent assessment of regional performance, as academic research has shown (Charron, Dahlström, Fazekas and Lapuente, 2017). This working paper is predominantly descriptive, setting out theoretically informed definitions, measuring them precisely, and discussing their strengths and weaknesses. Then EU regions are compared across all major dimensions of governance currently being measured, which includes public procurement as well as other regional governance indicators. This approach paints a rich picture of governance quality in EU regions, laying the foundations for further analytical work, such as systematically exploring the links between governance of public spending and economic growth as well as the effectiveness of Cohesion Policy.

# 2. CONCEPTUAL FRAME

## 2.1 UNDERSTANDING GOVERNANCE

In order to enhance prosperity, human well-being and the territorial cohesion of the EU, the quality of governance or of institutions is a fundamental precondition. High-quality institutions are characterised by “the absence of corruption, a workable approach to competition and procurement policy, an effective legal environment, and an independent and efficient judicial system”, as well as “strong institutional and administrative capacity, reducing the administrative burden and improving the quality of legislation” (European Commission, 2014, p. 161). This broad definition is also underpinned by influential academic work understanding good governance as the impartial exercise of public power and a focus on policy implementation rather than the content of policies or the democratic processes through which they were decided (Rothstein & Teorell, 2008). Such an approach corresponds well to the analysis below on public procurement procedures and outcomes, which represents a major way of implementing diverse policies across EU regions.

This working paper adopts a policy implementation focus and assesses these broad dimensions of governance in the context of public procurement and within the limitations of the available administrative data. Building on a prior review of public procurement performance for DG REGIO and the emerging academic literature identifying corruption indicators in public procurement (Cingolani, Fazekas, Kukutschka and Tóth, 2015; Fazekas, 2016), the following components of good governance are assessed in detail:

- ▶ Transparency,
- ▶ Competition,
- ▶ Administrative efficiency, and
- ▶ Corruption.

While these components of governance are often tightly enmeshed within academic and policy discussions, they are discussed below in turn, and are later measured separately.

The principle of transparency implies that information about public procurement should be readily available in a precise, reliable and structured format for the public as a whole or its representatives (Kovacic, Marshall, Marx and Raiff, 2006; OECD, 2007; Soreide, 2002). Transparency should concern all the information pertaining to public procurement processes and outcomes, such as general laws, regulations, judicial decisions, administrative rulings, procedures and policies on public procurement, statistics on procurement activities, and individual procedures and award decisions. While excess transparency may, in some cases, harm competition (e.g. disclosure of commercially sensitive information), generally speaking, greater transparency in European public procurement is deemed desirable. Of course, while transparency has a broader definition, here it is more narrowly understood as compliance with the already extensive information disclosure requirements in EU Public Procurement Directives.

<sup>1</sup> Digiwhist.eu

The principle of competition implies that the beneficial effects of multiple bidders competing against each other are harnessed to achieve low prices, high quality and on-time delivery of procured goods, works and services (Cingolani and Fazekas, 2017; Lewis-Faupel, Neggers, Olken and Pande, 2016; OECD/Sigma, 2014). Such beneficial effects arise when competition is intense, open and fair, such as potential bidders having equal opportunities to participate (Arrowsmith, 2009). Fair competition implies a level playing field for every potential and actual competitor. In general, decision-making procedures should be rule-bound whereby every rule is transparently accessible to potential and actual bidders. Naturally, bidders may be treated differently if reasonable justification for such treatment is specified prior to the procedure.

The principle of administrative efficiency is best understood as minimising the total cost of achieving the predetermined outcome of public procurement, i.e. the successful completion of the contract. This implies that the adequateness of project design and the cost-benefit ratio of alternative designs are not taken into account. This vastly simplifies the analysis and allows for comparisons to be made between highly divergent markets and organisations as well as significantly aligning the conceptualisation with the academic literature on impartiality in policy implementation (Rothstein and Teorell, 2008).

While defining corruption would merit a long discussion on its own, within the framework we adopted for public procurement it is a much more straightforward exercise. This framework allows us to concentrate on the absence of favouring some bidders over others and following prior explicit rules destined to assure open and fair access to public contracts (Mungiu-Pippidi, 2015; North, Wallis and Weingast, 2009; World Bank, 2009). Hence, corruption in public procurement is defined as the allocation and performance of government contracts by bending prior explicit rules and principles

of open and fair public procurement in order to benefit a closed network while denying access to all others (Fazekas, Tóth and King, 2016). While the above definition of open and fair competition overlaps considerably with the definition of corruption, it is decisively broader: corruption is necessarily accompanied by the violation of open and fair competition, but this violation can also take place without corruption, for example when companies collude or buyers are incompetent.

## 2.2 MEASURING GOVERNANCE AT THE REGIONAL LEVEL

While there are plenty of governance indicators at the national level, there is a particular paucity of regional governance indicators. Two notable exceptions to this are the European Quality of Government Index (EQI), which was created by the Quality of Government Institute at the University of Gothenburg (Charron, Dijkstra and Lapuente, 2014), and a new measure of meritocracy in the public sector derived from the same regional survey underpinning the EQI (Charron, Dahlström and Lapuente, 2016). Such pioneering work amply demonstrates that within-country variation is very strong and, in many cases, it often outperforms cross-country variation, suggesting that public procurement indicators vary considerably within countries, too.

As a direct consequence of this lack of regional indicators, the analysis below will test the validity of public procurement governance indicators by cross-checking them against these two indicators (EQI and regional public-sector meritocracy), by correlating different public procurement indicators with each other, and by relating public procurement indicators to socio-economic factors widely believed to influence the quality of governance, such as the level of development.

FIGURE 1. THE EUROPEAN QUALITY OF GOVERNMENT INDEX (EQI), 2010

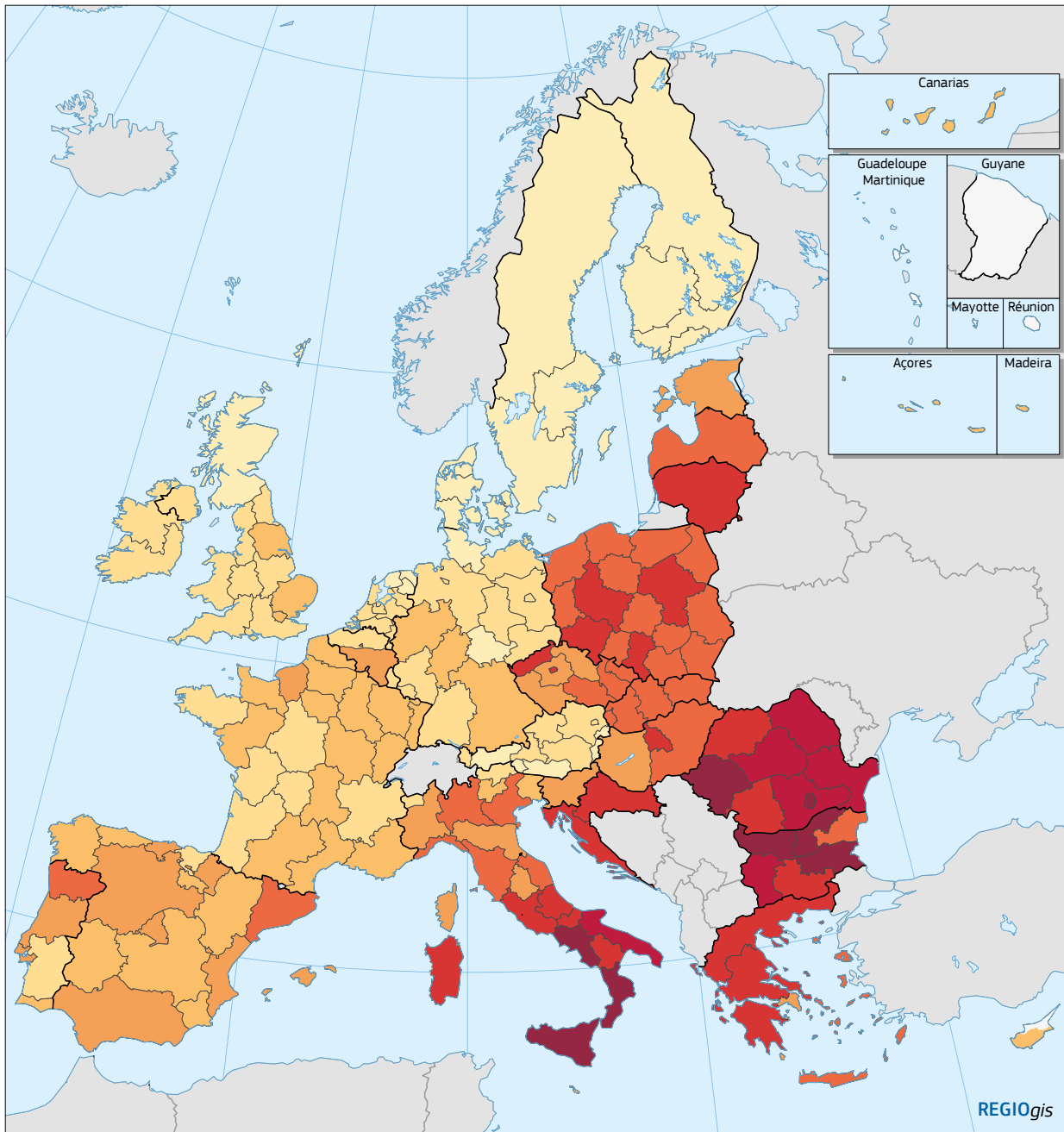
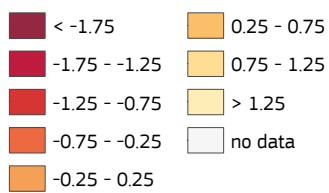


Figure 1 - The European Quality of Government index, 2010



Source: Charron et al., 2014



## 3. DATA, DATA QUALITY AND INDICATORS

### 3.1 DATA

The analysis makes use of administrative data on European countries' public procurement tenders. The data contain information on individual public procurement tenders which are regulated administrative procedures in which public bodies purchase goods, works and services. They derive from the EU's Tenders Electronic Daily (<http://ted.europa.eu/>) which is the mandatory online publication portal for tenders that fall under the remit of the EU Public Procurement Directives. This means that contracts awarded by national and EU bodies are included in the database as well as those funded by various national and international actors, including EU Structural and Cohesion Funds. A key criterion for publication is contract value: if it exceeds uniformly set publication thresholds (which have changed only marginally over time), the contract must follow procedural rules set out in the Directives and be published on TED, thereby being present in the database. Publication thresholds vary somewhat over time, with the threshold for service contracts being around EUR 130 000 and for public works contracts around EUR 5 000 000 over the last 10 years<sup>2</sup>.

For the analysis, we use the TED database for years 2006-2015 in the EU-28. This data represents a complete database of all public procurement procedures conducted under the Directives in the EU-28. As all countries' public procurement legislation is within the framework of these Directives, national TED datasets are directly comparable with each other. While below-threshold national data are collected by the EU-funded DIGIWHIST project, these datasets are generally not comparable due to wildly varying national publication thresholds, procedural requirements, and reporting content (Cingolani et al., 2015).

Data in TED is entered into standard reporting forms by procuring bodies, following a common EU reporting guide. The data received is checked by the EU's Publications Office. In spite of this, there is a non-negligible amount of missing or nonsensical data. Our analysis shows data errors tend to be concentrated in selected countries and procuring bodies (see more on data quality and improvements below). The contract-level public procurement database used in this analysis can be downloaded at [digiwhist.eu/resources/data](http://digiwhist.eu/resources/data).

TED contains variables appearing in: 1) calls for tenders, such as product specification, the deadline for submitting bids, or assessment criteria; and 2) contract award notices, such as name of the winner, awarded contract value, or date of contract signature. For every tender observed, the database contains information from the contract award announcement as publication is always mandatory, while information from call for tenders may not be published under specific circumstances. Missing rates also vary greatly by variable, with some variables, such as the contracting body's name, almost 100 % present while others, such as the contract value, are missing to a large extent.

The TED 2006-2015 database contains more than 4.2 million contracts. Of these, 1.2 million are used in the analysis based on the following exclusions: 1) only local/regional contracting authorities' tenders are analysed; 2) contracts below the mandatory reporting thresholds are excluded<sup>3</sup>; and 3) tenders where NUTS 3 code cannot be linked to the contracting authority are excluded. For the regional analysis, a region-level database was created to capture public procurement characteristics in the cross section of NUTS 3 regions as well as annually over time, using a simple aggregation of tender-level variables (averages and sums).

#### DATA QUALITY ASSESSMENT

Below, data quality is assessed from the viewpoint of the regional quality of government analysis, establishing sample size, availability of key variables, inconsistencies among the records, reasons for sample size reduction, and the limitations of the dataset. The main findings are reported here while detailed statistics are available in Appendix A.

First, the database was restricted to above-threshold tenders by removing voluntarily published notices – i.e. those which fall below the publication thresholds (European Commission, 2016) (Table 1). This was necessary as voluntary publication is not equally prevalent across the Member States, hence the inclusion of these low-value tenders would distort regional scores. Below-threshold tenders can be identified through a thorough review of the Directives which define contract value, contract type (i.e. supplies, services and works), exceptional economic sectors, such as legal services, and regulatory change-related conditions (e.g. adjusting thresholds for inflation). Due to data-quality issues and concerns over the correct application of these complicated rules in a wide range of tenders, we used a simplified method and applied a blanket EUR 125 000 contract-value threshold. Such an approach is also used by DG GROW, for example, in the Single Market Scoreboard for Public Procurement<sup>4</sup>.

Second, tenders conducted by local bodies were identified by the 'entity type' variable in the TED database (Table 1). The following entity types were considered to be local authorities: 1) regional or local authorities; 2) entities operating in the water, energy, transport and telecom sectors; and 3) regional or local agencies/offices. If the entity type information was 'other' or missing, the tender was excluded from the analysis as these categories include a variety of different organisations, of which only a minority appears to be local or regional. For the smallest Member States (MS) – Cyprus, Estonia, Lithuania, Luxembourg, Latvia and Malta – national bodies were included in the local sample, too, with the restriction that purchases in markets rarely used by local bodies across the EU were excluded (2-digit common procurement vocabulary (CPV) divisions with less than 2 % of purchases in the local sample).

Third, the regional analysis requires information on the location of contracting authorities (Table 1). Unfortunately, buyers' NUTS codes are not usually published in the TED database – only for contract implementation location – but this does not necessarily

<sup>2</sup> [http://europam.eu/?module=country-profile&country=European%20Commission#info\\_PP](http://europam.eu/?module=country-profile&country=European%20Commission#info_PP)

<sup>3</sup> There is one exception to this condition: below threshold contracts are used for calculating one transparency indicator: voluntary publishing which compares the number of above and below threshold contracts on TED (Table 3).

<sup>4</sup> [http://ec.europa.eu/internal\\_market/scoreboard/performance\\_per\\_policy\\_area/public\\_procurement/index\\_en.htm](http://ec.europa.eu/internal_market/scoreboard/performance_per_policy_area/public_procurement/index_en.htm)

overlap with the entity's region. In addition, the NUTS code of contract implementation is often not detailed enough for regional analysis: NUTS 2 or NUTS1 codes instead of NUTS 3. In order to create sufficiently detailed geographical data, NUTS 3 codes were matched to buyers based on the postcode and settlement name. This information is mainly available in public procurement notices, and Eurostat correspondence tables allow for an almost complete matching to NUTS 3 codes<sup>5</sup>. While postcode-NUTS correspondence tables are published only for the years 2010 and 2013, settlement name-NUTS tables are available for every year during the period 2010-2016. The tables between 2010 and 2012 use the 2010 NUTS nomenclature, while the more recent ones use the 2013 NUTS nomenclature.

When matching NUTS codes to contracting authorities' postcodes and settlement names, the latest correspondence tables were used: the 2013 postcode-NUTS table and the 2016 settlement name-NUTS table. If there was no match in these tables, the second most recent table was used, and so on. In the final database, NUTS 2010 codes were recoded to NUTS 2013 codes using the 2010-2013 NUTS correspondence table on the Eurostat website describing the history of NUTS<sup>6</sup>. This translation to the latest NUTS nomenclature introduced some bias in the regional coding, as splitting one NUTS region into two cannot be recoded one-to-one, for example.

Before applying the city name-NUTS and postcode-NUTS matching algorithms, string cleaning procedures were carried out to standardise location names wherever possible, for example, by removing non-alphabetic characters and lower-casing them and removing terms that are not strictly part of the city name (e.g. terms like "municipality of", "commune of", "Stadt" and "Landeshauptstadt"). In addition, postcodes were checked to ensure that they complied with national standards, which included removing alphabetic characters except where these characters are officially part of postcodes (UK, Ireland and Malta). Then, a matching algorithm was applied which conservatively links postcodes and settlement names to NUTS 3 codes – i.e. only perfect matches were accepted (the statistical details of the matching procedure are highlighted in Table A3). Although the success rate of the postcode-based and settlement-name-based methods varies significantly by country, the combination of the two procedures was able to reduce the rate of tenders without NUTS 3 code to below 1 % (Table 1). Reassuringly, there is very little variation over time in the sample selection and error rates warranting robust time-series analysis.

To check the reliability of assigning NUTS 3 codes to contracts, NUTS 3 codes based on the settlement name or settlement postcode were compared (Table A5). Overall, the fit is 96 %, although there are some countries with surprisingly low ratios, such as Croatia. a random example points to the potential

discrepancy between the European Commission correspondence tables we used for assigning NUTS 3 codes: the Croatian city of Rijeka belongs to HR031 according to the settlement-name correspondence table<sup>7</sup>, while it belongs to HR032 according to the postcode correspondence table<sup>8</sup>. When the two matching methods deviated, the postcode-based NUTS code was assigned because postcodes are less likely to be mistyped than settlement names. Settlement names often exist in multiple versions and different settlements may have very similar names (e.g. Frankfurt am Main, Frankfurt an der Oder, etc.).

The final sample contains 1 278 177 contract awards (lots) for 2006-2015 in the EU-28, all of which are above the threshold, conducted by local authorities, and have an available NUTS 3 code (Table 1). This is a considerable reduction in sample size compared to the number at the start. However, it is predominantly due to local bodies representing a relatively low share of a given country's total procurement spending (across all EU-28 countries, an average of 36 % of contracts are awarded by local authorities), as well as a relatively low proportion of above-threshold tenders within the total number of tenders in the database (84 % on average across the EU-28).

Although the size of the final sample seems enormous at first glance, contract numbers per NUTS 3 regions vary greatly, which potentially limits the scope of the regional analysis (Figure 2). For example, there are 187 NUTS 3 regions out of 1349 with fewer than 51 contracts awarded between 2006-2015; in contrast, there are only three such NUTS 2 regions. When looking at annual time series of NUTS 3 regions, the share of regions with too few observations increases further. Hence, it is suggested that time-series analysis is either conducted on the annual NUTS 2 level or over longer time periods (e.g. three to five years) at NUTS 3 level.

Advancing the discussion on public procurement governance indicators, here we briefly discuss the availability of key variables necessary for calculating these indicators. In the final sample, the quality of key variables varies greatly, potentially biasing some results later (Table 2). Some variables, such as the procedure type, are available in nearly every announcement; others, such as prices, are only available in about half of the announcements. For more detailed, country-level information, see Tables A1 and A2 in Appendix A.

<sup>5</sup> Information on local administrative units: <http://ec.europa.eu/eurostat/web/nuts/local-administrative-units> NUTS-postcode correspondence tables: <http://ec.europa.eu/eurostat/tercet/flatfiles.do>

<sup>6</sup> <http://ec.europa.eu/eurostat/web/nuts/history>

<sup>7</sup> <http://ec.europa.eu/eurostat/web/nuts/local-administrative-units> (EU-28\_LAU\_2016.xlsx)

<sup>8</sup> <http://ec.europa.eu/eurostat/tercet/flatfiles.do> (pc2016\_hr\_NUTS-2013\_v2.3.csv)



TABLE 1. NUMBER OF TENDERS IN THE RAW DATABASE AND THE FINAL SAMPLE, 2006-2015

	TOTAL NUMBER OF CONTRACTS	ABOVE THRESHOLD %	LOCAL AUTHORITY %	NUTS3 CODE AVAILABLE %	NUMBER OF CONTRACTS IN FINAL SAMPLE
AT	31958	73	44	100	10307
BE	59346	88	39	100	21081
BG	68451	75	21	100	9827
CY	8817	89	83	100	6546
CZ	69628	78	28	99	14314
DE	294050	73	48	100	98149
DK	44968	95	57	99	24253
EE	15944	79	81	100	9700
ES	199293	93	55	100	102708
FI	59488	90	55	100	29931
FR	1202190	79	37	99	325539
GR	39635	77	34	99	11373
HR	14602	99	12	100	1701
HU	57873	83	33	100	14676
IE	25526	96	27	97	6310
IT	180776	94	55	100	92302
LT	80132	75	91	100	52856
LU	7505	61	86	100	3738
LV	82997	94	90	100	69304
MT	2123	80	74	99	1207
NL	60338	93	50	95	26788
PL	997934	82	14	100	106403
PT	21001	75	24	96	3922
RO	160593	94	16	100	22709
SE	84612	97	63	100	52088
SI	61847	93	10	100	5207
SK	24820	97	14	100	3307
UK	290839	96	52	97	140622
TOTAL	4247286	84	36	99	1266868

FIGURE 2. HISTOGRAM OF NUTS 3 (LEFT PANEL) AND NUTS 2 (RIGHT PANEL) REGIONS ACCORDING TO THE NUMBER OF CONTRACTS AWARDED IN 2006-2015, TED, EU-28

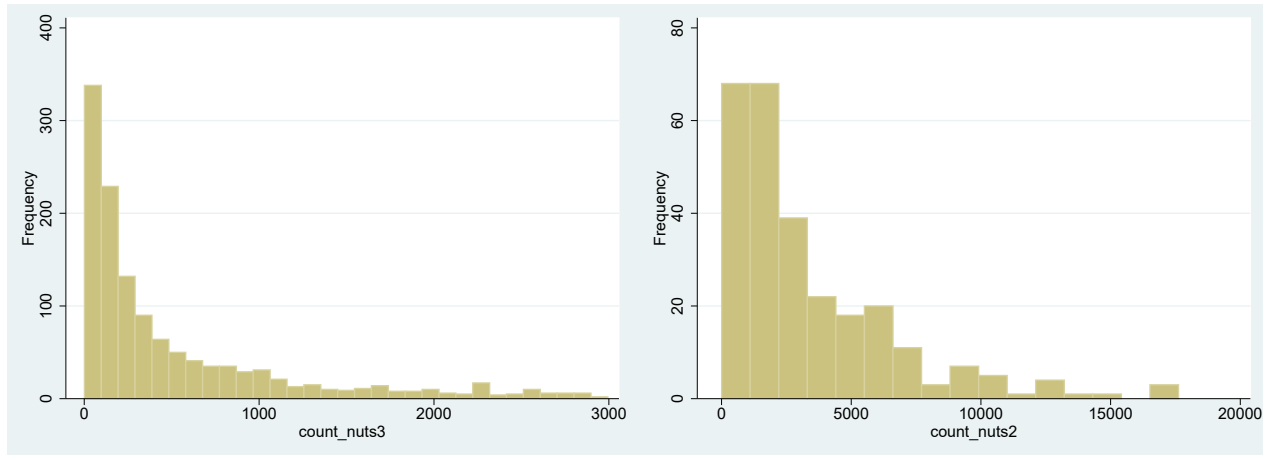


TABLE 2. THE AVAILABILITY OF SELECTED VARIABLES USED FOR CALCULATING PERFORMANCE INDICATORS

	NUMBER OF CONTRACTS	% AVAILABLE
CALL FOR TENDER AVAILABLE	867111	68
PROCEDURE TYPE	1255348	99
E-AUCTION	1063542	84
NUMBER OF BIDS	1010727	80
BIDDING DEADLINE	866898	68
SELECTION METHOD	1206490	95
ESTIMATED PRICE	372458	29
FINAL PRICE	937029	74

## 3.2 INDICATORS

The selected set of public procurement performance indicators are meant to comprehensively characterise the quality of governance across EU regions along the lines of the above conceptual framework. Hence, the eventual indicator set provides two to five individual indicators for each component of governance quality (Table 3). In addition, the selection had to balance diverse quality expectations towards indicators. On the one hand, conceptual fit was paramount; on the other hand, data availability and quality in TED posed constraints on measurements. Indicator definitions greatly benefitted from directly relevant prior work, in particular DG REGIO's work on "Benchmarking contracting authorities in the EU according to their performance", which covered transparency, competition and efficiency (Fazekas, 2016); and prior work in the EU-funded research project DIGIWHIST on corruption risks (Fazekas, Cingolani and Tóth, 2016). This means that there is no need to conduct a comprehensive review of potential indicators and their assessment; instead, the description of selected indicators can follow directly.

On the most general level, all the selected indicators must fulfil the following basic standards so that they can support policy assessment and decision-making:

- ▶ **objective:** they are based on factual data non-mediated by stakeholders' perceptions, judgements or self-reported experiences;
- ▶ **de facto:** indicators describe actual behaviour or events rather than legal prescriptions or expectations;
- ▶ **micro-level:** they are defined at the level of transaction between buyers and suppliers (i.e. contracts). Nevertheless, they can be aggregated at higher levels such as regions;
- ▶ **internationally comparable:** while defined at the micro-level, indicators should be comparable across countries or regions, due the same underlying theoretical concepts and measurement approach;
- ▶ **comprehensive:** they adequately capture public procurement performance in a wide set of organisations performing comparable tasks; and
- ▶ **time-series:** indicators are ideally measured and can be compared over time for at least 5-10 years.

Transparency Indicators aim to capture different aspects of public procurement information availability within TED which have been shown to influence bidding outcomes and organisational behaviour (Tóth and Fazekas, 2017). Publishing the contract notice on TED assures that a wider pool of bidders can access timely information on a bidding opportunity, as opposed to publishing only via national public procurement portals or newspapers. Open tenders are those which allow for any company to bid, providing the minimal conditions are fulfilled. Open tenders also require the broadest possible advertisement reach, increasing the scope of transparency. The reporting completeness indicator goes beyond the mere presence of different announcements and their dissemination by looking into the mandatory fields within standard tendering announcements and whether they are actually filled in.

In the absence of complete data fields, the actual level of transparency which matters for bidding firms when preparing their bids is low. The use of e-auctions in public procurement tendering provides additional transparency on top of the minimum standards set for every tender regulated by the EU Public Procurement Directives, as this makes the bidding process itself more transparent for the participant (e.g. bids placed in successive rounds of a reverse action are published). Voluntary reporting on TED takes public procurement transparency one step further inasmuch as even those tenders which are below minimum contract value thresholds are placed on the TED portal in line with its stringent publication standards. Such publication practice signals additional effort by public buyers to go beyond the legal minimum and encourage open competition<sup>9</sup>.

Competition indicators aim to capture both the intensity of competition and the composition of the participating bidders. Intensity of competition measured by the number of bids submitted is based on a simple idea that more bidders make for a stronger, healthier competitive environment, with the benefits of an additional bidder diminishing with more and more bidders appearing on the market. Both indicators on the share of local and foreign bidders aim to signal that when at least some bidders come from outside the immediate locality the buyer is located in, competition is expected to be more intense due to more diverse companies competing.

Indicators of administrative efficiency aim to capture both the processes and outcomes of how public buyers minimise the total cost of achieving a predetermined outcome of public procurement tenders. The speed of decision making approximates the cost of evaluating tenders and responding to legal challenges, operating on the assumption that slower decision-making means higher costs for both public and private actors. The use of the most economically advantageous tender (MEAT) criteria implies that considerations other than price are taken into account. As quality is often difficult to assess, although it is certainly a very important parameter besides price, the use of MEAT criteria carries the potential for better value-for-money outcomes through a more balanced assessment of bids. Price-saving complements the previous quality considerations in that it captures the value of discounts that companies give compared to reference prices – i.e. the cheaper the winning bid, the better the process.

Indicators of corruption aim to capture the extent to which a given situation heightens the risk of government contracts being allocated in a way that benefits closed networks while denying access to all others. This scenario occurs through the subversion and violation of established explicit rules and the principles of open and fair public procurement. The simplest indication that the principles of open and fair competition are being violated is when only one bid is submitted for a tender in a competitive market, meaning there are companies which could have bid, yet only one actually did. The more complex indication of corruption, the Corruption Risk Index, also incorporates characteristics of the tendering process that are determined by public officials conducting the tender and contributing to competition restriction, such as a very tight deadline that leaves little chance for non-connected bidders to compile their bids. It is also expected that a contract represents a higher corruption risk if it is awarded to a company registered in a tax haven, as secrecy allows for hiding corrupt money.

<sup>9</sup> This interpretation rests on the assumption that there is a large number of contracts below the EU reporting thresholds for which there is a choice of voluntarily publishing them or not. Give observed contract distributions on TED as well as national datasets collected by DIGIWHIST, this assumption appears to be fulfilled.

TABLE 3. LIST OF PUBLIC PROCUREMENT GOVERNANCE INDICATORS, NUTS REGIONS, TED, 2006-2015

VARIABLE GROUP	VARIABLE NAME	INDICATOR DEFINITION: REGION LEVEL
TRANSPARENCY	contract notice publication	% call for tenders published compared to all awarded contracts
	use of open procedures	% contracts awarded in an open or restricted procedure type over all contract awards
	reporting completeness	% non-missing information in all mandatory information fields
	use of e-auctions	% contract awards using e-auction over all contract awards (for selected countries)
	voluntary reporting	% below-EU-threshold contract awards over all contract awards
COMPETITION	intensity of competition	Average number of bids submitted (trimmed mean )
	non-local suppliers	% contract awards to firms headquartered in a different region than the contracting body over all contract awards
	foreign suppliers	% contract awards to firms headquartered in a foreign country
ADMINISTRATIVE EFFICIENCY	decision-making speed	% deviation of average decision-making time from market average (higher values indicate shorter than average)
	MEAT assessment criteria	% tenders using MEAT assessment criteria compared to market average
	price savings	% deviation of contract value from estimated contract value (higher values indicate higher savings)
CONTROL OF CORRUPTION RISKS <sup>15</sup>	single bidding	% contract awards with one bid submitted over all contract awards (competitive markets only)
	CRI	Average Corruption Risk Index (competitive markets only)
	tax haven	% contract awards to firms registered in a tax haven

<sup>10.</sup> information fields were considered for information reporting completeness: contracting body name, contracting body address, contracting body settlement name, contracting body postcode, winner name, winner address, winner settlement name, winner postcode, winner country, procedure type, main CPV code, NUTS code, use of EU funds, type of assessment criteria used, contract award date, number of bids, contract value, and use of subcontracting. In each case, missing values were marked as incomplete information, unfortunately, as incorrect or meaningless information provided could not be assessed.

<sup>11.</sup> For current EU contract value thresholds, see: [http://ec.europa.eu/growth/single-market/public-procurement/rules-implementation/thresholds/index\\_en.htm](http://ec.europa.eu/growth/single-market/public-procurement/rules-implementation/thresholds/index_en.htm)

<sup>12.</sup> Bidder number values above 20 are recoded as 20.

<sup>13.</sup> The market average decision-making time is defined as the arithmetic average by market measured in days (defined by 2-digit CPV codes).

<sup>14.</sup> Average MEAT criteria use by market is defined by calculating the percentage of contracts using MEAT criteria within any CPV division (using 2-digit codes).[perhaps the footnotes should be renumbered to make them consecutive – 15 comes after 17] – yes very good idea, could you please rearrange them to be consecutive?

<sup>15.</sup> To make this component of good governance score comparable to the others, its direction has been rescaled – i.e. higher values mean better performance which in turn mean lower corruption. In the table, we present the original formulation of the indicators before such transformation.

<sup>16.</sup> Components of CRI are: i) single bidding; ii) no call for tender published; iii) non-open procedure types; iv) risky evaluation criteria; v) extreme submission period; and vi) extreme decision period.

<sup>17.</sup> Competitive markets are those with three or more contracts awarded annually, indicating a sufficient demand for two or more operating companies. This excluded 8 % of the sample.

## 4. RESULTS: COMPOSITE INDICATOR VALIDITY AND REGIONAL PERFORMANCE

The theoretically relevant and empirically feasible indicators listed in Table 3 were subject to statistical tests to assess their validity and reliability for measuring governance equality in EU regions. As a result of basic tests checking whether there is sufficient variance in the observed indicators, three had to be removed: use of e-auctions (transparency), foreign suppliers (competition), and tax haven (corruption). Each of these indicators had a very low mean as well as variance, meaning that most of their values were zeros,

thus they conveyed relatively little information for inter-regional benchmarking. For detailed descriptive statistics, see Table B1 in Appendix B. The remaining analysis and testing use the final list of selected performance indicators (Table 4).

The sections below assess indicator validity at NUTS 3 and NUTS 2 levels by correlating indicators with each other as well as with already established indicators of regional institutional quality, such as EQI, public-sector meritocracy, GDP per capita and social trust. In addition, robustness to missing data is assessed by applying different sample size cut-points to make sure smaller regions do not drive the overall findings and rankings. Using the indicators which pass these validity tests, a brief analysis of regional governance quality is conducted at NUTS 3 and NUTS 2 levels, including time-series comparisons. In addition, preliminary evidence is also provided on the relationship between regional governance quality and growth.

**TABLE 4. FINAL LIST OF PUBLIC PROCUREMENT GOVERNANCE INDICATORS USED IN THE ANALYSIS, NUTS REGIONS, TED, 2006-2015**

VARIABLE GROUP	VARIABLE NAME	INDICATOR DEFINITION: REGION LEVEL
TRANSPARENCY	contract notice publication	% call for tenders published compared to all contracts awarded
	use of open procedures	% contracts awarded in an open or restricted procedure type over all contract awards
	reporting completeness	% non-missing information in all mandatory information fields <sup>18</sup>
	voluntary reporting	% below-EU-threshold <sup>19</sup> contract awards over all contract awards
COMPETITION	intensity of competition	Average number of bids submitted (trimmed mean <sup>20</sup> )
	non-local suppliers	% contract awards to firms headquartered in a different region than the contracting body over all contract awards
ADMINISTRATIVE EFFICIENCY	decision-making speed	% deviation of average decision-making time from market average <sup>21</sup> (higher values indicate shorter than average)
	MEAT assessment criteria	% tenders using MEAT assessment criteria compared to market average <sup>22</sup>
	price savings	% deviation of contract value from estimated contract value (higher values indicate higher savings)
CONTROL OF CORRUPTION RISKS <sup>23</sup>	single bidding <sup>24</sup>	% contract awards with one bid submitted over all contract awards (competitive markets only)
	CRI	Average Corruption Risk Index <sup>25</sup> (competitive markets <sup>26</sup> only)

<sup>18</sup> 19 information fields were considered for information reporting completeness: contracting body name, contracting body address, contracting body settlement name, contracting body postcode, winner name, winner address, winner settlement name, winner postcode, winner country, procedure type, main CPV code, NUTS code, use of EU Funds, type of assessment criteria used, contract award date, number of bids, contract value, and use of subcontracting. In each case, missing values were marked as incomplete information, unfortunately, as incorrect or meaningless information provided could not be assessed.

<sup>19</sup> For current EU contract value thresholds, see: [http://ec.europa.eu/growth/single-market/public-procurement/rules-implementation/thresholds/index\\_en.htm](http://ec.europa.eu/growth/single-market/public-procurement/rules-implementation/thresholds/index_en.htm)

<sup>20</sup> Bidder number values above 20 are recorded as 20.

<sup>21</sup> The market average decision-making time is defined as the arithmetic average by market measured in days (defined by 2-digit CPV codes).

<sup>22</sup> Average MEAT criteria use by market is defined by calculating the percentage of contracts using MEAT criteria within any CPV division (using 2-digit length code).

<sup>23</sup> To make this component of good governance score comparable to the others its direction has been rescaled, that is higher values mean better performance which means lower corruption. In the table, we present the original formulation of the indicators before such transformation.

<sup>24</sup> Single bidding is already part of CRI, hence for building the composite indicator, only CRI is included. Single bidding is kept in the indicator list as it can be used independently of CRI, too.

<sup>25</sup> Components of CRI are: i) single bidding; ii) no call for tender published; iii) non-open procedure types; iv) risky evaluation criteria; v) extreme submission period; and vi) extreme decision period.

<sup>26</sup> Competitive markets are those with three or more contracts awarded annually, indicating a sufficient demand for two or more operating companies. This excluded 8 % of the sample.

## 4.1 COMPOSITE INDICATOR VALIDITY

The correlations among each procurement governance indicator are looked at in order to establish their fit with the theoretically postulated grouping. The basic correlations only partially fit the theoretically defined groups with unexpected negative correlations between intensity of competition and non-local suppliers in the competition indicator group, and negative correlations among all indicators in the administrative efficiency group (Table 5). This suggests that there might trade-offs between different aspects of competition and efficiency; for example, decision-making speed might be partially at odds with using more complex price + quality (MEAT) assessment criteria, or lower price savings achieved where price + quality (MEAT) assessment criteria is used more frequently.

Given the only partial fit of correlations among indicators with the theoretical grouping, there are two somewhat different ways to build composite scores. One follows the clear theoretical concepts and provides simple averages along the lines presented in Table 4, while the other uses principal component analysis in an attempt to unearth latent dimensions relying solely on correlations among indicators. The former is selected because the theoretical concepts are clear and non-contested and because of its simplicity. The principal component analysis results are shown in Appendix C. This leads to the overwhelming conclusion that correlations warrant four governance components which nevertheless are combined in a somewhat less clear-cut fashion than the theoretical constructs; for example, corruption and competition are closely linked in a principal component, or transparency and efficiency are mainly overlapping in the same composite score.

The simple arithmetic averages following the indicator groups in Table 4 yield four composite scores<sup>27</sup> which have also been combined into an overarching procurement good governance score, once again using the simplest equally weighted averaging method. Scaling of the indicators is such that they all range between 0 and 100, with 100 denoting the best possible performance and 0 the worst. All the composite indicators follow roughly normal distributions, warranting later statistical analysis (Figures 3 and 4).

Whilst the average procurement good governance score is in the 50-60 range, not all the components reflect this distribution; in particular, the average competition score is about 30 points while the transparency and efficiency score averages are all around 60. These differences in average scores as well as further differences in the observed minimum and maximum values in each score are driven by the dispersion of the underlying indicators among regions. That is, the average competition score is very low because the average region's performance is vastly inferior compared to the front-runner region in terms of bidder number and share of non-local suppliers. Hence, each composite indicator is best used in comparative terms with regards to the top-performing region along each dimension, while the underlying individual indicators can be used to understand absolute differences among regions as well as to set performance targets directly amenable to policy.

Whilst the composite scores have been created based on theoretical expectations, they strongly correlate with each other, confirming indicator building logic (Table 6). In particular, corruption risks are strongly related to overall governance quality in a similar way to the EQI regional indicator (Charron et al., 2014). Rather counter-intuitively, although in line with the Single Market Scoreboard's country-level findings<sup>28</sup>,

transparency is only weakly related to the overall good governance score, and even negatively related to the three other components (Figure 5). For a more detailed discussion of transparency, see also Figure 12.

So far, while correlations among governance indicators derived from public procurement data have pointed at the validity and usefulness of applying such indicators, they might suffer from relying on a single data source. Hence, the public procurement governance indicators discussed below are validated against existing indicators of regional governance and its correlates. This analysis is done at the NUTS 2 level only, as comparable external data is not generally available at the NUTS 3 level. As external validity tests, we use the level of economic development (GDP/capita) and quality of local institutions, as reported in a large-scale population survey (EQI). Both these variables are expected to correlate positively with public procurement governance scores (Charron et al., 2014). We also expect procurement governance quality to be positively associated with public-sector meritocracy. This is understood as the hiring and progression of public-sector employees based on merit or performance rather than connections, which is also measured by the Quality of Government Institute's large-scale regional survey (Charron et al., 2017). In regions where generalised social trust – i.e. trust in strangers or people who do not belong to 'your group' – is higher, we expect the quality of local institutions to be higher because people who trust the wider community are more ready to contribute to public goods by paying taxes, protecting public spaces, or engaging in local political discourse, for example (Uslaner, 2005).

In line with our expectations based on prior research, we find that all public procurement good governance indicators correlate positively with GDP/capita, EQI, public-sector meritocracy, and social trust, albeit with the exception of transparency (Table 7). EQI and regional public-service meritocracy purport the strongest association with public procurement indices, with a somewhat weaker relationship with GDP/capita and social trust. Control of corruption risks in public procurement is most strongly associated with EQI, while a number of regions demonstrate unexpected combinations of the two variables. For example, the Spanish regions in Catalonia and the Basque country with the best public procurement governance performance are ranked considerably lower according to citizens' views, as captured by the EQI (Figure 6). Conversely, some regions in Finland and Austria score considerably higher in EQI than public procurement governance. Interestingly, by and large, the control of corruption risks score is also the strongest correlate with GDP/capita, underlining the crucial role of inclusive institutions for growth (North et al., 2009) (Figure 7).

To briefly test the robustness of our indicators to sample size restrictions, some of the above tables have been replicated on much smaller samples, including regions with a higher number of awarded contracts only. Both Table 8 and Table 9 confirm that results are not driven by small regions either when comparing different procurement good governance scores or when testing them against external indices.

So far, another concern with the analysis is the limited nature of TED data, namely that it only captures large contracts which may

<sup>27</sup> Please note that single bidding is already part of CRI, so it was not included separately in the corruption risk composite score again.

or may not reflect quality of institutions more broadly. Hence, for two selected countries, Poland and Spain, where national public procurement data is of high quality and its scope is wide (national reporting threshold is around EUR 20 000-30 000), TED regional indicators are compared with regional scores using national data (Table 10). While the sample is small, the findings are clear and point to a weak relationship, albeit mainly in the direction we would expect. In Poland, the speed of decision-making is the most consistent indicator across TED and national public procurement data, while the strongest consistency for contract notice publication is seen in Spain. Both bidder number and single bidding are weakly related across the TED and national datasets, while relationships are insignificant due to the small sample size. Such lack of consistency between below- and

above-threshold procurement indicators is hardly surprising given the very different regulatory frameworks. Beyond regulatory differences, contract sizes are also likely to influence the weak alignment of data from TED and national sources, as contracts of a lower value are managed differently and attract different bidders. Research controlling for contract value differences confirms that regulatory differences lead to considerable deviations in outcomes just below and above the EU regulatory thresholds (Tóth and Fazekas, 2017). At any rate, this small-scale comparison reveals that national public procurement data brings considerable additional insights to understanding regional public procurement governance and to exploring why the same public bodies behave differently and produce different outcomes depending on regulatory and market conditions.

**TABLE 5. LINEAR CORRELATIONS AMONG PUBLIC PROCUREMENT GOVERNANCE INDICATORS, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{\text{REGIONS}}=1241$ ), SIGNIFICANT COEFFICIENTS ARE SHOWN (THEORETICALLY DEFINED INDICATOR GROUPS ARE HIGHLIGHTED IN GREY)**

	Contract notice publ.	Open proc.	Reporting compl.	Voluntary rep.	Intensity of comp.	Non-local suppl.	Decision-making speed	Price savings	MEAT assess. criteria	Single bid	CRI
contract notice publication	1.00										
use of open procedures	0.28	1.00									
reporting completeness	0.13		1.00								
voluntary reporting	-0.08		0.25	1.00							
intensity of competition	-0.08	0.07	-0.24	-0.06	1.00						
non-local suppliers		0.06	-0.08	-0.10	-0.20	1.00					
decision-making speed	0.10		0.20	0.34	-0.11		1.00				
price savings	0.12	0.10	0.08		-0.19		-0.06	1.00			
MEAT assessment criteria	-0.22	-0.07	-0.47	-0.25	0.29	-0.12	-0.28	-0.16	1.00		
single bidding	0.14		0.20		-0.65	0.36		0.22	-0.35	1.00	
CRI	0.22		0.25	-0.13	-0.44	0.27	-0.08	0.34	-0.42	0.69	1.00

FIGURE 3. HISTOGRAM OF THE PROCUREMENT GOOD GOVERNANCE SCORE, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{REGIONS} = 1239$ )

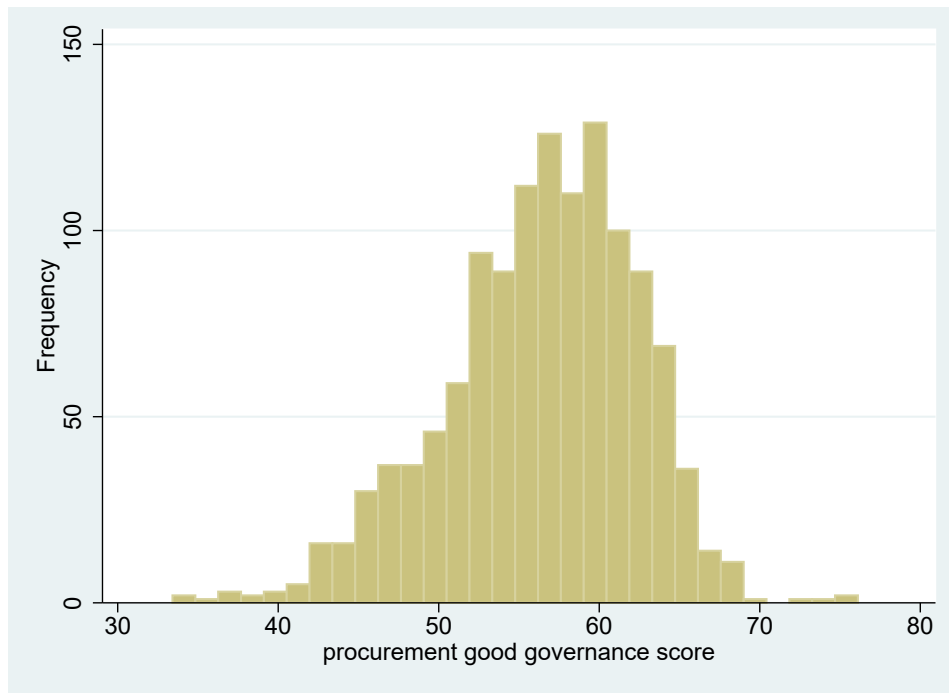
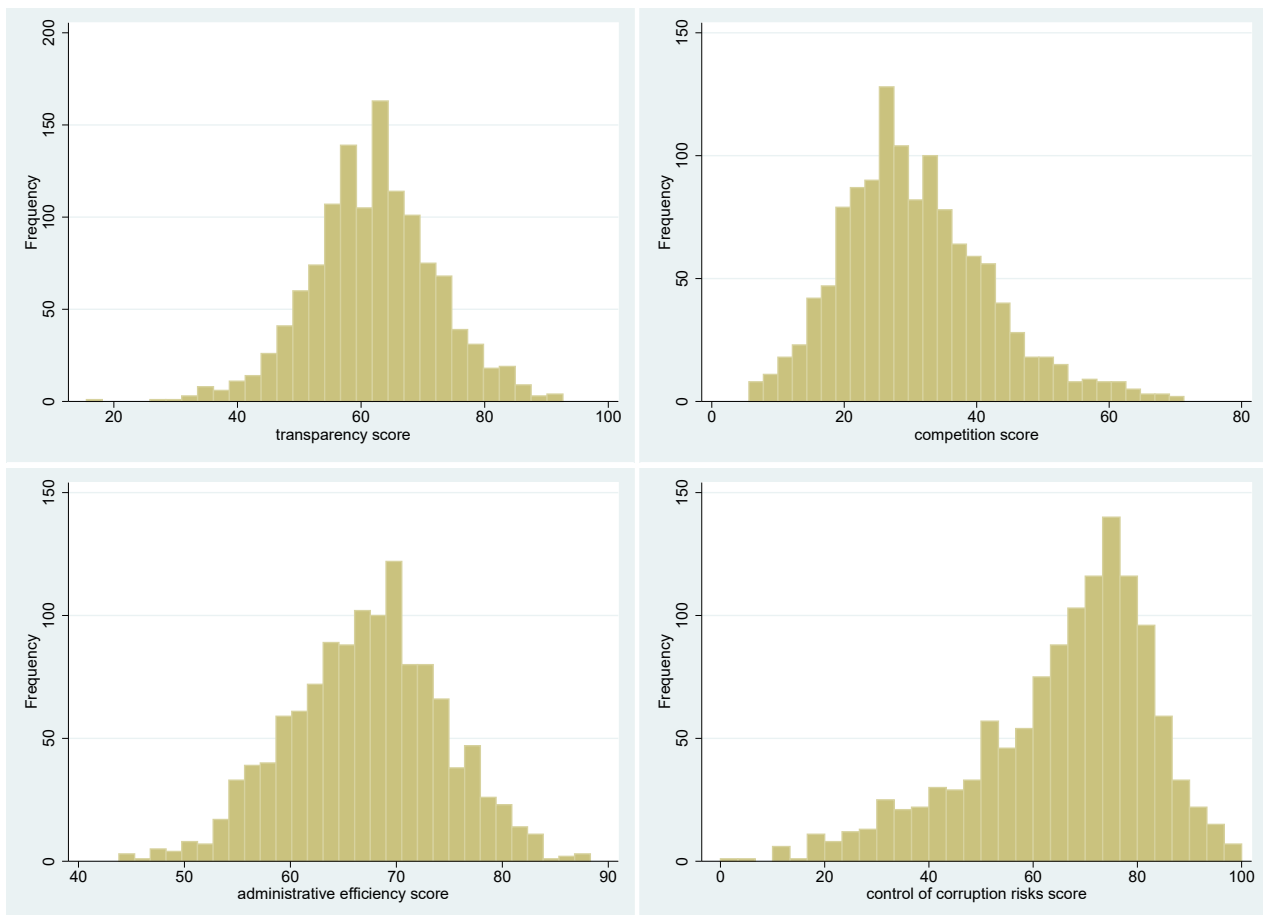


FIGURE 4. HISTOGRAMS OF THE COMPOSITE INDICATORS MAKING UP THE PROCUREMENT GOOD GOVERNANCE SCORE, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{REGIONS} = 1241$ )



<sup>28</sup> [http://ec.europa.eu/internal\\_market/scoreboard/performance\\_per\\_policy\\_area/public\\_procurement/index\\_en.htm](http://ec.europa.eu/internal_market/scoreboard/performance_per_policy_area/public_procurement/index_en.htm)



**TABLE 6. CORRELATIONS AMONG PUBLIC PROCUREMENT GOVERNANCE COMPOSITE SCORES, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> = 1241), SIGNIFICANT COEFFICIENTS ARE SHOWN**

	Procurement good governance score	Transparency score	Competition score	Efficiency score	Control of corruption risks score
Procurement good governance score	1.00				
Transparency score	0.16	1.00			
Competition score	0.49	-0.15	1.00		
Efficiency score	0.44	-0.25		1.00	
Control of corruption risks score	0.79	-0.16	0.10	0.31	1.00

**FIGURE 5. HISTOGRAMS OF THE COMPOSITE INDICATORS MAKING UP THE PROCUREMENT GOOD GOVERNANCE SCORE, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> = 1241)**

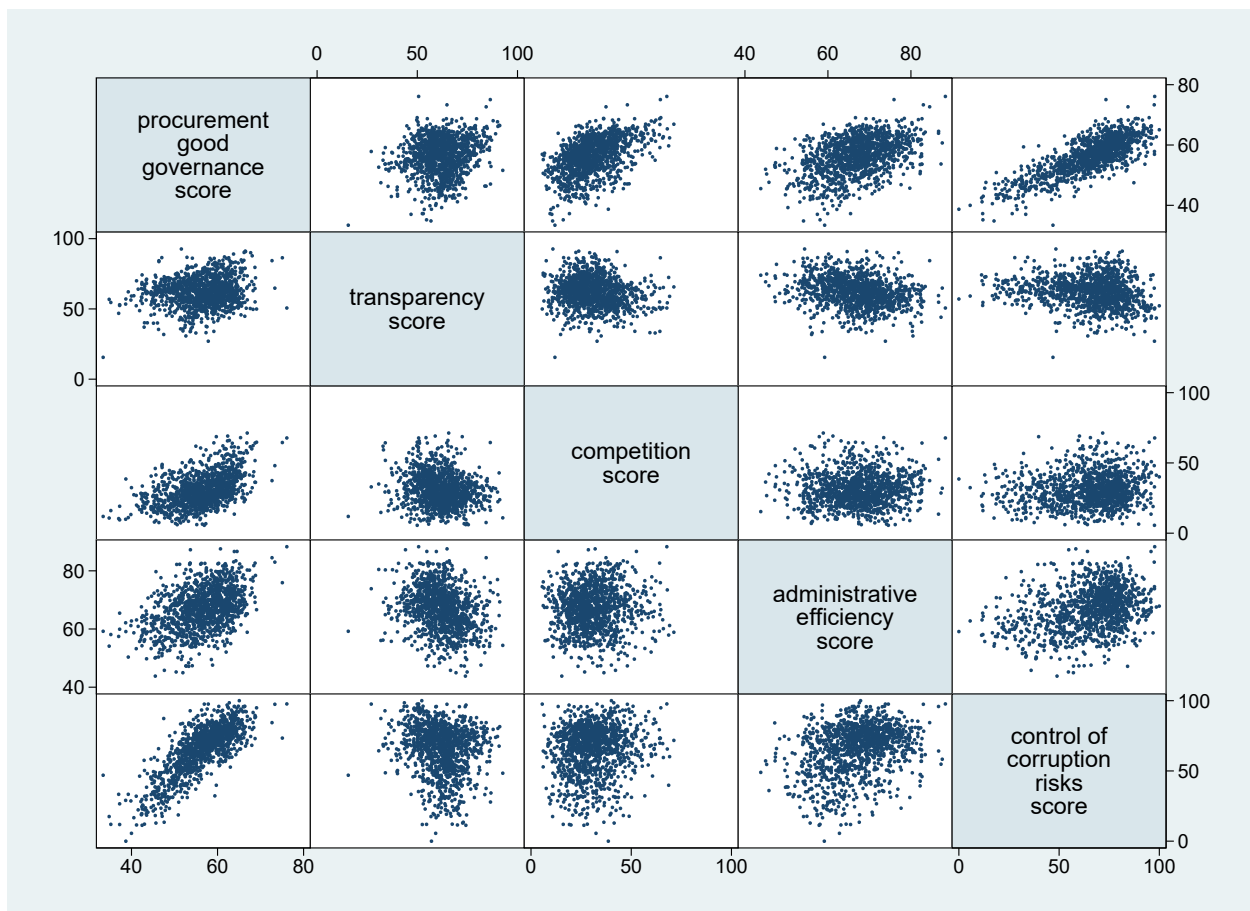


TABLE 7. CORRELATIONS AMONG PUBLIC PROCUREMENT GOVERNANCE COMPOSITE SCORES AND EXTERNAL INDICATORS OF REGIONAL GOOD GOVERNANCE, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{\text{REGIONS}}=276$ ), SIGNIFICANT COEFFICIENTS ARE SHOWN (AT 5 % LEVEL)

	GDP/capita	EQI (2010)	EQI (2013)	Public-sector meritocracy	Social trust
Procurement good governance score	0.19	0.50	0.57	0.59	0.33
Transparency score	-0.27	-0.26	-0.23	-0.28	-0.22
Competition score	0.13	0.27	0.27	0.40	0.38
Efficiency score		0.31	0.27	0.39	
Control of corruption risks score	0.32	0.63	0.65	0.58	0.32

FIGURE 6. SCATTER PLOT OF THE PUBLIC PROCUREMENT GOOD GOVERNANCE SCORE AND EQI (2010), NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{\text{REGIONS}}=139$ ), OUTLIERS' NUTS 2 CODES ARE HIGHLIGHTED (TOP/BOTTOM 5 % ACCORDING TO EITHER DIMENSION)



FIGURE 7. SCATTER PLOT OF THE CONTROL OF CORRUPTION RISKS SCORE AND GDP PER CAPITA (CURRENT MARKET VALUES PPS), NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> =275)

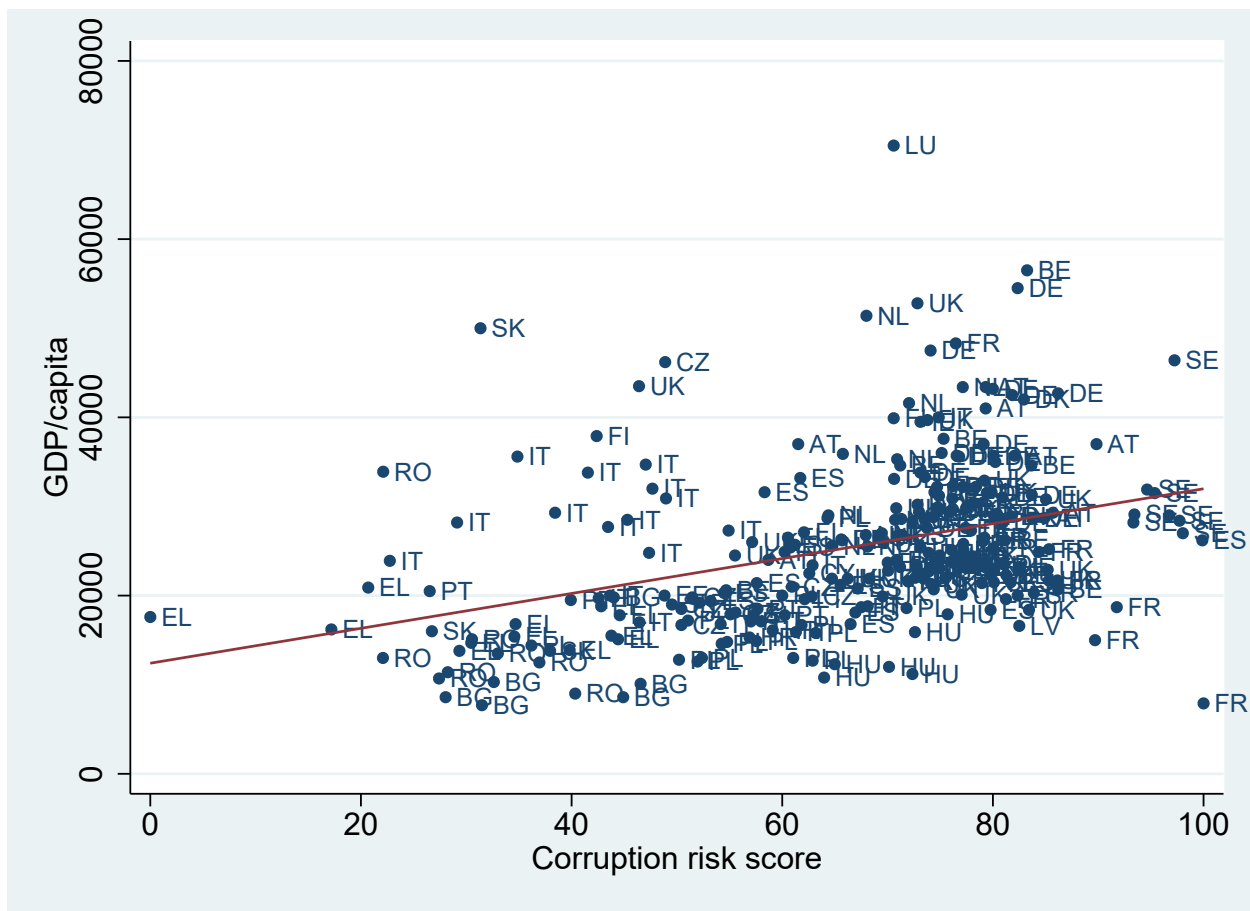


TABLE 8. CORRELATIONS AMONG PUBLIC PROCUREMENT GOVERNANCE COMPOSITE SCORES, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 100 CONTRACTS AWARDED (N<sub>REGIONS</sub> =1002), SIGNIFICANT COEFFICIENTS ARE SHOWN (AT 5 % LEVEL)

	Procurement good governance score	Transparency score	Competition score	Efficiency score	Control of corruption risks score
Procurement good governance score	1.00				
Transparency score	0.11	1.00			
Competition score	0.54	-0.16	1.00		
Efficiency score	0.45	-0.24	0.08	1.00	
Control of corruption risks score	0.80	-0.21	0.17	0.31	1.00

**TABLE 9. CORRELATIONS AMONG PUBLIC PROCUREMENT GOVERNANCE COMPOSITE SCORES AND EXTERNAL INDICATORS OF REGIONAL GOOD GOVERNANCE, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 500 CONTRACTS AWARDED (N<sub>REGIONS</sub> = 242), SIGNIFICANT COEFFICIENTS ARE SHOWN (AT 5 % LEVEL)**

	GDP/capita	EQI (2010)	EQI (2013)	Public-sector meritocracy	Social trust
Procurement good governance score	0.15	0.59	0.60	0.59	0.29
Transparency score	-0.30	-0.26	-0.21	-0.27	-0.21
Competition score		0.28	0.29	0.40	0.38
Efficiency score		0.39	0.26	0.33	
Control of corruption risks score	0.31	0.71	0.68	0.58	0.28

**TABLE 10. CORRELATIONS AMONG SELECTED PUBLIC PROCUREMENT INDICATORS, TED AND NATIONAL DATA COMPARED, POLAND AND SPAIN, NUTS 2 ANNUAL, 2010-2015<sup>29</sup>, N<sub>PL,OBS.</sub> = 96, N<sub>ES,OBS.</sub> = 87**

	Poland		Spain	
	GDP/capita	EQI (2010)	EQI (2013)	Public-sector meritocracy
contract notice publication	-0.06	0.08	0.23*	0.27*
intensity of competition	0.12	0.16	-0.12	-0.09
decision-making speed	0.41*	0.40*	-0.03	0.02
single bidding	0.07	0.17	0.05	0.09

Note: \* 5 % significance

<sup>29</sup> Pre-2010 Polish national public procurement data is not available in a structured analysable format, while Spanish national data has only been available since 2011 in a structured format.

## 4.2 ASSESSING REGIONAL PERFORMANCE ACROSS THE EU

The relevance of looking at regional institutional quality rather than merely at the national level is demonstrated by public procurement governance indicators which display an even wider within-country variance than the EQI score (Charron et al., 2014) (Figure 8). Within-country variation is particularly pronounced in large federal countries like Italy, Germany and Spain, while there is a surprisingly strong variation within smaller countries such as Greece, Bulgaria and Portugal. Top-performing countries like Denmark, Sweden and Finland are much more diverse within their national boundaries than is revealed by the EQI, with Finland even scoring close to the EU average rather than top, as suggested by the EQI.

A powerful feature of the public procurement-based governance indicators is that they allow for a high level of resolution, such as looking at NUTS 3 regions (Figure 9) or even on the municipal level. This nuanced understanding of the procurement good governance score reveals considerable within-country variation as well as regional similarities across national borders such as parts of Northern Austria, Southern Czech Republic and Western Slovakia. Looking at a NUTS 2 level of detail is also highly informative when evaluating the control of corruption risks score, for example. This highlights that high institutional quality is found in the Baltic States, or the fact that Greece's performance is more aligned with high-corruption-risk countries like Bulgaria and Romania than with Spain (Figure 10).

The counter-intuitive findings for public procurement transparency and level of development can also be further investigated at the NUTS 2 level (Figure 11). Interestingly, the low-performing Nordic countries have little within-country variation on transparency, suggesting an overall weak national regulatory and information system. Other low-performing Western European Member States are internally quite diverse, such as the UK or Germany. Moreover, many high-corruption-risk countries like Greece, Poland and Romania perform remarkably well on the transparency scale although with strong within-country variation.

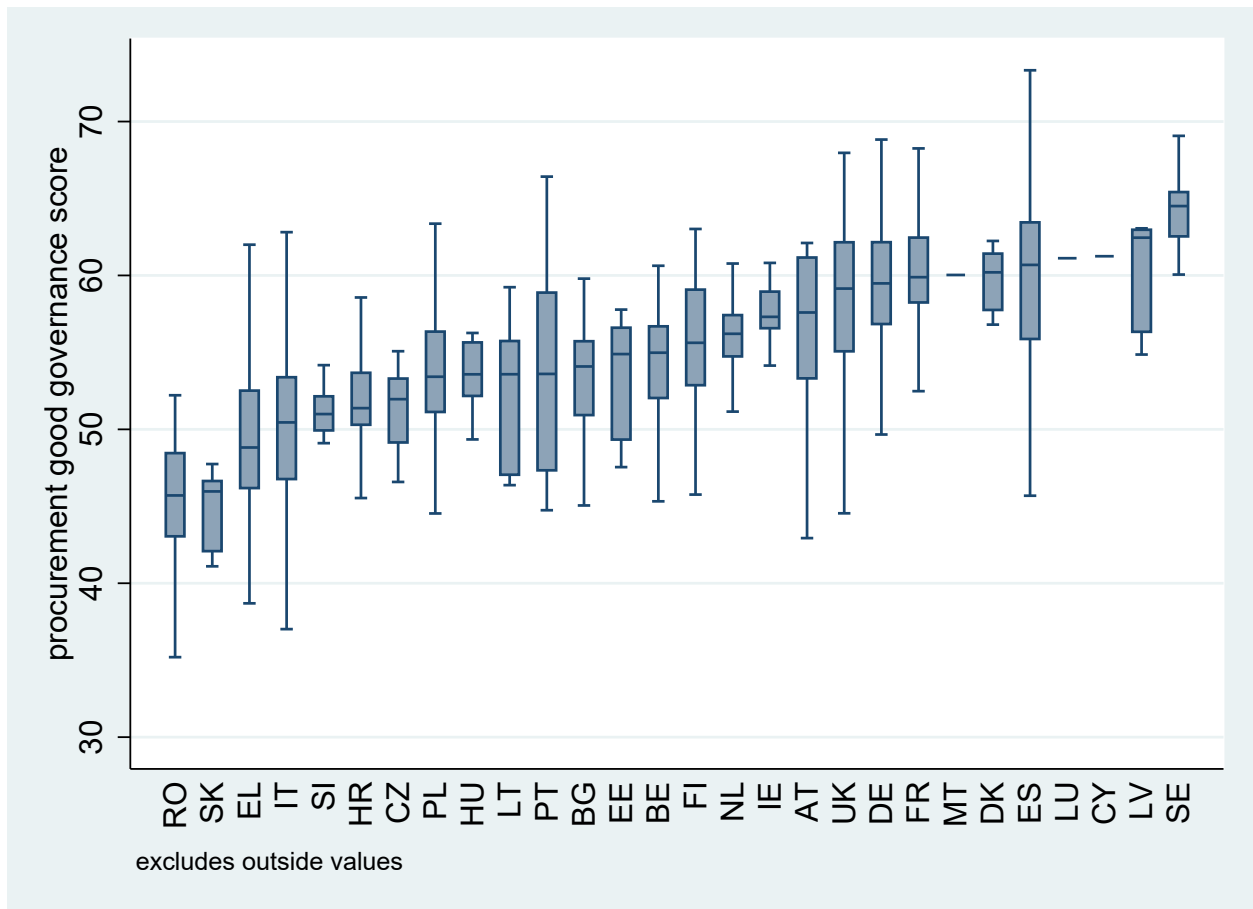
One possible explanation for the surprising weakness in transparency in TED in otherwise highly transparent and well-governed countries and regions is that they are using a parallel national system – hence, TED is not necessary for achieving high-quality outcomes. One way of exploring this potential explanation is to look at the quality of national public procurement systems using the EuroPAM<sup>30</sup> scoring template, which considers national thresholds, record-keeping standards, and regulation of exceptions, among others. The EuroPAM national public procurement system scores and TED-based procurement transparency scores are positively correlated, albeit to a moderate degree. Indeed, this suggests that where TED transparency is weak, national systems are also weak (Figure 12) (note the strength of relationship is influenced by outliers).

In strong contrast to regional transparency scores, competition performance is high in many low-transparency regions in the Nordic countries. In addition, some Spanish, Irish and UK regions perform very strongly (Figure 13). Interestingly, many core European regions in Germany, Benelux and France achieve only an average performance in the public procurement competition measure.

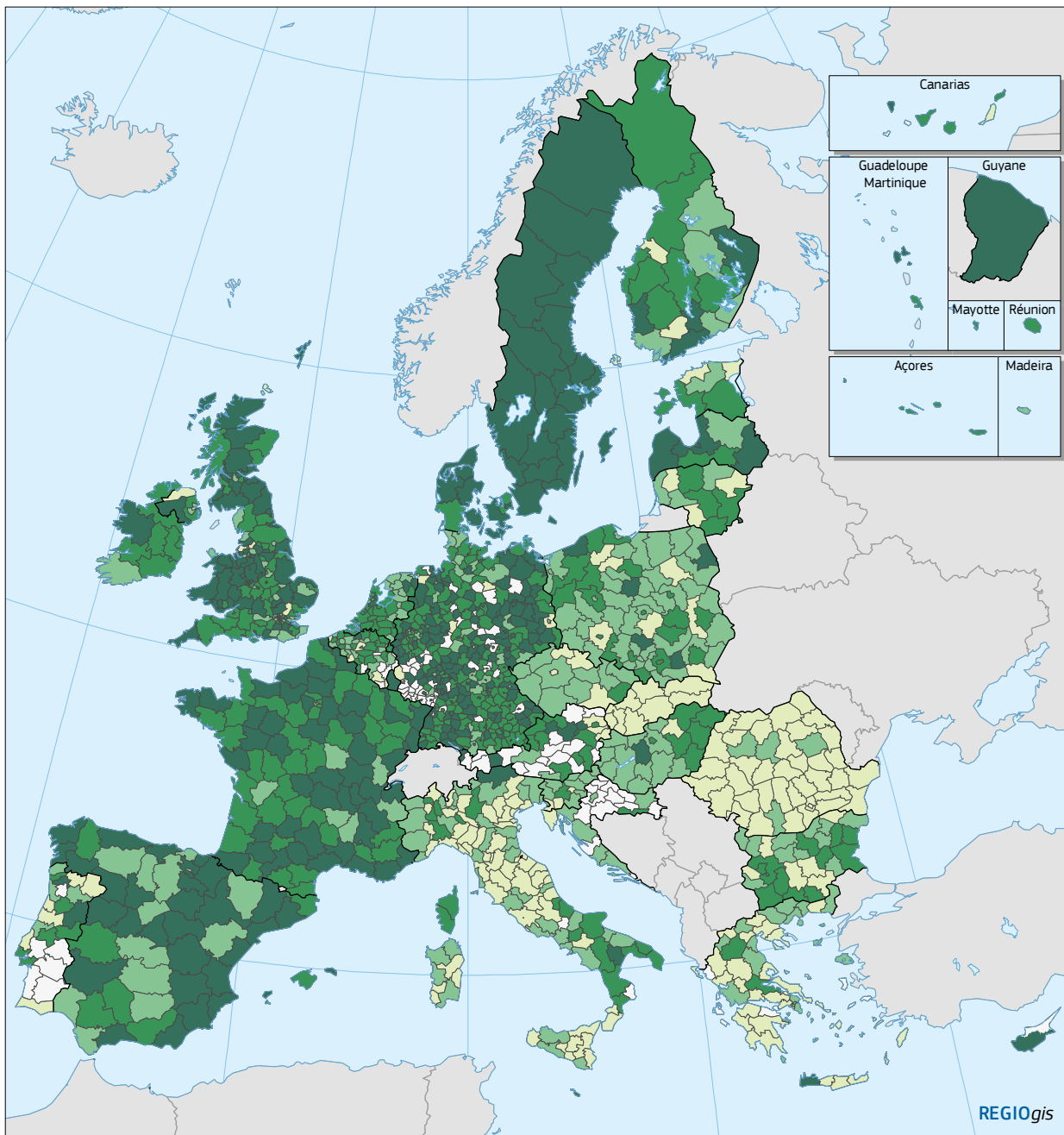
Surprisingly, administrative efficiency regional scores show Spain as a front-runner with some French and Italian regions also at the forefront (Figure 14). This partial disconnect with competition or transparency scores shows that, in some respects, transparency and competition may be at odds with administrative efficiencies such as the speed of decision-making (e.g. if only one company bids, assessing tenders is a lot quicker than when 10 companies submit bids).

<sup>30</sup> <http://europam.eu/?module=overview>

FIGURE 8. REGIONAL PROCUREMENT GOOD GOVERNANCE SCORE AND WITHIN-COUNTRY VARIATION, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{\text{REGIONS}} = 1241$ )



**FIGURE 9. MAP OF THE PROCUREMENT GOOD GOVERNANCE SCORE, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{REGIONS} = 1238$ )**



**Figure 9 - Regional procurement good governance score, TED, 2006-2015**

- 0 - 50
- 50 - 55
- 55 - 60
- 60 - 100
- no data

Regions with at least 35 awarded contracts (1238 regions)

0 500 km

FIGURE 10. MAP OF THE CONTROL OF CORRUPTION RISKS SCORE, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> =278)

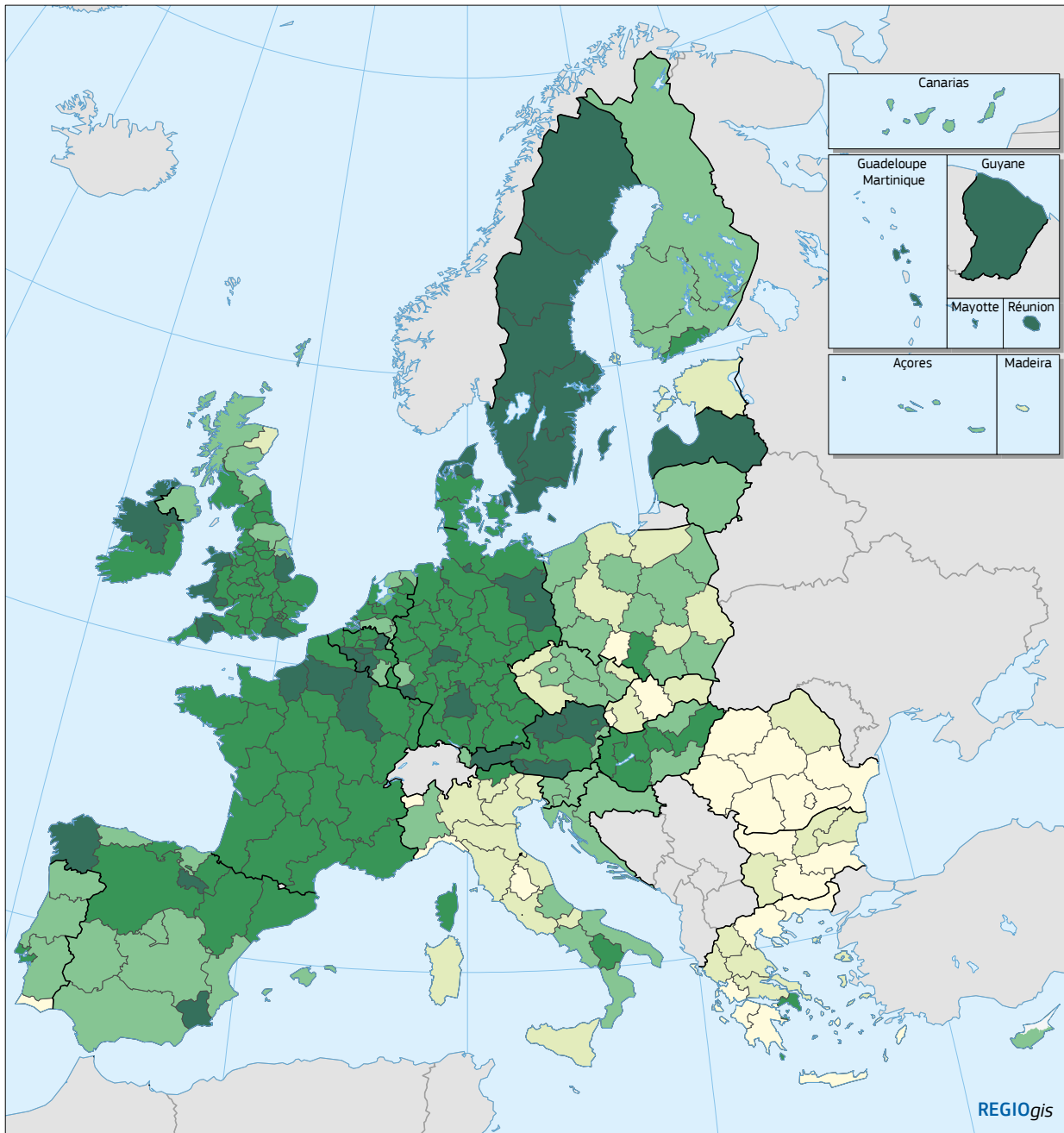


Figure 10 - Control of corruption risks score, TED, 2006-2015

- 0 - 37
- 37 - 53
- 53 - 68
- 68 - 81
- 81 - 100
- no data

Regions with at least 35 awarded contracts (278 regions)

0 500 km



FIGURE 11. MAP OF THE PROCUREMENT TRANSPARENCY SCORE, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> =278)

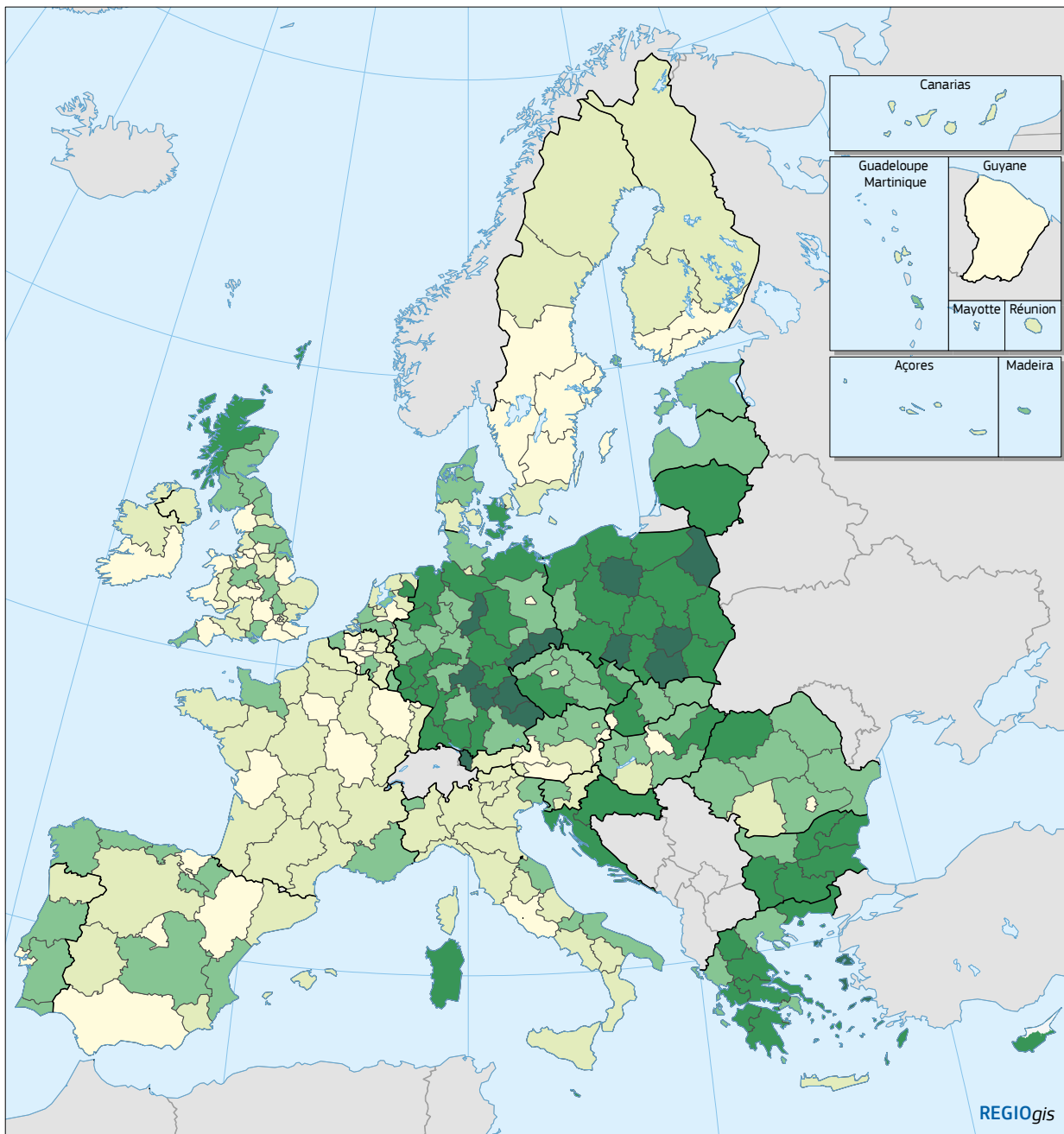


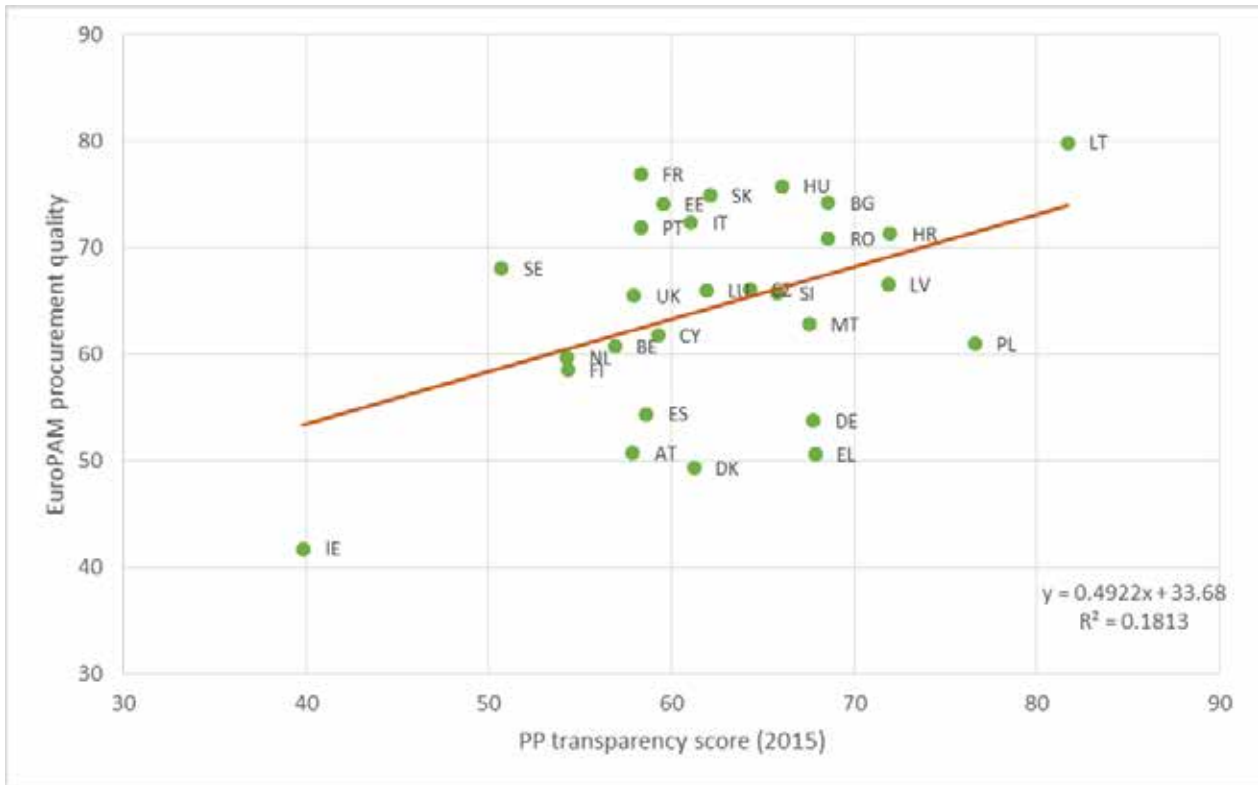
Figure 11 - Procurement transparency score, TED, 2006-2015

- 0 - 52
- 52 - 59
- 59 - 66
- 66 - 75
- 75 - 100
- no data

Regions with at least 35 awarded contracts (278 regions)

0 500 km

FIGURE 12. SCATTER PLOT OF PUBLIC PROCUREMENT TRANSPARENCY (TED) AND EUROPAM<sup>31</sup> PUBLIC PROCUREMENT NATIONAL INSTITUTIONAL QUALITY, 2015, COUNTRY LEVEL



<sup>31</sup> <http://europam.eu/?module=overview>

FIGURE 13. MAP OF THE PROCUREMENT COMPETITION SCORE, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> =278)

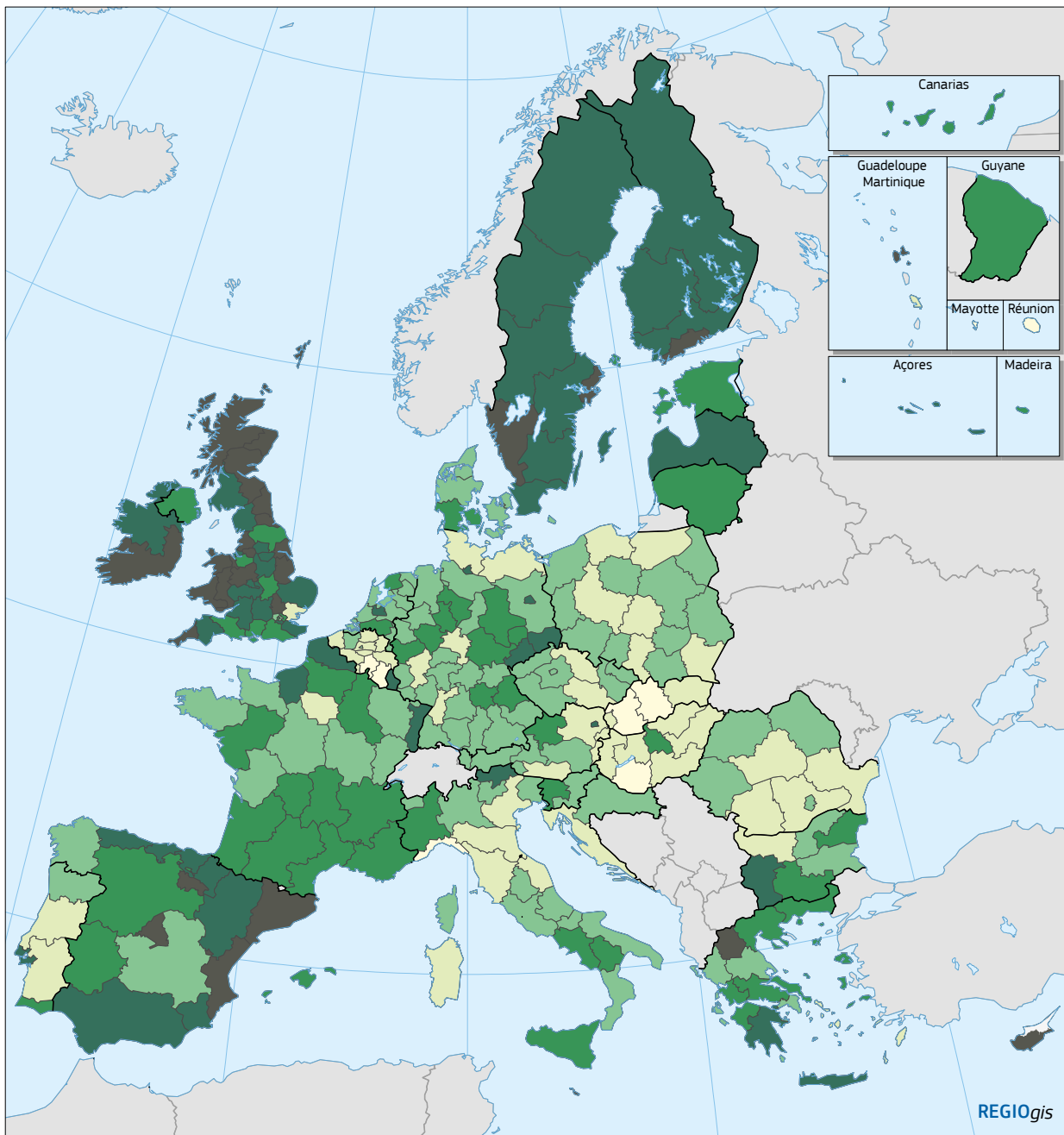


Figure 13 - Procurement competition score, TED, 2006-2015

- 0 - 15
- 15 - 26
- 26 - 34
- 34 - 42
- 42 - 53
- 53 - 100

Regions with at least 35 awarded contract (278 regions)

0 500 km

FIGURE 14. MAP OF THE PROCUREMENT EFFICIENCY SCORE, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> =278)

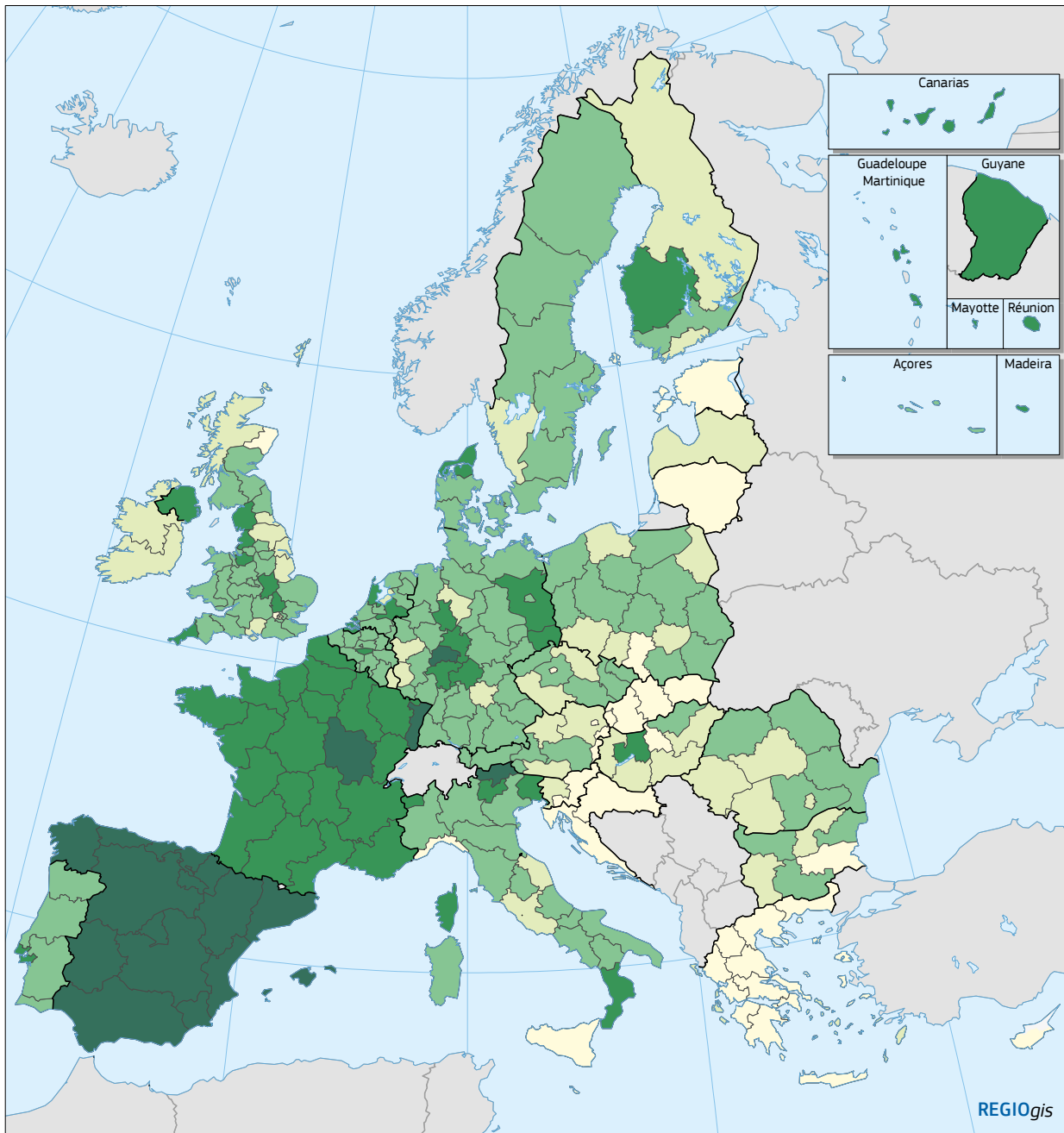


Figure 14 -Procurement efficiency score, TED, 2006-2015

- 0 - 52
- 52 - 59
- 59 - 66
- 66 - 74
- 74 - 100
- no data

Regions with at least 35 awarded contracts (278 regions)

0 500 km

#### 4.2.1 REGIONAL CONVERGENCE IN THE EU

The power of a large volume of data and the use of indicators deriving from objective, administrative datasets is further demonstrated by looking at changes over time which are non-negligible and which contradict much of the survey evidence on little to no change in governance quality (Figure 14). Overall, many Eastern European and some Mediterranean regions succeeded in improving their procurement good governance score from 2006-2008 to 2013-2015, while initially high governance quality regions in Southern Sweden, Western and Southern Germany, and Ireland have witnessed considerable institutional decay.

The processes of and explanations for the slow decay of initially high-quality public institutions are under studied, although in recent times some scholars have noted such developments particularly for the USA (Fukuyama, 2014). Reasons for decaying institutions in many well-governed Western European regions can be diverse, ranging from wage-cutting austerity policies hitting the quality of the public sector (Klasnja, 2016), weak political competition (Broms, Dahlström and Fazekas, 2017; Coviello and Gagliarducci, 2017; Fazekas, 2015), or powerful business interests capturing government (OECD, 2017; Shaxson and Christensen, 2014).

The surprising fall in governance quality as measured in public procurement data in Western Europe plus some notable improvements in Eastern Europe suggest there has been convergence in institutional quality over the last 10 years. However, looking at four macroregions in Europe does not confirm this view; instead, it becomes apparent that overall there has been a decline in governance quality across Europe, with only Central and Eastern Europe managing to stagnate or even slightly improve (Figure 16). Most strikingly, governance quality has been constantly declining in Mediterranean Europe, reaching lower levels than new Eastern European Member States at the end of the 2013-2015 period. This implies that, while some peripheral regions converged to the continental European core – most notably many Central and Eastern European regions – others in the South of the EU have diverged considerably. Statistical tests also support this view, with the overall dispersion of procurement good governance scores remaining largely unchanged.

Looking at sub-components of procurement good governance reveals a diverse picture with improvement in some dimensions and deterioration in others, although generally there is a lack of overall convergence (Figure 17) (the same time-series figures without the somewhat outlier 2006<sup>32</sup> and a figure with annual contract numbers showing a stable time-series are in Appendix B). The main reasons behind the observed decline in the total procurement good governance score are the falling competition and control of corruption scores. Meanwhile, administrative efficiency has, by and large, remained stable throughout the period, and transparency has improved in Central and Eastern Europe. An even more detailed analysis making use of selected underlying performance indicators points towards similar patterns (Figure 18). The number of bidders declines in parallel with an increasing single-bidder rate, particularly in Mediterranean Europe. Average savings and reporting completeness have remained stable in most of the EU.

A more detailed look at convergence at the extremes of good and bad procurement governance performance further supports the above conclusions (Figure 19). Understanding the reasons for the steepest decay among initially top-performing regions could provide novel lessons for why there is a significant need for investment in rich regions' institutions. Conversely, better mapping of how and why the initially low-performing regions managed to drastically improve their performance could provide lessons for others wanting to catch up.

<sup>32</sup> There are institutional legal reasons why 2006 appears to be an outlier in the whole time-series: 1.1.2006 was the deadline for the transposition of the 2004 Public Procurement Directives, but the actual implementation of new rules and reporting standards typically follow the effective date by a few months, especially when a lot of other legislative changes must be implemented at the same time, such as was the case in the 2004 enlargement Member States.

FIGURE 15. MAP OF THE CHANGES IN PUBLIC PROCUREMENT GOOD GOVERNANCE SCORES, NUTS 2, TED, 2006-2008 VS. 2013-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub> = 278)

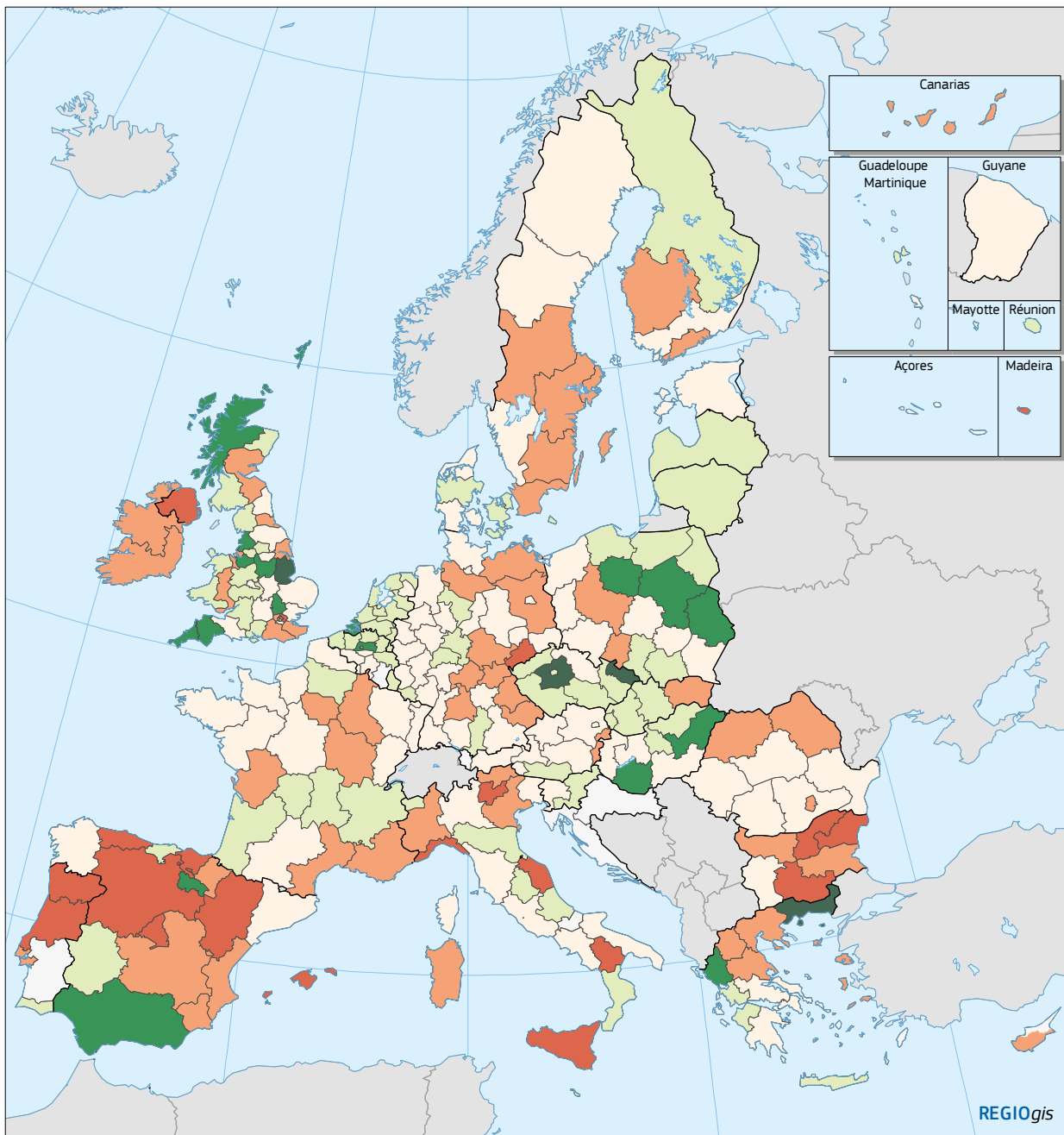


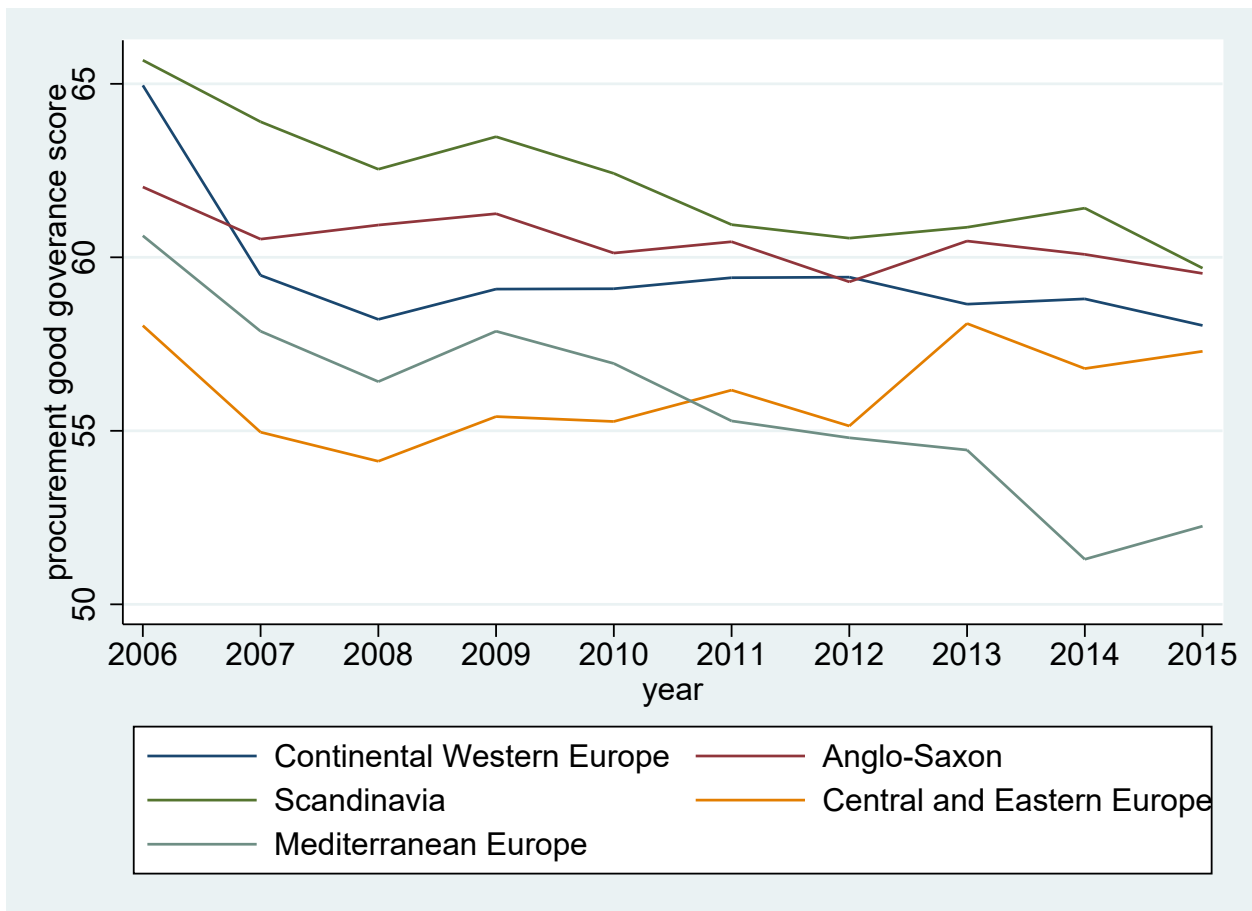
Figure 15 - Changes in public procurement good scores, TED, 2006-2015



Regions with at least 35 awarded contracts (278 regions)

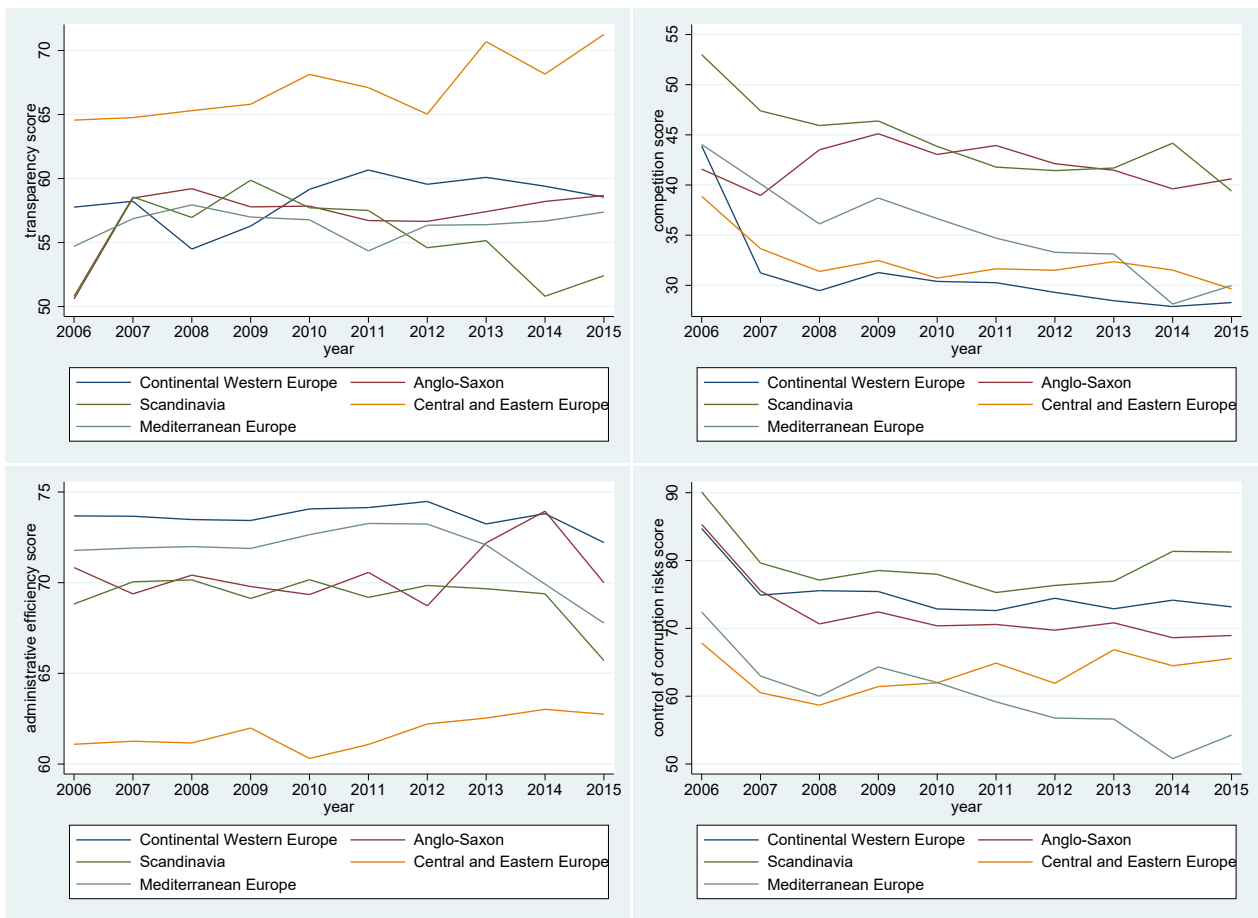


FIGURE 16. TRENDS IN THE AVERAGE PUBLIC PROCUREMENT GOOD GOVERNANCE SCORE ACROSS MACROREGIONS<sup>33</sup> OF THE EU, 2006-2015, TED



<sup>33</sup> Continental Western Europe includes AT, BE, DE, FR, LU and NL; Anglo-Saxon denotes IE and UK; Scandinavia includes DK, FI and SE; Central and Eastern Europe include BG, HR, CZ, CY, EE, HU, LV, LT, MT, PL, RO, SK and SI; Mediterranean Europe denotes EL, IT, PT and ES.

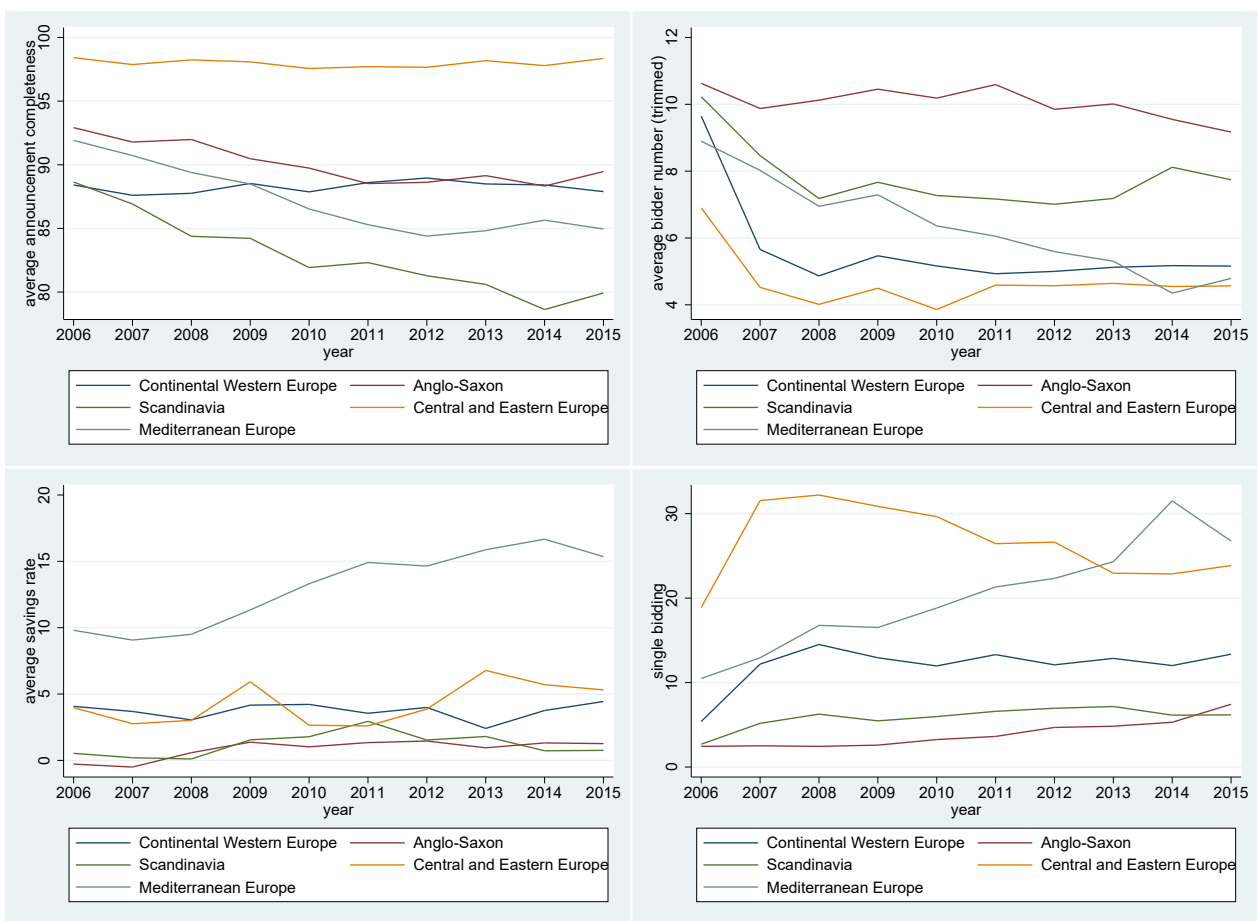
FIGURE 17. TRENDS IN AVERAGE PUBLIC PROCUREMENT GOOD GOVERNANCE COMPOSITE SCORES ACROSS MACROREGIONS<sup>34</sup> OF THE EU, 2006-2015, TED



<sup>34</sup> Same macroregion definitions as above.

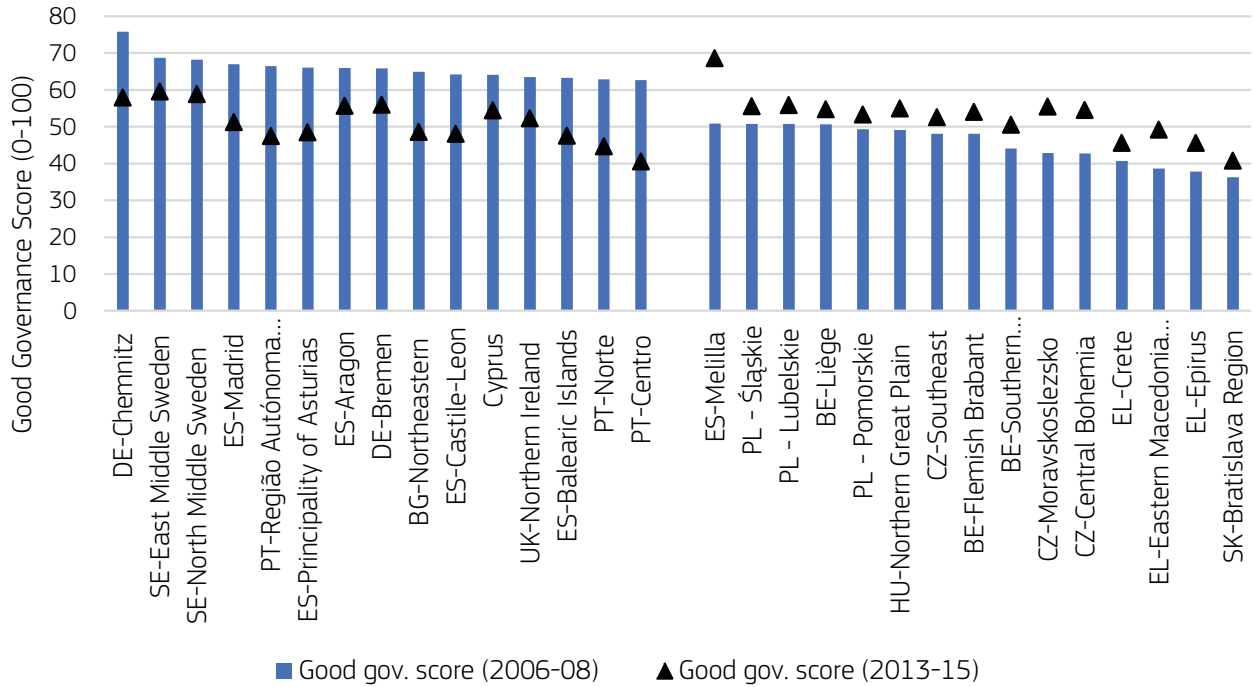


FIGURE 18. TRENDS IN SELECTED PUBLIC PROCUREMENT GOOD GOVERNANCE INDICATORS ACROSS MACROREGIONS<sup>35</sup> OF THE EU, 2006-2015, TED



<sup>35</sup> Same macroregion definitions as above.

FIGURE 19. CHANGES IN PUBLIC PROCUREMENT GOOD GOVERNANCE SCORES, NUTS 2, TED, 2006-2008 VS. 2013-2015, GREATEST CHANGES IN PERFORMANCE AMONG TOP PERFORMERS (LEFT-HAND SIDE) AND BOTTOM PERFORMERS (RIGHT-HAND SIDE) IN 2006-2008, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED



#### 4.2.2 REGION PROFILES

The power of a large volume of data and the use of indicators deriving from objective, administrative datasets is further demonstrated by looking at changes over time which are non-negligible and which contradict much of the survey evidence on little to no change in governance quality (Figure 14). Overall, many Eastern European and some Mediterranean regions succeeded in improving their procurement good governance score from 2006-2008 to 2013-2015, while initially high governance quality regions in Southern Sweden, Western and Southern Germany, and Ireland have witnessed considerable institutional decay.

The processes of and explanations for the slow decay of initially high-quality public institutions are under studied, although in recent times some scholars have noted such developments particularly for the USA (Fukuyama, 2014). Reasons for decaying institutions in many well-governed Western European regions can be diverse, ranging from wage-cutting austerity policies hitting the quality of the public sector (Klasnja, 2016), weak political competition (Broms, Dahlström and Fazekas, 2017; Coviello and Gagliarducci, 2017; Fazekas, 2015), or powerful business interests capturing government (OECD, 2017; Shaxson and Christensen, 2014).

The partial disconnect between the four good-governance dimensions enables identification of different region profiles in terms of strengths and weaknesses of institutional quality. Control of corruption risks and competition scores have a strong positive association, with many Danish, Swedish and UK regions excelling in both dimensions, as well as many Greek, Romanian and Slovakian regions underperforming in both (Figure 21). Much more interestingly, some regions have a high control of

corruption risks score while showing competition results closer to the worst performers. This is the case for some French, Italian and Belgian regions, for example. The opposite combination – weak control of corruption but strong competition performance – is almost completely absent, underlining how healthy competition cannot only improve procurement outcomes but can also make corruption more difficult to carry out.

Given that the relationship between transparency and competition is very weak in our regional sample, there are many more regions performing well on one dimension but poorly on another (Figure 22). While causal interpretation would require a lot more in-depth analysis, it is notable that administrative efficiency and control of corruption risks are also closely associated with each other, with very few regions exhibiting low corruption control and high efficiency (Figure 23).

FIGURE 20. DECOMPOSITION OF COUNTRY-LEVEL PROCUREMENT GOOD GOVERNANCE SCORE INTO ITS COMPONENTS, NUTS 3, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (NREGIONS=1241)

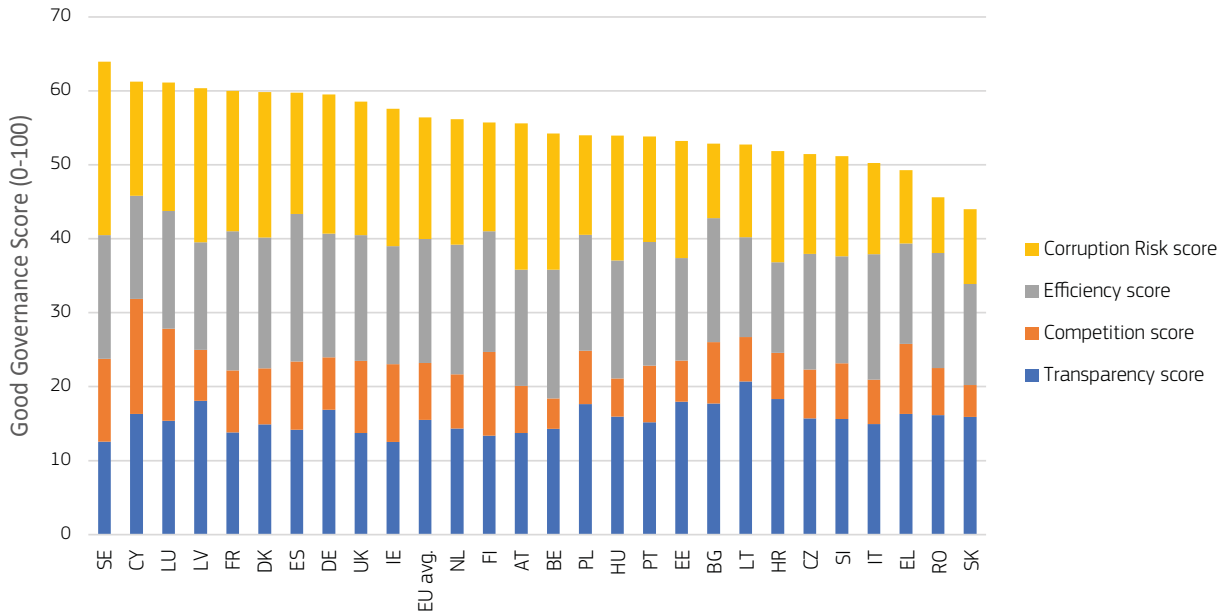


FIGURE 21. SCATTER PLOT OF THE CONTROL OF CORRUPTION RISKS AND COMPETITION SCORES, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (N<sub>REGIONS</sub>=278), OUTLIERS HIGHLIGHTED (TOP/BOTTOM 20% ACCORDING TO THE TWO DIMENSIONS)

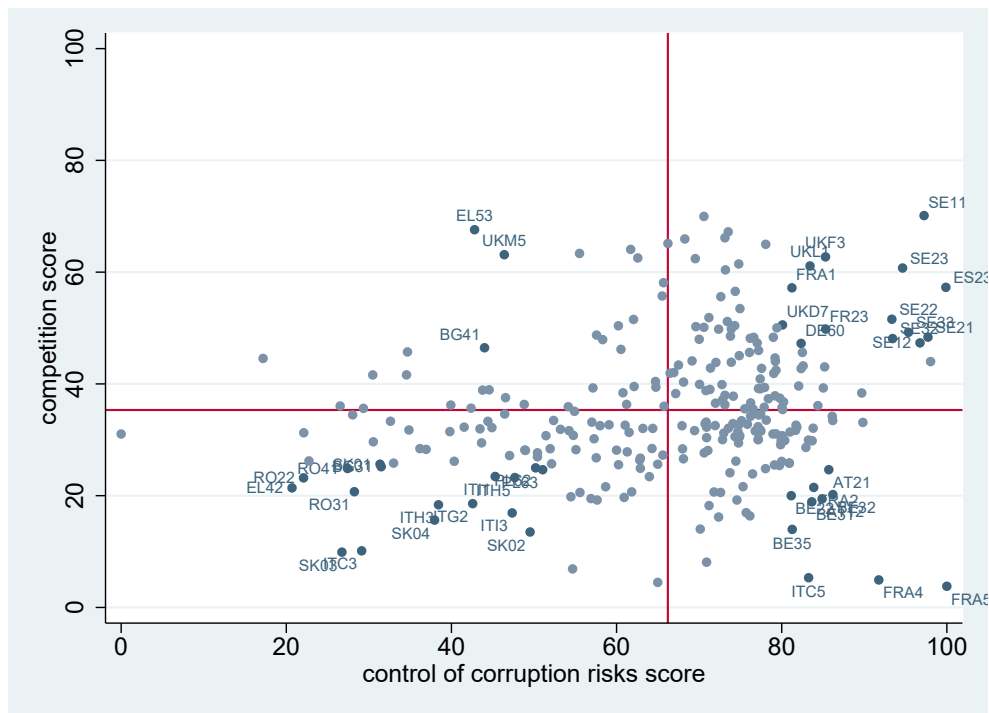


FIGURE 22. SCATTER PLOT OF THE TRANSPARENCY AND COMPETITION SCORES, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{REGIONS}=278$ ), OUTLIERS HIGHLIGHTED (TOP/BOTTOM 20% ACCORDING TO THE TWO DIMENSIONS)

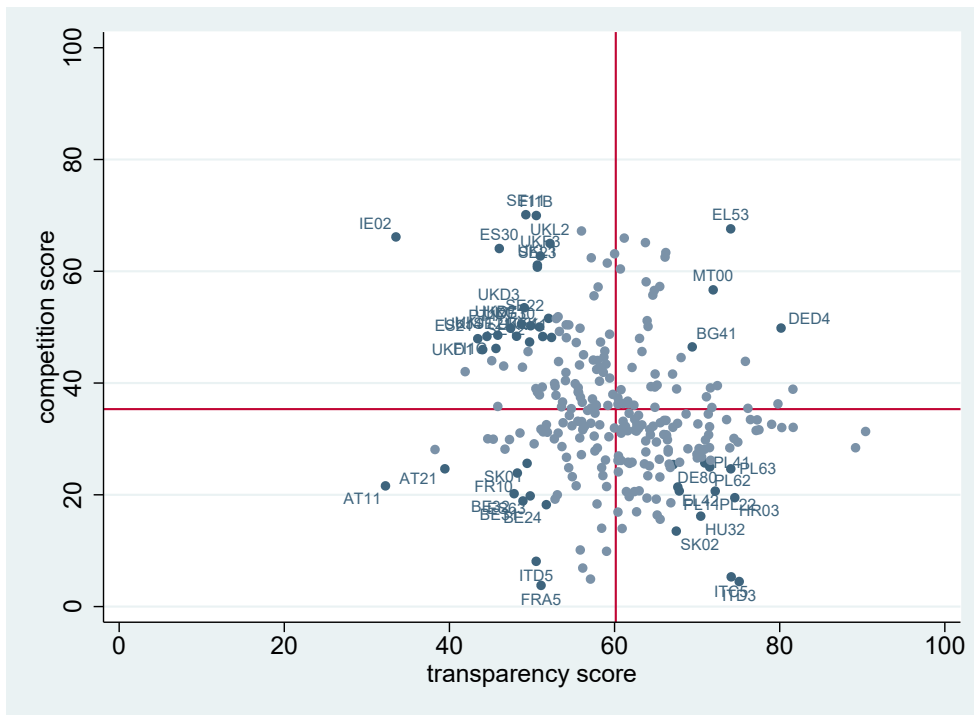
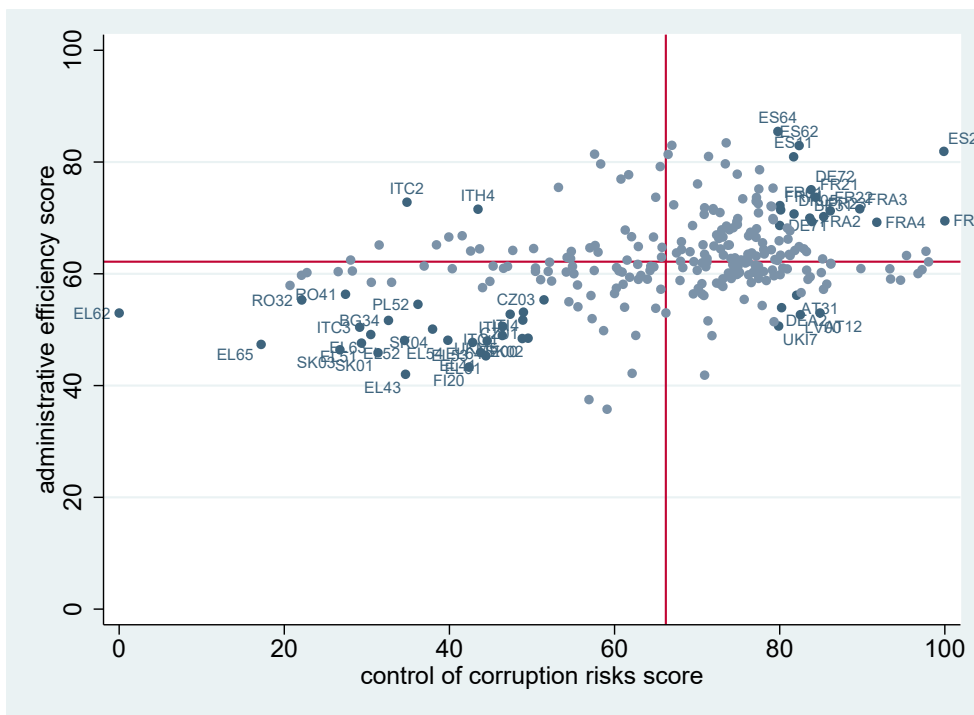


FIGURE 23. SCATTER PLOT OF THE CONTROL OF CORRUPTION RISKS AND ADMINISTRATIVE EFFICIENCY SCORES, NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED ( $N_{REGIONS}=278$ ), OUTLIERS HIGHLIGHTED (TOP/BOTTOM 20% ACCORDING TO THE TWO DIMENSIONS)

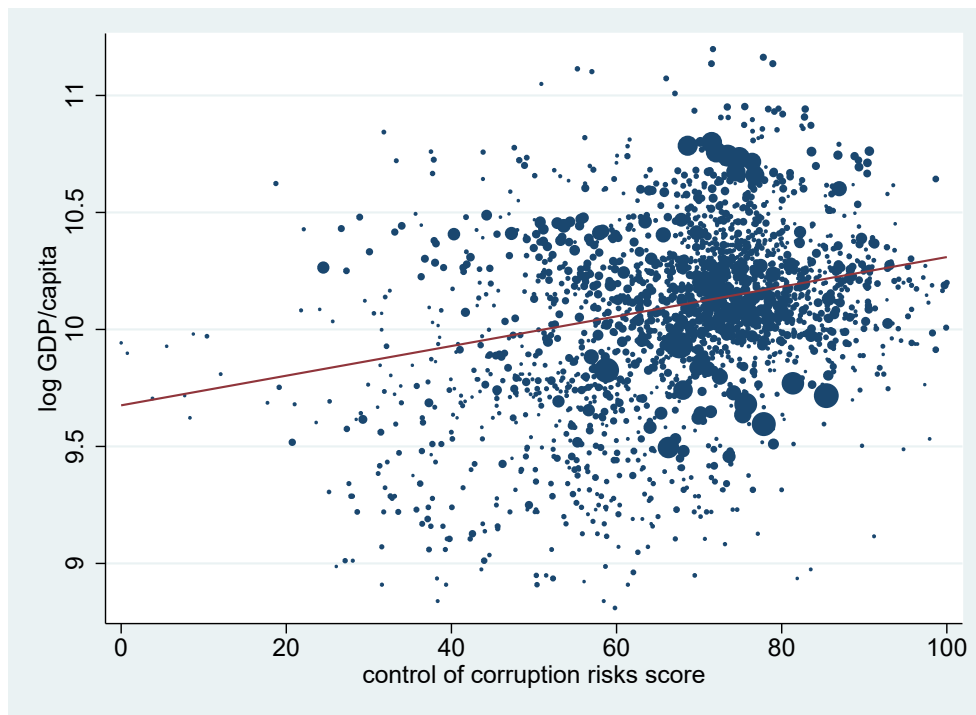


#### 4.2.3 GOVERNANCE AND DEVELOPMENT

There are strong reasons to believe that regional institutional quality determines wealth and economic growth as well as the effectiveness of EU Cohesion Policy (Rodríguez-Pose and Garcilazo, 2015). This relationship is also supported by comparing GDP/capita and the control of corruption risks score in the

simplest bivariate setting (NUTS 2, annual data) (Figure 24). While further, more sophisticated work is needed, this preliminary evidence further supports the idea that a direct measure of institutional quality could deliver fresh insights into how and under which conditions regional policy is effective, given that much of the Structural and Cohesion Funds is eventually spent through public procurement systems.

**FIGURE 24. SCATTER PLOT OF THE CONTROL OF CORRUPTION RISKS SCORE AND LOG GDP PER CAPITA (CURRENT MARKET VALUES PPS), ANNUAL NUTS 2, TED, 2006-2015, REGIONS WITH AT LEAST 35 CONTRACTS AWARDED (NREGION-YEAR=2198), WEIGHTED BY REGION CONTRACT NUMBER**



## 5. POLICY RECOMMENDATIONS

While the above analysis was only preliminary and focusing primarily on establishing the validity of the indicators rather than on providing an in-depth analysis of any particular policy problem, a few policy lessons can be drawn regarding the future use of such indicators, as well as ways in which procurement good governance performance can be improved.

### Increase competition in public procurement by encouraging market entry of both local and non-local firms

Our evidence points out that, over the last 10 years, competition has been on the decline throughout Europe – a process that had already started before the global financial crisis but which was most likely exacerbated by the lack of investment in public-sector capacity due to austerity policies (Figure 15). This negative trend is not inevitable: there are successful European regions as well as countries outside the EU which have improved competition by encouraging market entry. A wide range of tools are available to foster this goal, many of which have already been rigorously evaluated (Fazekas and Blum, 2016). Some of the most promising solutions are highlighted below as a guide:

1. E-procurement and, in particular, a complete implementation of various electronic tools such as e-submission, e-invoicing, or e-contract monitoring, which reduce transaction costs and increase transparency, typically making the bidding process more accessible to more firms (Buyse et al., 2015; Coviello and Mariniello, 2014; Lewis-Faupel et al., 2016; Strand, Ramada and Canton, 2011). Nevertheless, it is essential to enforce minimum standards to have any impact. For example, rigorously upheld data entry and publication standards are imperative, as even the best IT systems remain ineffective if users and administrators do not feed data into them.
2. More extensive use of central purchasing bodies as well as framework agreements for homogenous, standard goods can lower prices and improve quality and timeliness of delivery, as central bodies are usually more professional and better staffed than most buyers. Moreover, economies of scale often allow for more competitive prices (Albano and Sparro, 2010; Bandiera, Prat and Valletti, 2009; Barbosa and Fiuza, 2012; National Audit Office, 2010, 2013; Walker, Schotanus, Bakker and Harland, 2013).
3. Improving auction and tender design by better accommodating bidder characteristics can enhance bidder participation, especially of SMEs. Decreasing lot size so that even small and mid-sized companies can bid, or giving additional points to small firms, can increase SME participation and also lower price offers from large firms through more intense competition (Decarolis, 2014; Krasnokutskaya and Seim, 2011; Marion, 2007; Nakabayashi, 2013; Spagnolo, 2012).
4. Reducing bureaucratic controls of public procurement processes currently overly used can result in better outcomes if combined with better monitoring of outcomes or incentives for administrators better aligned with public goals (e.g. pay for performance) (Chever and Moore, 2012; Chever, Saussier and Yvrande-Billon, 2013; Coviello and Mariniello, 2014; Kelman, 1990; Lalive and Schmutzler, 2011; Rasul and Rogger, 2015; Tran, 2008).

### Understand the broader political and institutional antecedents of governance decay and design tailored solutions

Our evidence has revealed, quite startlingly, that many regions with an exceptionally high quality of institutions in the mid-2000s have witnessed the deterioration of their governance scores close to or even below the EU average (e.g. Figure 16). This process was particularly pronounced in some austerity-hit Mediterranean regions, but many more examples – albeit of a less dramatic magnitude – can be found in Continental European and Scandinavian regions (Figure 13). Quite obviously, lowering the salary of those civil servants administering and managing multi-million EUR government tenders by a few thousand EUR per year not only has an adverse effect on institutional quality but also makes little long-term financial sense (e.g. a negligible price increase of 0.5% or less on a major contract due to worse tender design offsets the financial savings on a lower civil-service wage bill). While significantly more research is needed to understand the cause of the problems and to design effective solutions, some pointers are already being provided by recent research:

1. Low pay for civil servants and political office holders decreases the quality of administrations and increases the motivation for corrupting public procurement, while a weak meritocracy in the public service can lower governance quality in procurement further (Charron et al., 2017; Klasnja, 2016). Matching key public employees' pay with the value of public tenders they handle and improving meritocracy through entrance examinations and merit-based promotion systems are examples of changes that have the capacity to improve procurement performance (Meyer-Sahling, 2009; OECD/Sigma, 2014).
2. Weak political competition lowers the motivation to both improve public procurement and reduce the risks of corrupting government contracts, as evidenced by cases in Italy, Sweden and the UK – particularly at the local level (Broms et al., 2017; Coviello and Gagliarducci, 2017; Fazekas, 2015).
3. Policy capture and the excessive influence of business elites can also contribute to deteriorating public procurement governance. Political finance, large campaign contributions, and personal connections between bidding firms and political office holders all contribute to the capture of government policies, including public procurement, as evidenced by high- and middle-income OECD countries (Fazekas and Cingolani, 2017; OECD, 2017; Shaxson and Christensen, 2014).

### Understand better the contribution of procurement governance quality to the effectiveness of EU funds and regional convergence to boost critical functions

It has been shown that public procurement good governance and especially the control of corruption risks are closely associated with the level of development (i.e. GDP/capita). This suggests that the growth effects of public investment projects, including those funded by EU Structural and Cohesion Funds, hinge on procurement good governance. Clearly, a lot more research is needed to establish whether this link is causal and can lead to effective policy interventions. Broader evidence, using the EQI measure of regional institutional quality, supports a causal interpretation and establishes the crucial importance of regional institutions for EU funding effectiveness (Rodríguez-Pose and Garcilazo, 2015) as well as for innovation and growth more broadly (e.g. Rodríguez-Pose and Di Cataldo, 2015). Over a period of 10 years, the highly detailed data and multitude of indicators in public procurement would allow for the precise identification of the public-procurement-related determinants of EU regional policy effectiveness.

### Improve data quality and availability to support their wider use in ongoing policy implementation and design

Public procurement data quality and scope are well below adequate standards, impacting practical transparency relevant to both core users, such as bidding firms, as well as for policy users (Mendes and Fazekas, 2017). Our findings highlight the low level of transparency due to factors like missing TED data, especially in Western and Northern European regions (Figure 10). This echoes the years of evidence published by the Single Market Scoreboard<sup>36</sup>. Such deficiencies in data quality and scope are by no means limited to TED; many national public procurement systems are weak, especially among the richer

Member States (Cingolani et al., 2015). Problems with public procurement data limit our capacity to use this data for analysis and for informing policy implementation and design, hence further action is needed.

1. Data scope and quality could be improved through better legislation as well as investment in IT systems. Full implementation of e-procurement systems currently under way across the EU could lead to better quality and more integrated data, if implemented as planned. These systems can capture a wider scope of all public procurement and contract implementation activities (Buyse et al., 2015). In addition, if reporting thresholds are lowered and sectoral exceptions are minimised, a more complete and thus more accurate picture can be painted of public procurement governance.
2. While TED data is impressive in both size and scope, it typically captures high-value contracts above the mandatory reporting thresholds which means many smaller or poorer regions and localities have little contracting activity to analyse. By combining TED data with national public-procurement datasets, where the latter is of sufficient scope and quality, further insights can be gained and more tailored policy advice can be developed. This is currently being pursued by the EU-funded DIGIWHIST<sup>37</sup> research project, within the limitations of national data quality and standards.
3. Encourage regular use of public-procurement analytics in both EU and national policy implementation and design by adopting easy-to-use and low-cost analytical solutions such as Tableau (for an example using this report's data see here) or public procurement web portals which are already available and offer analytic capabilities.

<sup>36</sup> [http://ec.europa.eu/internal\\_market/scoreboard/performance\\_per\\_policy\\_area/public\\_procurement/index\\_en.htm](http://ec.europa.eu/internal_market/scoreboard/performance_per_policy_area/public_procurement/index_en.htm)

<sup>37</sup> <http://digiwhist.eu/resources/data/>



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# APPENDICES

## APPENDIX A: ADDITIONAL DATA QUALITY TABLES

**TABLE A1. THE AVAILABILITY OF VARIABLES NECESSARY FOR CALCULATING RISK INDICATORS BY COUNTRY**

	N	Call for tender available	Procedure type	e-auction	Number of bids	Bidding deadline	Selection method	Estimated price	Final price
AT	10307	6820	10231	9689	8670	6819	10045	1170	5528
BE	21081	14176	21044	20301	18917	14174	20700	4471	14983
BG	9827	7565	9827	9798	9519	7565	9641	2576	8455
CY	6546	4988	6546	6311	5811	4988	6544	4904	6385
CZ	14314	9084	14259	13807	13433	9084	13907	10161	13571
DE	98149	67136	97162	93437	81607	67122	96081	14831	58844
DK	24253	19197	24229	23276	19018	19197	23530	3133	14391
EE	9700	5803	8753	8983	7589	5803	9695	3182	9688
ES	102708	75045	102505	81632	71101	75045	93042	43614	96375
FI	29931	24415	25848	12595	16993	24415	28103	6715	25259
FR	325539	199857	324822	222873	211506	199820	305651	35393	176929
GR	11373	8396	11100	10673	9532	8396	11064	7815	11182
HR	1701	1608	1701	1700	1699	1608	1701	1694	1701
HU	14676	11079	14545	14435	14250	11065	14640	8917	14394
IE	6310	4083	6285	4299	5479	4083	6286	613	2980
IT	92302	63073	92240	81261	72799	63073	89301	48342	85804
LT	52856	32593	52494	52842	52845	32593	52850	2041	50635
LU	3738	1785	3736	2474	3036	1762	3512	706	2226
LV	69304	51665	66313	68715	69007	51665	69289	29390	67925
MT	1207	964	1206	1053	1187	964	1163	460	1074
NL	26788	17695	26595	25425	23929	17695	26347	2960	8845
PL	106403	83918	106378	99345	102258	83918	104054	81442	103815
PT	3922	2735	3918	3290	2687	2735	3556	1619	3701
RO	22709	15614	22709	22701	22589	15614	22670	14972	22675
SE	52088	38329	52026	41418	42513	38265	39877	4001	11982
SI	5207	3725	5207	4819	4476	3724	5024	3615	4793
SK	3307	2371	3303	2967	3120	2324	3182	2235	3229
UK	140622	93392	140366	123423	115157	93382	135035	31486	109660
Total	1266868	867111	1255348	1063542	1010727	866898	1206490	372458	937029

TABLE A2. THE AVAILABILITY OF VARIABLES NECESSARY FOR CALCULATING RISK INDICATORS BY COUNTRY (%)

	N	Call for tender available	Procedure type %	e-auction %	Number of bids %	Bidding deadline %	Selection method %	Estimated price %	Final price %
AT	10307	66	99	94	84	66	97	11	54
BE	21081	67	100	96	90	67	98	21	71
BG	9827	77	100	100	97	77	98	26	86
CY	6546	76	100	96	89	76	100	75	98
CZ	14314	63	100	96	94	63	97	71	95
DE	98149	68	99	95	83	68	98	15	60
DK	24253	79	100	96	78	79	97	13	59
EE	9700	60	90	93	78	60	100	33	100
ES	102708	73	100	79	69	73	91	42	94
FI	29931	82	86	42	57	82	94	22	84
FR	325539	61	100	68	65	61	94	11	54
GR	11373	74	98	94	84	74	97	69	98
HR	1701	95	100	100	100	95	100	100	100
HU	14676	75	99	98	97	75	100	61	98
IE	6310	65	100	68	87	65	100	10	47
IT	92302	68	100	88	79	68	97	52	93
LT	52856	62	99	100	100	62	100	4	96
LU	3738	48	100	66	81	47	94	19	60
LV	69304	75	96	99	100	75	100	42	98
MT	1207	80	100	87	98	80	96	38	89
NL	26788	66	99	95	89	66	98	11	33
PL	106403	79	100	93	96	79	98	77	98
PT	3922	70	100	84	69	70	91	41	94
RO	22709	69	100	100	99	69	100	66	100
SE	52088	74	100	80	82	73	77	8	23
SI	5207	72	100	93	86	72	96	69	92
SK	3307	72	100	90	94	70	96	68	98
UK	140622	66	100	88	82	66	96	22	78
Total	1266868	68	99	84	80	68	95	29	74

TABLE A3. STATISTICS OF THE NUTS 3 MATCHING PROCEDURE

	All tenders	Availability of postcode %	NUTS 3 matched on postcode %	Settlement name availability %	NUTS 3 matched on settlement name %	Manual correction N	Final NUTS 3 %
AT	31958	100	78	100	97	6	100
BE	59346	100	99	100	84	48	100
BG	68451	100	45	100	0	37572	100
CY	8817	100	34	100	0	5798	100
CZ	69628	100	38	100	90	2512	99
DE	294050	100	100	100	82	0	100
DK	44968	100	95	100	64	1456	99
EE	15944	99	98	100	83	0	100
ES	199293	99	99	100	91	0	100
FI	59488	98	98	100	85	27	100
FR	1202190	100	97	100	89	3013	99
GR	39635	100	79	100	1	7615	99
HR	14602	100	98	100	47	302	100
HU	57873	100	98	100	96	0	100
IE	25526	34	0	100	11	21865	97
IT	180776	99	95	100	94	1586	100
LT	80132	100	99	100	0	816	100
LU	7505	100	100	100	96	0	100
LV	82997	100	97	100	80	563	100
MT	2123	98	78	100	79	0	99
NL	60338	99	46	100	81	1656	95
PL	997934	100	89	100	82	8145	100
PT	21001	92	79	100	18	2642	96
RO	160593	100	95	100	95	0	100
SE	84612	98	95	100	95	0	100
SI	61847	100	98	100	89	0	100
SK	24820	100	27	100	52	9456	100
UK	290839	99	95	100	14	5056	97
Total	4247286	99	91	100	77	110134	99

TABLE A4. NUMBER OF TENDERS IN THE RAW DATABASE AND THE FINAL SAMPLE BY YEAR

	All tenders N	Above threshold %	Local authority %	NUTS 3 code available %	Final sample N
2006	238 597	69	47	99	73 170
2007	309 469	82	43	99	107 754
2008	357 371	83	37	99	106 913
2009	393 605	84	37	99	119 717
2010	439 279	86	38	99	139 935
2011	472 010	84	38	99	149 004
2012	493 927	84	36	99	147 742
2013	494 609	85	32	99	133 443
2014	516 250	85	34	99	144 049
2015	532 169	87	32	99	145 141
Total	4 247 286	84	36	99	1 266 868

TABLE A5. DISCREPANCIES BETWEEN POSTCODE AND CITY-NAME-BASED NUTS 3 CODES

	No. of contracts with non-missing NUTS 3 based on postcode and settlement name	Percent of contracts with the same NUTS 3 based on postcode and settlement name
AT	23939	98
BE	49464	99
BG	38	100
CZ	22845	85
DE	241212	98
DK	28159	92
EE	12913	100
ES	180841	100
FI	49365	100
FR	1049985	100
GR	44	100
HR <sup>38</sup>	6834	40
HU	54375	100
IT	163219	99
LU	7146	100
LV	64516	99
MT	1239	100
NL	21064	100
PL	713993	100
PT	2972	87
RO <sup>39</sup>	145825	63
SE	75727	100
SI	53874	100
SK	4418	88
UK <sup>40</sup>	37966	45
Total	3011973	97

<sup>38.</sup> In Croatia, the "Percent of contracts with the same NUTS 3 based on postcode and settlement name" is low because there are discrepancies between the postcode-NUTS and city-NUTS tables. For example, Rijeka has different NUTS 3 codes in the two correspondence tables.

<sup>39.</sup> In Romania, the "Percent of contracts with the same NUTS 3 based on postcode and settlement name" is low because there are discrepancies between the postcode-NUTS and city-NUTS tables as released by Eurostat. For example, Bucharest has different NUTS 3 codes in the two correspondence tables.

<sup>40.</sup> In the UK, in only 12 % of contracts could NUTS codes be assigned based on both settlement name and postcode. For this small sample, the "Percent of contracts with the same NUTS 3 based on postcode and settlement name" is low. a major reason for this high discrepancy is the obvious disagreement between the two correspondence tables released by Eurostat.

TABLE A6. DISCREPANCIES BETWEEN POSTCODE AND CITY-NAME-BASED NUTS 2 CODES

	No. of contracts with non-missing NUTS 3 based on postcode and settlement name	Percent of contracts with the same NUTS 2 based on postcode and settlement name
AT	23939	99
BE	49464	100
BG	38	100
CZ	22845	86
DE	241212	99
DK	28159	98
EE	12913	100
ES	180841	100
FI	49365	100
FR	1049985	100
GR	44	100
HR	6834	98
HU	54375	100
IT	163219	100
LU	7146	100
LV	64516	100
MT	1239	100
NL	21064	100
PL	713993	100
PT	2972	96
RO	145825	63
SE	75727	100
SI	53874	100
SK	4418	90
UK	37966	46
Total	3011973	97

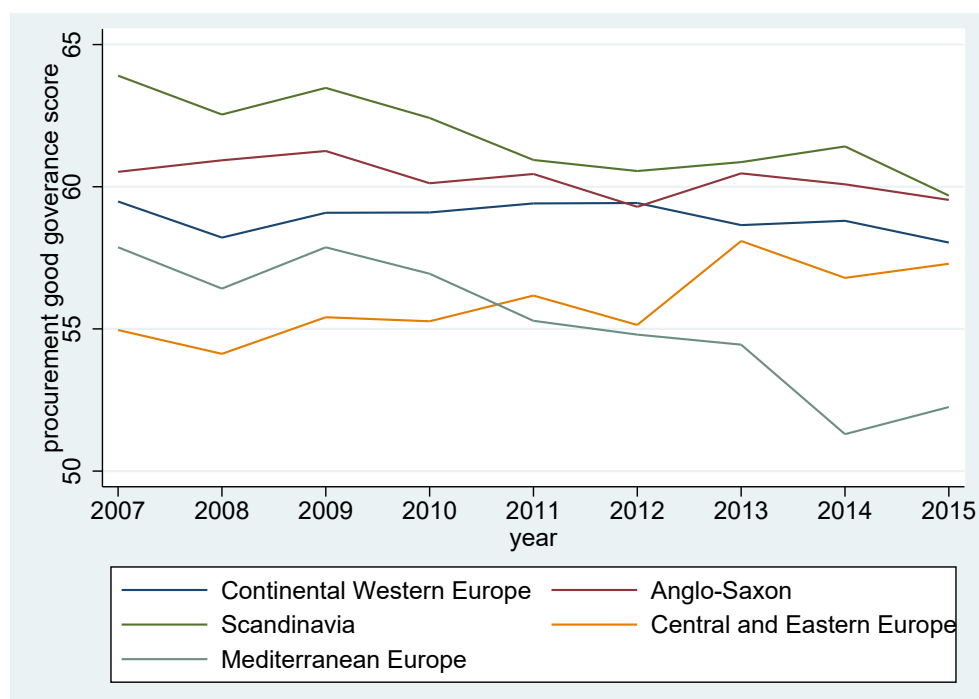


## APPENDIX B: ADDITIONAL DESCRIPTIVE STATISTICS

TABLE B1. TABLE B1. DESCRIPTIVE STATISTICS OF RAW GOVERNANCE INDICATORS, NUTS 3, TED, 2006-2015

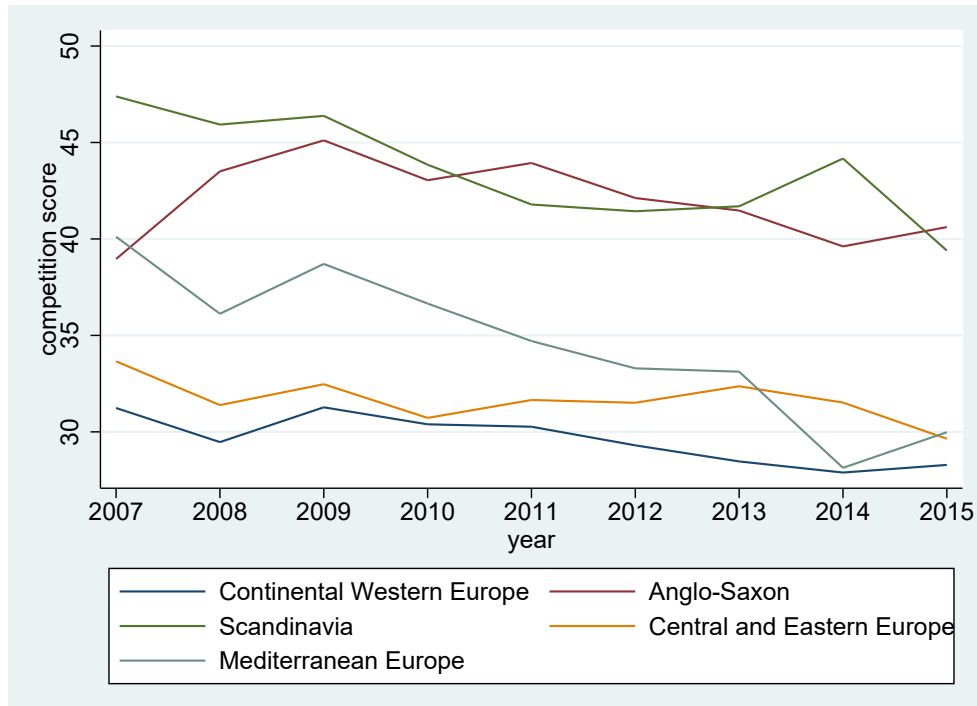
Variable	N	Mean	Std. Dev.	Min	Max
Contract notice publication	1239	68.99	15.96	10.27	100.00
Use of open procedures	1239	85.75	13.00	7.71	100.00
Reporting completeness	1239	91.88	5.93	67.14	99.97
Use of e-auctions	1239	3.02	8.44	0.00	78.14
Voluntary reporting	1239	18.26	16.50	0.00	79.89
Intensity of competition	1239	5.91	2.54	1.19	16.53
Non-local suppliers	1239	29.27	17.94	0.00	96.10
Foreign suppliers	1239	1.34	2.58	0.00	29.63
Decision-making speed	1239	-13.90	65.39	-550.45	69.97
Price savings	1239	5.78	6.68	-40.06	31.07
MEAT assessment criteria	1239	-4.47	26.18	-64.44	55.08
Single bidding	1239	16.05	14.29	0.00	90.49
CRI	1238	19.32	7.22	4.83	47.12
Tax haven	1239	7.13	18.67	0.00	100.00

FIGURE B1. DESCRIPTIVE STATISTICS OF RAW GOVERNANCE INDICATORS, NUTS 3, TED, 2006-2015



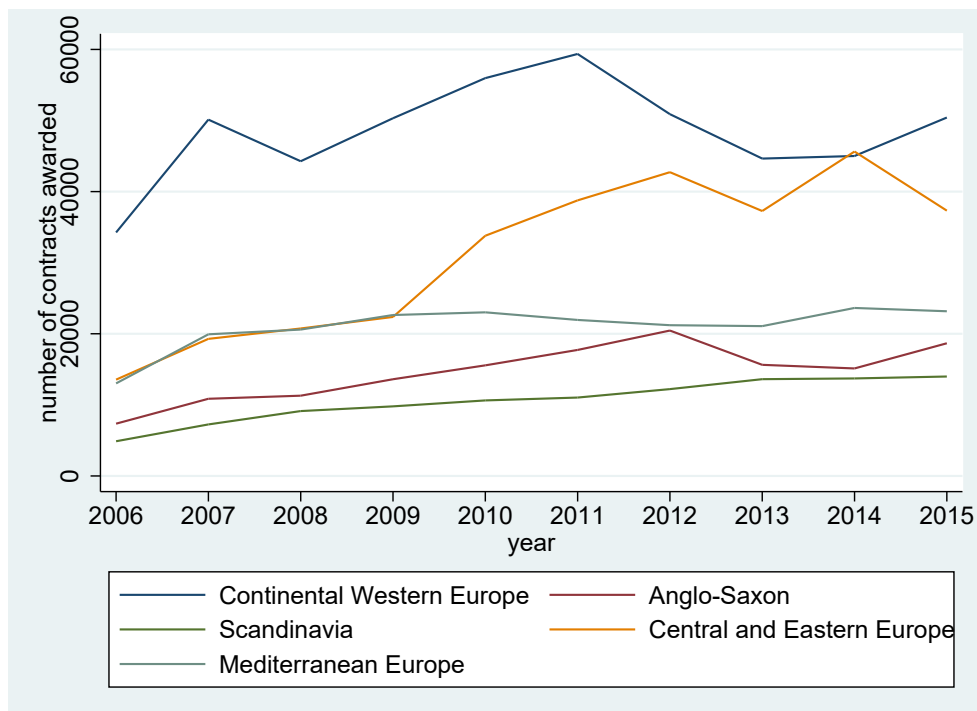
Note: Continental Western Europe includes AT, BE, DE, FR, LU and NL; Anglo-Saxon denotes IE and UK; Scandinavia includes DK, FI and SE; Central and Eastern Europe include BG, HR, CZ, CY, EE, HU, LV, LT, MT, PL, RO, SK and SI; Mediterranean Europe denotes EL, IT, PT and ES.

**FIGURE B2. TRENDS IN THE AVERAGE PUBLIC PROCUREMENT COMPETITION SCORE ACROSS MACROREGIONS OF THE EU, 2007-2015, TED**



Note: Continental Western Europe includes AT, BE, DE, FR, LU and NL; Anglo-Saxon denotes IE and UK; Scandinavia includes DK, FI and SE; Central and Eastern Europe include BG, HR, CZ, CY, EE, HU, LV, LT, MT, PL, RO, SK and SI; Mediterranean Europe denotes EL, IT, PT and ES.

**FIGURE B3. TRENDS IN THE TOTAL NUMBER OF CONTRACTS AWARDED ACROSS MACROREGIONS OF THE EU, 2006-2015, TED**



Note: Continental Western Europe includes AT, BE, DE, FR, LU and NL; Anglo-Saxon denotes IE and UK; Scandinavia includes DK, FI and SE; Central and Eastern Europe include BG, HR, CZ, CY, EE, HU, LV, LT, MT, PL, RO, SK and SI; Mediterranean Europe denotes EL, IT, PT and ES.

## APPENDIX C: PRINCIPAL COMPONENT ANALYSIS RESULTS ON NUTS-3 LEVEL

TABLE C1. STATISTICS OF EACH COMPONENT

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.4261	.803765	0.2426	0.2426
Comp2	1.62233	.392066	0.1622	0.4048
Comp3	1.23027	.17287	0.1230	0.5279
Comp4	1.0574	.196173	0.1057	0.6336
Comp5	.861224	.134764	0.0861	0.7197
Comp6	.72646	.0798445	0.0726	0.7924
Comp7	.646615	.0763122	0.0647	0.8570
Comp8	.570303	.0876147	0.0570	0.9141
Comp9	.482688	.106074	0.0483	0.9623
Comp10	.376614	.	0.0377	1.0000

FIGURE C1. SCREE PLOT OF EIGENVALUES OF COMPONENTS

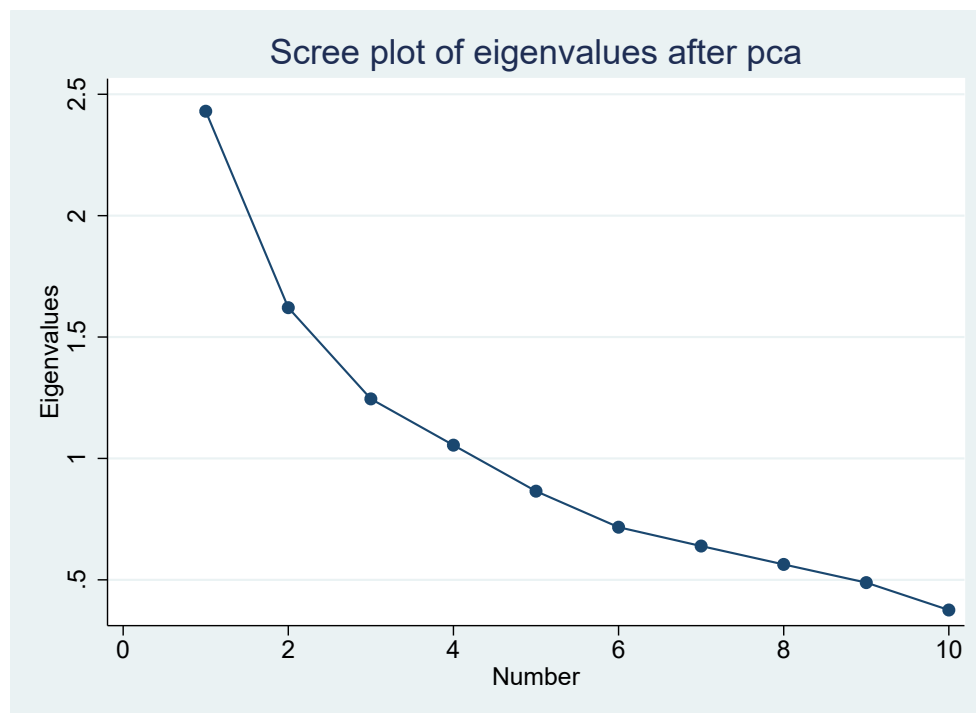


TABLE C2. FACTOR LOADINGS FOR THE FIRST FOUR COMPONENTS

	Comp1: corruption & competition (reverse scale)	Comp2: transparency & efficiency	Comp3: open competition	Comp4: open markets
Contract notice publication	0.2671		0.554	
Use of open procedures			0.7134	
Reporting completeness	0.3929	0.2943		-0.2928
Voluntary reporting		0.5666		
Intensity of competition	-0.3938		0.3532	
Non-local suppliers		-0.2905		0.7464
Decision-making speed	0.2153	0.4697		0.3863
Price savings	0.2534	-0.2712		-0.4286
MEAT assessment criteria	-0.5001			
CRI	0.4433	-0.3747		

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ISBN 978-92-79-69338-0  
ISSN 2529-3303  
doi:10.2776/521934