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The effectiveness of the European Union in safeguarding competition in public procurement markets

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Abstract

The EU's single market in government purchases constitutes a fundamental pillar of economic integration throughout the continent, as it amounts to 4% of GDP. If competition is deficient efficiency losses ensue. As we know surprisingly little about the effectiveness of monitoring and enforcement institutions designed to safeguard competition, we investigate whether the European Commission and the Court of Justice of the European Union are effective in changing market behaviour. Using a unique micro-level public procurement database of over 3.7 million contracts linked to all relevant legal decisions from 2009-2014, we investigate two distinct causal mechanisms: i) requiring a change in national public procurement legislation; and ii) striking down anticompetitive practices while leaving legislation unchanged. Theoretically, it is unclear whether any of these interventions would result in a lasting improvement in competitive outcomes such as the number of bidders, supplier composition, and discounts offered, as well as in public sector tender design such as procedure types or open advertisement. Using matched samples difference-in-differences estimation, we find that requiring legislative change has a significant and sizable positive impact on market openness: it increases the number of bidders (1.8-3%), lowers the incidence of single bidding (3-4%), decreases the market share of local winners (3-4%), and lowers prices (0.4-0.6%). Requiring change in anticompetitive practices has no discernible impact. The policy implications are profound, in order to improve the EU-wide single market of government purchases, better monitoring and stronger supranational legal action are needed.

1. Introduction

The European Union's (EU) single market in government purchases constitutes a fundamental pillar of economic integration throughout the continent, as even lower bound estimates put it at 4% of the block's annual GDP (European Commission, 2016). Probably even more importantly, total government expenditure on public procurement, that is also including contracts below the value thresholds of applying EU-wide rules, amounts to 15-20% of annual GDP across the EU (European Commission, 2011, 2016). Open and fair competition is the hallmark of the EU-wide regulatory framework as enshrined in the Public Procurement Directives and their national transposition. However, low levels of competition and the particular lack of cross-border procurement are increasingly becoming a policy problem (European Commission, 2017; Fazekas & Skuhrovec, 2016; The Economist, 2016), while being recognised for over 2 decades (EuroStrategy Consultants, 1997; Martin, Hartley, & Cox, 1999). If competition is deficient in public procurement markets, it surely has wide-ranging ramifications such as efficiency losses, cost inflation contributing to budget deficits, lower quality public services, and higher risk of government favouritism.

In spite of the vast amounts involved and their wide ranging impacts, the scientific evidence to date is surprisingly scarce about the effectiveness of monitoring and enforcement institutions designed to uphold norms of open and fair competition in EU-wide public procurement markets. There are two EU-level decision making bodies, the European Commission and the Court of Justice of the European Union (EC/CJEU in short), which are responsible at the supranational level for upholding the proper implementation of EU-wide rules of competition. The single market in public procurement is an area where the EU has had a clear legal mandate for more than a decade with substantial enforcement powers. EC/CJEU have generated a considerable amount of case law since the introduction of the 2004 Public Procurement Directive (European Union, 2004), allowing us to carry out a systematic quantitative analysis testing the effectiveness of supranational institutions. From a theoretical perspective, studying the impact mechanisms of supranational decisions in the national context in a diverse set of countries across the whole EU informs debates about under which conditions supranational rule enforcement is effective in changing economic actors' behaviour. Member states', especially large and powerful ones, mere formalistic compliance with EU rules has long been subject to intense academic debate.

Given that the implementation of EC/CJEU decisions ultimately rests with member states (MSs) who are often disinterested in proper implementation, the decisions' effectiveness in terms of actual competitive outcomes and tendering process in MSs is ambiguous. Hence, we explore the following research question:

> Are the European Commission and the Court of Justice of the European Union effective in enforcing open competition in public procurement markets? If yes under which circumstances?

These research questions are explored in a contract-level public procurement database containing of over 3.7 million contract awards in the 2008-2015 period in the EU-27 (EU-28 excluding Malta) linked to EC/CJEU decisions from 2009-2014 (contracts data has a longer time series in order to allow for full before-after comparisons around decisions). All the contracts awarded according the EU Public Procurement Directives and all the EC/CJEU decisions on public procurement cases are included in the analysis, making both the

dependent and independent variables measured in the full population rather than using sampling.

Our novel contributions derive from estimating the impact of supranational rule enforcement not on national legislation or policy documents rather directly economic actors' (public buyers and suppliers) market behaviour. In spite of widely held scepticism, we find that supranational bodies mandating national legislative change are effective in changing actor behaviour increasing competitiveness as well as tendering practices. Whereas decisions mandating change in policy implementation such as the use of specific tendering clauses are ineffective in changing competitive outcomes such as number of bidders, they only influence formal tendering practices in line with the literature predicting mere formalistic compliance. Moreover, national legislative change has far greater impact in smaller, newer EU member states which typically have less bargaining power than their larger, older counterparts. This confirms the crucial importance of member state characteristics for determining EU rule implementation with some members of the club getting away with only formally complying.

These findings have clear policy ramifications. In order to improve the EU-wide single market of government purchases, better monitoring and stronger supranational legal action are likely to deliver the desired impacts, especially if larger, older member states are better monitored.

2. Institutional framework

2.1 EU PP Directives

The new Directive 2014/24/EU on public procurement came into force at the EU level on 17 April 2014 repealing Directive 2004/18/EC (European Union, 2014). As Member States still have 2 years to implement the new directive in national legislation, the Directives that governed public procurement during the period analysed in this report are Directives 2004/18/EC and 2004/17/EC. These Directives regulate the award of contracts for public works, supplies and services and set up the norms to be followed for tendering procedures across the EU.

The main objective of the above Directives is to promote public procurement market openness to competition, transparency of tendering, preventing national institutions from discriminating against other Member States' providers and promoting the free movement of goods and services. The Directives also aim to increase quality for final users, fairness for international competitors, and transparency for taxpayers, all by opening up competition within and across national borders.

Any contracting entity needs to comply with the provisions of the abovementioned Directives when a contract simultaneously satisfies the following conditions:

I. The awarding contracting entity has to be defined as a body governed by public law,

II. the contract has to be a public works, services or supplies not excluded by Annex II B; and

III. the estimated value of the contract (net of VAT) equals or exceeds the thresholds set in the Directive and regularly updated.

In the frame of the above directives, the main rules to be followed by the contracting entities are:

1. To use the EU´s Official Journal to advertise the procurement procedure.
2. To choose the most convenient procurement procedure from the ones allowed by the Directives in line with the specific need of the project.
3. To make use of non-discriminatory and fair criteria to select bidders, generally guided by 'Value for Money' principles.
4. To award contracts in an open and transparent way according to the announced criteria.
5. To transparently notify all bidders of the tender of the contract award decision, including reasons of exclusion if applicable.
6. To stick to the deadlines and timescales set in the Directive for the different parts of the procedure.

For procedures in which bidders believe that contracts have not been awarded according to the rules established by those Directives, the Remedies Directives provide means of redress in all EU countries. Directive 92/13/EEC and Directive 29/665/EEC coordinate national review systems by imposing a set of standards to be satisfied in all the Member States for the utilities sector and the public sector respectively. Those Directives were substantially amended by Directive 2007/66/EC.

Infringement procedures launched by the Commission, by contrast, are intended not to protect individual rights, but primarily to correct infringements of EU law. Subsection 2.2 provides a more detailed description of these procedures and the steps involved.

2.2 EU remedies system

The scope of the review system at the EU level is derived from Directive 2007/66/EC of the European Parliament and of the Council of 11 December 2007 with regard to improving the effectiveness of review procedures concerning the award of public contracts. The scope of the Directive 2007/66/EC extends to those contracts which are also covered by Directives 2004/17/EC and 2004/18/EC: works, services and supply contracts and also concessions. This implies that all the Member States provide a review system to the contracts above the EU threshold (i.e. contracts above the monetary values above which the Directives apply). However, certain countries such as Austria, Hungary and Sweden also apply the rules of the Directive 2007/66/EC to contracts whose value is below the EU threshold, and thus are not included in Directives 2004/17/EC and 2004/18/EC. The OECD published "Public Procurement Review and Remedies Systems in the European Union" (2007) which provides an extensive introduction to the functioning of the review systems in public procurement at national and European levels (OECD, 2007).

Although review and remedies systems vary between countries, generally when candidates or stakeholders consider that their rights have been infringed, there are two available options open to them:

- They may pursue a legal action at Member State arbitration institutions or courts against the contracting authority concerned. Pre-contractual remedies refer to those that are imposed before the contract is entered into and include the power to suspend an incomplete contract award procedure or cancel a decision in an incomplete contract

award procedure. Post-contractual remedies are applied when the contract has already been awarded and include contractual ineffectiveness, contract shortening, and civil financial penalties. A properly applied standstill period (i.e. postponing contract signature or contract implementation) gives good protection against post-contractual remedies.

- They may also make a complaint to the European Commission requesting its intervention for breach of the relevant European Directive and/or the EU Treaties. Any individual can bring their claims for non-compliance of Member State with EU procurement rules to the European Commission, but most often it is those bidders who were unsuccessful who file complaints about breaches of public procurement law. These cases, when accepted by the Commission, trigger infraction proceedings against the Member State, and can lead to a CJEU hearing, substantial fines, and potentially other CJEU imposed orders against the Member State if the breach is not satisfactorily resolved by other means.

For a more in depth description of this procedure, OECD (2007b) provides an extensive revision of the differences and similarities between different European countries. However, the procedure can be also launched by the European Commission on its own initiative. According to Article 263 TFEU, the European General Court is the institution responsible when alleged procurement infringement was carried out by EU institutions, bodies and agencies.

When an alleged non-compliance by a Member State is presented at the European Commission, it requires an assessment of the complaint to decide whether it should be pursued or not. The infringement procedure consists of two main stages: an *early settlement* and a *formal procedure*.

The *early settlement* attempts to achieve a quick solution in compliance with EU law in order to avoid the need for a formal infringement procedure. The purpose is to try to resolve the conflict as quickly as possible in order to minimise the impact of interrupting a procurement procedure on stakeholders through a structured dialogue. However, if the Member State does not agree with the Commission or does not abide by the measures to amend the alleged violation of EU law, a formal infringement procedure is launched. Given the informal nature of this first stage of the infringement procedure, there is no official record amenable for our database building purposes. Therefore, this information is not included in the analysis.

The *formal procedure* is split into 5 different steps which are summarised below (European Commission, 2015):

1. The first stage of the formal procedure consists of the European Commission (EC) sending by letter a **formal notice** requesting the Member States to comment on the issues that may imply non-compliance with EU legislation. Member States have a maximum two months to provide a satisfactory reply to the EC.

2. If such response does not satisfy the requirements of the EC, it will publish a **reasoned opinion** explaining the reasons why it considers that there has been an infringement of EU law. Member States are given once again a maximum period to comply with the Commission´s opinion.

3. These opinions are published on the European Commission´s webpage[1] and are included in the statistical analysis as they signal market restriction risks. Although they are short opinions, all of them include information regarding the state being litigated and the reasons to suspect that an infringement has occurred, as well as its impacts on different stakeholders.

4. In the case that compliance is not achieved within a given period, the Commission refers the case to the **Court of Justice of the European Union (CJEU)** to start the litigation process. If the Member State subsequently notifies the European Commission, as requested by the latter, about what measures have been implemented to correct the breached EU legislation, the EC may still require the CJEU to impose a lump sum and/or a penalty payment (Article 260 TFEU).

5. The CJEU decides then if there has been an infringement of EU law. This normally takes an average period of 2 years. Once a **judgement** finding an infringement has been issued by the CJEU, the violating Member State is supposed to adapt its national laws according to the corresponding European norm in order to resolve the initial dispute. These judgements can be accessed at the webpage of the CJEU[2], hence they form part of the statistical analysis in this report.

6. The EC will then monitor whether the changes imposed by the judgement of the CJEU have been implemented by the violating Member State. In this case, if the Member State has not yet complied with the European legislation, the EC will send another formal notice. The EC will request again the CJEU to impose a **lump sum and/or penalty payment** if it did not receive a reply from the MS or if this response is not sufficiently justified.

For the remainder of the paper we will use the term *decisions* to refer to both types of EU-level court interventions related to transparent, open and fair market competition, namely, both opinions by the European Commission (EC) and judgements by the Court of Justice of the European Union (CJEU). Additionally, the *implementation date* will be used to refer to the maximum period that a Member State is given to take the requested actions. It may be two months after the decision is issued, if it is a reasoned opinion by the European Commission; or the exact date set by the judgement if it is a judgement by the Court of Justice of the European Union.

3. Theory

3.1 Related literature

There are two strands of literature which inform our hypotheses. First, the literature on the determinants of MS compliance with European Directives, in particular public procurement Directives, helps us understand to what degree and due to which factors should we expect compliance with standards of open and fair competition. Second, the literature on how and under which circumstances supranational bodies such as the WTO and independent courts can facilitate trade, in particular open and fair competition across countries' public procurement markets.

1 http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/?lang_code=en

2 http://curia.europa.eu/

Regarding MS compliance with EU legal norms, while the perennial challenges of measurement and conceptualisation remains (Hartlapp & Falkner, 2009), a small number of robust conclusions have arisen. Different mechanisms explaining the compliance record of MS understood as the degree of rule transposition (not implementation on the ground though) were identified such as enforcement, management and legitimacy. Testing these mechanisms on the full set of EU law non-compliance cases, (Borzel, Dudziak, Hofmann, Panke, & Sprungk, 2007) found that politically more powerful MSs are less likely to implement EU law on time in full, while small countries are more compliant. Furthermore, bureaucratic inefficiency and corruption independently decrease compliance with EU rules by MSs as measured by transposing EU Directives. In the specific domain of Public Procurement Directives, (Gelderman, Ghijsen, & Brugman, 2006; Gelderman, Ghijsen, & Schoonen, 2010) find that compliance with Public Procurement Directives at the purchasing body level is limited on average across Europe, but in the Netherlands in particular. Based on the authors' small scale survey of procurement practitioners, they find that the expected gains of and organizational incentives for compliance increase compliance. Interestingly, sanctions and the perceived inefficiencies of EU Directives have no discernible impact on compliance.

Given our focus on sanctions imposed by the EC/CJEU, their effectiveness and impact channels are of particular importance. The relevant literature about the impact of legal sanctions on compliance has mixed conclusions. Broader legal scholarship has long realised that regulatees' support for rules is essential for effective compliance as coercion is expensive and often impractical (Gunningham & Kagan, 2005). Nevertheless, legal sanctions remain essential to regulatory compliance while often having a cumulative effect reminding agents that violators will be punished (Sutinen & Kuperan, 1999). Crucially for our argument, it is envisaged that the sanctions-compliance relationship is potentially complex and non-linear as regulatees often respond to sanctions by becoming more sophisticated in concealing their actions (Sparrow, 2000). (Gelderman et al., 2010) find no support for the effect of the likelihood and severity of sanctions on compliance. According to their work, the EC should encourage a greater focus on the economic benefits of compliance rather than the legal aspects of non-compliance. If this holds in our analysis, we should expect no significant change in behaviour after a country receives a negative notification from European institutions.

The literature on international trade in government contracts is relatively small, while it produced clear theoretical predictions (Gourdon & Messent, 2017; Kutlina-Dimitrova & Lakatos, 2014). In this perspective, governments have the tendency to prefer domestic over foreign suppliers, aka 'home-biased' procurement. This bias is expected to influence prices and market entry under supply constraints, imperfectly competitive markets, and restrictive national competition policy (Trionfetti, 2001). Ceteris paribus, this suggests that lifting of constraints of competition by influencing either national legislation or tendering practice, competitiveness of procurement markets will increase.

3.2 Causal mechanism and hypotheses

The causal mechanisms hypothesized here link the supranational decisions of EC/CJEU with national public procurement practice. EC/CJEU decisions are diverse in nature just like their impacts. They may concern anything from a particular tender to a provision in a national public procurement law. Nevertheless, in broad terms they influence public procurement practice in MSs in two distinct ways. First, they require a change in national public procurement legislation

influencing all the public procurement markets in a country. For example, a procedural rule such as the kind of information published in a negotiated procedure may be in breach of information requirements in the Directives (e.g. European Commission opinion nr. IP/10/1233 vs the Netherlands). Second, EC/CJEU decisions may require a change of public procurement practice in a particular market. For example, in the office supplies market, the methods for establishing the value of the tender and consequently allowing for a non-open negotiated procedure was deemed in conflict with the Directives (European Commission opinion nr. IP/10/1240 vs the Hungarian Central Purchasing Body (KSZF)).

For either type of decisions, the goal is to directly support the enforcement of transparent, open and fair competition across the EU, irrespective of the underlying motivations for restricting competition in the MS. Nevertheless, for understanding the decisions' impact mechanism reasons for restricting competition are fundamental. Competition may be restricted by a MS or its procuring body for many reasons among which some are most prominent: i) covert trade policy (i.e. preferring local firms over outsiders); ii) corruption and favouritism (i.e. preferring particular connected firms over others); and iii) low state capacity (i.e. not understanding markets and regulations sufficiently to enable open and fair access). In the first two cases, we see a clear misalignment of supranational regulatory goals and MS preferences; while in the third case, interests might be aligned but domestic implementation capacity need to be improved.

Understanding the two distinct types of EC/CJEU decisions and the potential motivations of MS governments and individual contracting bodies gives rise to a number of impact mechanisms whose ultimate importance and total effect can only be empirically decided. First, the EC/CJEU mandated change in national legislation is expected to have a nation-wide impact as legislators would aim to avoid sanctions including financial penalties for non-compliance. Once national laws are changed, the changes have clear and well-known channels of informing all actors (e.g. national procurement bulletins), and national courts are automatically obliged to enforce the new rules. However, if competition restriction was deliberate at the outset, due to protectionist or corrupt motives, legislators could insert clauses providing alternative ways to continue restricting open and fair access, or they can simply switch to influence policy implementation and monitoring institutions instead (Dávid-Barrett & Fazekas, 2016). Moreover, even with legislators honestly implementing the required legal changes, procuring bodies may still prefer to implement them in a way which maintains market closeness. In sum, there are clear arguments for the decisions requiring the change of national legislation to have the desired impact as well as having no impact at all, leading to the following null hypothesis to test:

> H_{0N}: EC/ECJ decisions increase the competitiveness of public procurement markets by changing national public procurement legislation.

The alternative hypothesis to this is that EC/CJEU decisions are ineffective in changing competition conditions in member states, with the only very unlikely possibility of making competition less open and fair. In line with prior literature discussing MSs' incomplete and formalistic compliance with EU rules, we can further hypothesize that even if EC/CJEU decisions on legislative changes have no effect on MS tendering outcomes, they may still influence tendering processes, tender design choices such a use of open procedure types or call for tender publication on TED. This would constitute formalistic compliance without substantive compliance whereby MS legislators and other national bodies manage to satisfy

the EU's requirements while substituting disallowed restrictive practices with new ones. This yields the following hypothesis:

> *H_{1N}: EC/ECJ decisions requiring national legislative change increase the use of formally open tendering practices without the corresponding increase in competitiveness of public procurement markets.*

Second, the required change in public procurement practice or policy implementation is expected to have a more targeted impact on a particular market and/or purchasing body on that market, hence countering competition restriction as practiced locally. More targeted and local nature may render such interventions more impactful; however, they may not influence actor behaviour any further than the actual decision because, unlike in case of a legislative change, there is no widely used and known information channel directly informing actors about an EC/CJEU decision. It is conceivable that national courts would use an EC/CJEU decision as part of case law they draw on, however. this impact mechanism is rather indirect and work probably only on a longer term if at all. Moreover, if procuring bodies are motivated by protectionist or favoritistic motives, they may find ways to comply with EC/CJEU decisions while continuing to keep markets closed. In sum, the decisions requiring the change of public procurement practice in selected MS markets may or may not be effective depending on information channels and actor motivations leading to the following null hypothesis:

> H_{0M}: EC/ECJ decisions increase the competitiveness of public procurement markets by changing public procurement tendering practices.

The alternative hypothesis to this is that EC/CJEU decisions are ineffective in changing competition conditions in MS markets. Similar to the MS-level interventions, the literature suggests that policy implementation of EC/CJEU decisions by procuring bodies could only be formalistic without the expected positive change in tendering outcomes due to procuring bodies finding alternative restrictive strategies to those disallowed by the EC/CJEU decision. If this is the case, EC rule implementation is predominantly driven by organisational goals, preferences, and local incentives which override supranational legislative and enforcement intent. This yields the following hypothesis:

> H_{1M}: EC/ECJ decisions requiring change in tendering practices increase the use of formally open tendering practices without the corresponding increase in competitiveness of public procurement markets.

Furthermore, either of the two principal forms of EC/CJEU interventions can have a heterogenous impact depending on the country in question. Based on the limited, but equivocal literature, it is expected that old and especially larger member states will implement EC/CJEU decisions with less vigour while new and especially smaller member states would display a considerably stronger genuine implementation record. Given the limited nature of our dataset (i.e. relatively few countries with EC/CJEU sentences), we hypothesize that

> H_{0MS}: EC/CJEU decisions concerning larger, Western European countries are less completely implemented with weaker effects than those concerning smaller, Easter European countries.

The combined alternative hypothesis to H0MS is that there is no different in implementation completeness and outcomes between the two groups or that the differences are opposite (this latter alternative hypothesis is the least supported by theory).

Finally, we cannot exclude the possibility that any EC/CJEU has actually the opposite than intended effect in the observed contracts sample. This is because the decisions may lead to the publication of previously non-published (hence unobserved) tenders without genuinely influencing competitive openness. In this case, the observed competition restriction indices would increase due to the more complete observation of tenders with restrictive processes and outcomes.

4. Data and variables

4.1 Public procurement data

The database derives from public procurement announcements in 2008-2015 in the EU27 (EU28 minus Malta). Announcements appear in the so-called Tenders Electronic Daily (TED), which is the online version of the "Supplement to the Official Journal of the EU", dedicated to European public procurement.) (DG GROWTH, 2015).[3] The data represent a complete database of all public procurement procedures conducted under the EU Public Procurement Directive by Member States or the European Commission regardless of the funding source (e.g. national, EU funded). The database was released by the European Commission - DG Market which also has conducted a series of data quality checks and enhancements. TED contains variables appearing in 1) calls for tenders, and 2) contract award notices. All the countries' public procurement legislation is within the framework of the EU Public Procurement Directive and are therefore directly comparable (European Commission, 2014). The source TED database contains over 2.8 million contracts of which 2.3 million are used in the analysis. Those excluded are: 1) countries with too few observations (i.e. Malta), 2) contracts below mandatory reporting thresholds[4], and 3) contracts in non-competitive markets (i.e. markets without sufficient number of competitors)[5].

4.2 Indicators measuring competition and tendering practices

This study exploits 4 types of measures capturing competitive outcomes. As the overall majority of the interventions were about countering restrictive access to tenders and contracts, our outcome measures relate to bidding behaviour and winner company characteristics. Furthermore, we also analyse changes in 3 formal tendering practices that ensure open access to these contracts. All variables are listed in Table 1.

3 Source data can be downloaded from: https://open-data.europa.eu/en/data/dataset/ted-csv

4 The filter for below threshold contracts cannot be perfect due to missing data. E.g. in case of missing estimated and final values, the tender cannot be categorized unambiguously. Therefore, the rule was simplified significantly: only contracts with known estimated or final values below the lowest publication threshold were excluded from the sample. This way, we do not exclude any contract that have to follow the EU Directives, however, we possibly include voluntary publications. Applicable EU threshold values can be found here: http://www.ojec.com/threshholds.aspx

5 As a proxy for competitive markets, we used the number of contracts awarded on a market per year as market size closely varies with number of competing firms. The threshold adopted was 3 contracts per year.

TABLE 1 DEFINITIONS OF THE KEY VARIABLES[6]

Variable name	Variable definition
Number of bids	Number of received bids during the tendering period
Single bidding	0 if more than one bid was received, 1 if only one bid was received
Foreign win	0 if the supplier is not a foreign company, 1 if the supplier is a foreign company.
Local winner company	Local supplier is defined based on whether the winner company is located at the same NUTS-3 region as the buyer (1) or not (0).
Relative price	Relative price is the ratio between the final contract price and the estimated price.
Call for tender publication	Call for tender publication denotes whether a call for tenders announcement was published on TED (1) or not (0).
Non-open procedure type	Non-open procedure type denotes those procedure types which are associated with frequent single bidding (0) or those which are not (1).
Short advertisement period	Short advertisement period is a categorical variable (short=1, not short=0) based on the number of days between call for tender publication date and the bid submission deadline.

4.3 EC/CJEU decisions data

In order to carry out the statistical analysis, we identified those countries and markets which received an EC/CJEU decision requiring behavioural change (i.e. change of law or practice). For identifying all the possible relevant EC/CJEU decisions, two main sources were used: the Court of Justice of the European Union (CJEU) database[7], and the European Commission (EC) database[8] on decisions relating to public procurement infringements. From these sources an initial broad list of legal documents was compiled: for CJEU decisions using standard keyword search in the database such as “procurement”, “contracting” or “tender”[9]; for EC decisions, simply including all documents on the EC website dedicated to public procurement implementation and enforcement decisions. We consolidated the list of documents to identify EC/CJEU decisions by grouping documents which related to the same decision and also by splitting the content of documents when they contained information on more than one EC/CJEU decision. At this very early stage the goal was to be as broad as possible in order to avoid missing any potentially relevant EC/CJEU decision.

These decisions are part of the formal procedure of the EU remedies system described in section 2.2 above. More precisely, decisions from the European Commission generally refer to *reasoned opinions* which include the reasons why the EC considers there has been an infringement of the EU legislation. Such reasoned opinions conform steps 2 of the procedure (see section 2.2). Given that Member States have two months to communicate to the EC what measures have been taken to correct the alleged infringement, we must consider this the

6 For a detailed definition of variable 6,7 and 8, see (Fazekas & Kocsis, 2017).

7 http://curia.europa.eu/

8 http://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/?lang_code=en

9 Many of the cases identified by the keyword search included documents not related to judgements at all (e.g. Application, Opinion, or Summary for the Official Journal), or used the keywords in a sense completely unrelated to public procurement legislation. These cases were removed before any analysis began.

implementation date of these decisions. EC reasoned opinions are included as long as they led to no follow-up CJEU procedure implying that the concerned Member States have implemented the opinion. The decisions from the CJEU refer to the judgement issued once the investigations are over and a final conclusion over whether the law was broken is provided. These decisions relate to the step 4 of the formal procedure.

There were 281 cases in the initial list of EC/CJEU decisions. Upon inspection, most were discarded as irrelevant to this analysis for a variety of reasons. In order to identify those decisions which imply an intervention in Member State public procurement markets during our observation period, we applied the following selection criteria:

- the decisions should deal with public procurement in EU Member States as regulated by the EU Public Procurement Directives;
- the decisions should deal with public procurement procedures undertaken during the period 2009-2014; and
- the decisions should imply behavioural change, i.e. requiring the Member State to change public procurement legislation or practice.

These criteria together yielded 50 relevant EC/CJEU decisions which could potentially be matched to the public procurement database (Table 2). Unfortunately, a few decisions provided so little information (e.g. only very general, vague description of the product procured in the tender) or related to so specialised products with a marginal number of influenced tenders (e.g. national geo-information system) that it was not possible to carry out an acceptable quality matching procedure (14 cases). Final list of EC/CJEU decisions used in the statistical analysis can be found in the Appendix A. Note, that the actual number of decisions included in the various models with matching can be different.[10]

TABLE 2. SUMMARY OF THE EC AND CJEU DECISIONS ANALYSED, 2009-2014

	CJEU	EC	Total
Initial sample compiled for detailed screening	208	73	281
Relevant cases available for matching to public procurement database	25	25	50
Included in statistical analysis	22	14	36

The interventions covered a surprisingly wide range of different cases addressed by the EC or CJEU. One typical example is that contracting authorities are reluctant to publish an open tender, despite the fact that it would have been under the scope of EU regulation requiring a publicized procedure. In other non-publicized cases, the contracted company was a state-owned consortia, where misinterpreting the rules can be a plausible explanation. However, there are amply of relatively clear cut cases, for example when the bidding criteria contains overly restrictive conditions favouring a particular supplier or supplier group. Nevertheless, it is important to emphasize, that *a priori* expectations on what overall effects are to be seen due to these interventions is somewhat ambiguous. Previously non-publicized tenders might appear in the 'market' with extremely restricted conditions leading to high ratio of single bidding contracts etc.

[10] For example, decisions were not included if there were less than 50 tenders affected before or after the decision in the difference-in-difference analysis with the +-180 days time window – see section 6.3.

4.3.1 Linking EC/CJEU decisions to public procurement data

The contract-level public procurement database and the decision-level EC/CJEU database were linked to each other in order to identify the corruption risk differences between the period before and after the decision is implemented. Two categorization rules were applied to categorize tenders before and after the implementation: i) call for tender publication date was used if it was available, ii) contract award date minus the median difference between the contract award and call for tender publication date (full sample median is 101 days) was used when the call for tender date was missing[11]. In case of the second rule, a certain extent of miscategorization is inevitable: some of the tenders categorized as before the intervention might have been actually started only after the intervention and vice versa.

As established already, there are generally two types of EC/CJEU decisions: one that implies change in the national public procurement legislation such as the information published in open procedures (national-level intervention henceforth) or one that implies change in market level public procurement practice such as the use of specific tendering criteria for assessing bidders (market-level intervention henceforth). Matching decisions to public procurement data in the first case is very simple, as the whole country is 'treated' yielding a very broad set of influenced tenders. Therefore, we included all the above EU threshold tenders in the relevant time-period around the intervention. While in the second case the matching procedure was somewhat more complicated in order to find the target market of the decision yielding a much smaller set of influenced tenders (Table 3).

In this case, we extracted the CPV[12] and NUTS-1[13] codes representing the product group and geographical area concerned by the EC/CJEU decision in question. Our aim was to be as precise as possible so as not to dilute the effect of any decision by including those contracts which are not directly influenced. In an ideal scenario, we defined the 4 digit CPV code of the product group and the NUTS1 level geographical area. However, in some cases the decision was not specific enough or the information was not detailed enough to define the precise CPV and NUTS-1 codes. In these cases, we employed broader CPV or NUTS categories up to 2 digit CPV codes and NUTS0 (country) codes.

As a result of linking two complete databases, on the one hand public procurement tenders above the EU thresholds, on the other hand EC/CJEU decisions relating to these tenders, our database and analysis together encompass the full population of observational units. In other words, aside the few missing data points and data errors and the limitations of our methodology (e.g. matching incompleteness), our study represents a complete assessment of the EC and CJEU ensuring open unrestricted, open access to public procurement tenders.

11 Note, that there are two main sources of missing call for tender publication date: i) erroneous publication (missing publication date), ii) call for tenders doesn't have to be published in certain cases.

12 CPV=Common Procurement Vocabulary. For more info see: http://simap.europa.eu/codes-and-nomenclatures/codes-cpv/codes-cpv_en.htm

13 NUTS=Nomenclature of territorial units for statistics. For more info see: http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction

TABLE 3. DISTRIBUTION OF CONTRACTS ACCORDING TO TREATMENT CATEGORY AND LEVEL, 2008-2015[14]

Treatment level	N	%
no EC/CJEU intervention	2,747,157 (2,326,171)	91% (77%)
market-level intervention	52,117 (50,127)	2% (2%)
national-level intervention	225,491 (648,467)	7% (21%)
Total	3,024,765	100

Note: In case of double treatment (i.e. both market and country level intervention applies), the number of tenders affected by the country level interventions are reported in parenthesis.

When looking at the country distribution of contracts in markets with EC/CJEU decisions, it is remarkable that some countries are completely missing (Table 3). For example, one of the member states with weakest competition in public procurement, Slovakia, has not received a single decision according to our data. Overall, 21 Member States are part of the analysis.

TABLE 4. COUNTRY DISTRIBUTION OF TENDERS INFLUENCED BY EC/CJEU DECISIONS

Targeted interventions			Broad interventions		
Country	N	%	Country	N	%
AT	244	0.5%	BG	16164	2.5%
BE	656	1.3%	CY	6089	0.9%
BG	1154	2.2%	ES	86080	13.3%
DE	31906	61.2%	LV	67779	10.5%
DK	3	0.0%	NL	18669	2.9%
EE	473	0.9%	PL	380442	58.7%
ES	3	0.0%	PT	12457	1.9%
FR	31	0.1%	SI	21161	3.3%
GR	369	0.7%			
HU	149	0.3%			
IT	6755	13.0%			
LU	776	1.5%			
NL	987	1.9%			
PL	1369	2.6%			
PT	192	0.4%			
RO	973	1.9%			
SI	112	0.2%			
UK	5,965	11.4%			
Total	52,117	100	Total	648,467	100

In order to lay the foundation for hypothesis testing, the contracts on markets with EC/CJEU decisions are described in detail as they represent a rather particular sample compared to the overall public procurement market. Treated and non-treated markets are compared according to our main outcome variables characterising competitiveness and tendering characteristics in Table 5**.** Apparently, competition is significantly weaker in treated markets as suggested by the high ratio of single bidding and lower number of received bids. However, there are only

[14] Note, that these are the number of tenders of the given country or market in the whole period (2009-2015), hence the actual number of tenders used in the analysis is lower.

minor differences with regards to the ratio of foreign or local suppliers, relative price, formal tendering practices such as the use of non-open procedure types. This suggests, that interventions were probably not triggered by large scale disobedience of rules but rather motivated by individual cases. Nevertheless, the markets in question had clearly lower levels of competition, hence the interventions might have been based on infringements possibly unrelated to those formal practices that we can measure.

TABLE 5. SUMMARY CORRUPTION RISK INDICATORS OF CONTRACTS WHICH RECEIVED OR NOT A TARGETED EC/CJEU DECISION

EC/CJEU decision received ?		Single bidding	Number of bids received (trimmed)	Foreign winner	Local winner (same NUTS3 region)	Relative price	Call for tender publication	Non-open procedure type	Short advertisement period
Yes	Mean	0.32	4.81	0.01	0.30	0.93	0.08	0.05	0.31
	Median	0.00	3.00	0.00	0.00	0.98	0.00	0.00	0.00
	SD	0.47	5.42	0.12	0.46	0.15	0.27	0.19	0.41
	N	627409	627407	613866	581989	339986	698594	691360	454077
No	Mean	0.20	5.62	0.02	0.30	0.94	0.08	0.04	0.28
	Median	0.00	3.00	0.00	0.00	1.00	0.00	0.00	0.00
	SD	0.40	5.62	0.13	0.46	0.15	0.27	0.17	0.40
	N	1779154	1779101	1959762	2069153	649777	2326171	2300018	1519052

5. Methodology and identification

The goal of the empirical analysis is to identify the causal impact of EC/CJEU decisions on competition and the procedural characteristics of public procurement tenders To this end, we applied 2 different analyses: i) simple before-after comparison, and ii) difference in differences estimation after matching.

As a simple benchmark assessment, a bivariate analysis was conducted which compared the period before to the period after the intervention in terms of average competitive outcomes and tendering practices. This serves only as a crude depiction of how public procurement actors reacted to EC/CJEU interventions.

A simple before-after comparison is biased if there is a general trend on procurement markets affecting the outcomes and tendering practices or the composition of tenders would change over time, hence confounding the estimates in a simple OLS framework. Therefore, using a difference-in-difference analysis would be better for identifying the intervention effects if a suitable control group can be constructed. As said before, all above EU threshold tenders have to follow the same regulations stipulated in the applicable EU Directives (section 2). Therefore, we can select comparable tenders from unaffected (i.e. no intervention) markets or countries. However, the tenders in the control group have to satisfy at least two criteria: i) the tenders compared have to be similar (same product market, same size etc.) and ii) the regional economic and institutional environment has to be comparable.

First, we identified similar-sized contracts from the same product market to avoid that both the levels and changes are driven by structural factors in the comparison – for example the trend in the number of submitted bids or the ratio of local companies awarded can be significantly different across product markets on average. Second, we balanced macro-level economic and

institutional environmental characteristics which typically plays an important role in how public procurement markets work – whether companies bid with aggressive pricing strategies, etc. For instance, a small-scale construction project taking place within half a year before the intervention in Poland was matched to a similarly small-scale construction project from a comparable Latvian region – as both countries have regions with similar GDP levels and comparable institutional environments.

Matching which balances treatment and control groups in both the pre and post treatment periods was carried out using coarsened exact matching (CEM) technique (Iacus, King, & Porro, 2012). The combination of matching with difference-in-difference estimation was already used in development studies (Cattaneo, Galiani, Gertler, Martinez, & Titiunik, 2009), the management literature (Rowley, Shipilov, & Greve, 2017), and international economics; while we do not know about any such approach in analysing public procurement markets.

More specifically, the applied CEM matching algorithm used to following covariates: first, we match based on tendering characteristics: product type, purchase type, tendering date, tender size.[15] Besides the tendering date and tender size, all of these dimensions were categorical variables. However, we dichotomized tendering date variable – we matched contracts before and after the implementation date separately –, and created a categorical variable in case of tender size according to quintiles. Second, we also used two macro measures to match on the overall level of development (NUTS-2 level GDP from 2008) and broader institutional quality (EQI).[16] These were also categorized according to quintiles. As there is a non-negligible ratio of missing data, we created a distinct missing category in case of all tender level variables that were used for the matching. Details on the matching are reported in Appendix B.

Table 6 shows the number of countries, markets and the actual number of tenders included in the difference-in-differences analysis with CEM matching. Four different matching setup was used in the analysis according to the time-window used around the intervention dates and the set of variables used for the matching. As we restricted the sample to those cases where there were at least 100 tenders both before and after the intervention in case of the one year time-window and at least 50 tenders in case of the half-year time-window, the number of actual markets used in the analysis is lower. There are 8 country- and 14 market-level interventions included in this analysis. The matching did not reduce the number of tenders included significantly: it only reduced the treated sample by 4-10% (one-year window) and 6-14% (half-year window) in case of country and 6-8% (one-year window) and 8-12% (half-year window) in case of the market interventions (based on Table 4). While these are the maximum number of tenders included in the matched difference-in-difference analysis, the actual number of included tenders can change due to missing values.

[15] Product type refers to 2-digit CPV product codes, purchase type specifies whether the tender was a supply, service or work contract.

[16] NUTS-2 level GDP can be proxy for the number of companies capable of bidding on public procurement markets. We only use year 2008 as we assume that one year is a good enough proxy to capture the overall regional differences for the roughly 6 year period included in the analysis (i.e. a region from Eastern Poland will be more similar to a Latvian region even after 6 years than to one in Denmark). We also control for the overall institutional quality that can be a proxy both for the bureaucratic capacity and the overall institutional environment for public contracting (e.g. contract enforcement). (Charron, Dijkstra, & Lapuente, 2014; Charron, Lapuente, & Rothstein, 2013)

TABLE 6. NUMBER OF CONTRACTS IN CASE OF DIFFERENT MATCHING TECHNIQUES.

		Country level intervention		Market level intervention	
+- 360 days	Number of intervention cases	8		14	
		Control tenders	Intervention cases	Control tenders	Intervention cases
	All tenders	4623442	288013	112,500	12,805
	Matched tenders (narrow matching)	502,224	259,263	26,100	11,796
	Matched tenders (wide matching)	738,744	276,446	33,282	12,098
+-180 days	Number of intervention cases	8		13	
		Control tenders	Intervention cases	Control tenders	Intervention cases
	All tenders	2276594	148,291	55,943	6,696
	Matched tenders (narrow matching)	208,488	127,112	11,938	5,900
	Matched tenders (wide matching)	319,205	139,281	16,507	6,186

There are two challenges to our identification strategy. First, without doubt, selection of intervention countries and markets is non-random hence they may differ from control markets and countries in non-observed characteristics that can violate the parallel trends assumption of the different-in-differences estimations (Angrist & Pischke, 2008). However, selecting regions and countries which are very similar in their macro characteristics is expected to account for broader differences which may confound our estimations. Second, it is possible that tenders are manipulated around the intervention date. For example, public buyers deliberately blocking market entry for some companies, say those without personal connections to the buyer, are motivated to move tenders ahead of the EC/CJEU intervention date. However, implementing EC/CJEU decisions involve high level decisions by national parliaments or negotiations between the EC and national governments without much publicity (e.g. decisions receive scant media coverage in domestic press, let along the progress of negotiations) which make the exact implementation date hard to predict for individual buyers. In addition, public buyers' public procurement plans are typically set for the financial year in EU member states which contain the types of purchases and contract values in advance. Hence, strategically manipulating tender timing is hard, albeit clearly not impossible.

While there is no empirically or theoretically implied cut-off time for defining the before and after intervention periods, we take +/-180 days before/after for simplicity and reflecting the fact that most tenders last for a couple of months including time for document preparation, advertisement, and contract award. In the robustness tests section, we show that our results are not sensitive to the choice of time window (i.e. results are unchanged for a longer time window such as +/-360 days).

6. Results

6.1 Simple comparison of treated and control tenders

First, the overall effect of EC/CJEU decisions is explored without controlling for any contract-level characteristics, simply exploiting the similarities in contracts a few months before and after the implementation date of the relevant EC/CJEU decisions. This approach assumes a quick and decisive implementation of EC/CJEU decisions, which carries the advantage of simplicity and intuitive interpretation.

The simple comparison of the different measures of competition and tendering practices between the two groups of contracts yields strikingly different results for country-level as opposed to market-level interventions. On the one hand, market-level interventions don't seem to have the hypothesized impact, overall the difference in group means is very small (Table 7). One measure showed even the opposite effect: the average number of bids decreases after the intervention significantly. This is in contrast with a significantly decreasing incidence of tenders without a call for tender which, at least in principle, should increase the level of competition. On the other hand, country-level interventions seem to have significant and expected effects. The ratio of single bidder contracts, the average number of bids and ratio of local winners all show a significant increase in the level of competition. Observed tendering outcomes are also in line with the changes in tendering practices: the ratio of tenders with a non-open procedure or without publication of a call for tender document decreases, as well as the use of short advertisement periods. In terms of prices, we observe a slight increase that is significant only at 10%. However, the change is very small and relative price is only available for a subsample.

TABLE 7. SIMPLE COMPARISON OF GROUP CRI MEANS ONE YEAR BEFORE AND AFTER THE BROAD EC/CJEU INTERVENTION (+/-180 DAYS)

		Group	N	Mean	Std. error	SD	95% confidence interval	
Market level	Single bidding	before	3,171	0.14	0.00617	0.34739	0.12824	0.15243
		after	3,231	0.14	0.00602	0.34205	0.12345	0.14705
		Diff. (after-before)		**-0.005**	**0.009**		-0.01	0.02
	Number of bidders	before	3,171	8.53	0.11	6.44	8.31	8.76
		after	3,231	8.23	0.11	6.14	8.02	8.44
		Diff. (after-before)		**-0.30****	**0.16**		-0.01	0.61
	Foreign winner	before	3,406	0.02	0.00	0.15	0.02	0.03
		after	3,320	0.02	0.00	0.14	0.02	0.03
		Diff. (after-before)		**0.00**	**0.00**		**-0.01**	**0.01**
	Local winner	before	3,276	0.20	0.01	0.40	0.19	0.22
		after	3,214	0.22	0.01	0.41	0.20	0.23
		Diff. (after-before)		**0.01**	**0.01**		**-0.03**	**0.01**
	Relative price	before	978	0.91	0.01	0.16	0.90	0.92
		after	814	0.92	0.01	0.16	0.91	0.93
		Diff. (after-before)		**+0.01**	**0.01**		**-0.02**	**0.01**
	Call for tender publication	before	3,657	0.09	0.00	0.28	0.08	0.10
		after	3,575	0.07	0.00	0.25	0.06	0.07
		Diff. (after-before)		**-0.021*****	**0.01**		**0.01**	**0.03**
	Non-open procedure type	before	3,615	0.05	0.00	0.19	0.04	0.05
		after	3,532	0.05	0.00	0.19	0.05	0.06
		Diff. (after-before)		**-0.00**	**0.00**		**-0.01**	**0.01**
	Short advertisement period	before	1,034	0.30	0.01	0.33	0.28	0.32
		after	1,011	0.32	0.01	0.34	0.30	0.34
		Diff. (after-before)		**-0.02**	**0.01**		**-0.05**	**0.01**
Country level	Single bidding	before	11,948	0.20	0.00	0.40	0.19	0.21
		after	12,404	0.17	0.00	0.38	0.16	0.18
		Diff. (after-before)		**-0.030*****	0.00		**0.02**	**0.04**
	Number of bidders	before	11,948	6.40	0.06	6.02	6.29	6.51
		after	12,404	7.15	0.06	6.51	7.03	7.26
		Diff. (after-before)		**0.74*****	0.08		-0.91	-0.59
	Foreign winner	before	11,988	0.01	0.00	0.12	0.01	0.02
		after	12,740	0.02	0.00	0.13	0.01	0.02
		Diff. (after-before)		**0.00**	0.00		-0.01	0.00
	Local winner	before	9,703	0.55	0.01	0.50	0.54	0.56
		after	10,104	0.50	0.00	0.50	0.49	0.51
		Diff. (after-before)		**-0.051*****	**0.01**		**0.04**	**0.07**
	Relative price	before	6263	0.93	0.00	0.13	0.93	0.94
		after	7136	0.94	0.00	0.13	0.93	0.94
		Diff. (after-before)		**0.004***	0.00		-0.01	0.00
	Call for tender publication	before	16262	0.18	0.00	0.38	0.17	0.19
		after	16859	0.17	0.00	0.38	0.17	0.18
		Diff. (after-before)		**-0.005**	0.00		0.00	0.01
	Non-open procedure type	before	15838	0.12	0.00	0.28	0.12	0.13
		after	16529	0.11	0.00	0.27	0.11	0.12
		Diff. (after-before)		**-0.007****	0.00		0.00	0.01
	Short advertisement period	before	11302	0.42	0.00	0.38	0.41	0.42
		after	12144	0.37	0.00	0.39	0.36	0.38
		Diff. (after-before)		**-0.046*****	0.01		0.04	0.06

Note: Bold values are differences in mean. ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

6.2 Difference-in-differences estimations

Difference-in-difference estimations following Coarsened Exact Matching (CEM) show clear results pertaining to our hypotheses: i) the effects are sizeable, statistically significant and have the expected direction for the nation-wide interventions; while ii) the results are mixed for the market level interventions.

We find consistent evidence for national level interventions increasing competition and openness (H_{0N}) (Table 8). The ratio of single bidder contracts decreases significantly due to the intervention: -3.3-3.7% points, while there is an increase in the number of received bids: +0.07-0.08 bids. In terms of winner composition, there is no significant effect on the probability of having foreign supplier which might be due to the generally very low market share of foreign companies (~1.5% in the investigated country sample). The likelihood of awarding to local suppliers decreases significantly: 2.9-3.8% points. While estimated and final contract values are missing for a significant fraction of tendering records, making it impossible to calculate relative prices, using this smaller sample, we find a small significant decrease in relative prices, that is price savings due to the intervention: 0.4-0.6%.

While it seems that the country level effects are in line with our hypothesis (H_{0N}), the evidence is mixed with regards to the competition effects of market level interventions (H_{0M}) (Table 8). There is no significant effect on single bidding and bidder numbers either. Surprisingly, the intervention has a significant positive effect on the number of foreign winners, although this effect is not robust to alternative time windows. Considering the low proportion of foreign suppliers in the sample (~1.7% in the market sample), identifying statistically significant and substantively important effects is challenging. There is no significant effect on the probability of awarding to local companies. With regards to relative price, the estimations show even a significant increase without controls and no significant effects with control variables included. Therefore, we couldn't find supporting evidence for the hypothesised impact of market level interventions on competition (H_{0M}).

TABLE 8. COUNTRY AND MARKET LEVEL INTERVENTION EFFECTS ON TENDERING OUTCOMES WITH +-180 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATIONS)

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
Country level interventions	Intervention effect	-0.0373***	-0.0331***	0.0704	0.0758*	-0.000345	-0.0021	-0.0382***	-0.0287***	-0.00558***	-0.00368*
		0	0	(0.067)	(0.045)	(0.861)	(0.125)	0	0	(0.001)	(0.025)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	325152	325098	325107	325053	372638	372129	358263	358210	137614	137575
	Adjusted R-squared	0.0464	0.0983	0.046	0.1	0.0066	0.2296	0.0018	0.1133	0.005	0.033

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
Market level interventions	Intervention effect	-0.000783	-0.00162	0.171	0.123	0.00876	0.0161*	0.0422	0.0333	0.0435***	-0.00971
		(0.957)	(0.905)	(0.364)	(0.456)	(0.185)	(0.015)	(0.052)	(0.079)	(0.000)	(0.356)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	16920	16918	16920	16920	18716	18647	19994	19992	4532	4532
	Adjusted R-squared	0.0035	0.2005	0.044	0.299	0.0099	0.1801	0.0085	0.1266	0.0077	0.2557

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

After reviewing the interventions' impact on competition and tendering outcomes, now we turn to tendering processes as a major impact mechanism and a potential sign of formalistic compliance (hypotheses H_{1N} for country-level interventions and H_{1M} for market level interventions). Similarly for tendering outcomes and competitiveness, we find mixed evidence on the effects of the different interventions types (Table 9). First, the probability of having no call for tender is significantly lower in all models, albeit effect sizes are small: -0.4-0.5% points for country-level interventions and -1.6-3.6% points for market-level interventions. Second, as predicted, the use of non-open procedures which may inhibit open competition decreases significantly as a result of the country-level interventions, albeit effect sizes are small again: -0.3-0.8% points. However, for the market-level interventions we find mixed evidence, the less preferred specification without controls shows a 0.4% point decrease in line with hypothesis H_{1M}, while the preferred specification with additional controls shows opposite results: a 1.6% points increase in non-open procedures' prevalence. Third, there are significant improvements in the length of advertisement periods in all models for the country-level interventions (note, that negative change means lower incidence of very short advertisement periods): we find a -2.5-3.3% points impact on short advertisement periods. However, for market-level interventions the impact is contrary to our expectations, due to the interventions, short advertisement periods become more frequent: a 8.9-10.7% points increase.

Taken together the results on outcomes as well as tendering processes, we suggest that for country-level interventions our theory holds: EC/CJEU sentences increase competition and openness in public procurement markets at least partially through encouraging more open tendering practices like advertising the call for tenders on the EU-wide TED website. That is we further confirm H_{0N} while providing contrary evidence for H_{1N}. There is little evidence for formalistic compliance without improving outcomes for country-level interventions.

However, for market-level interventions we find mixed evidence: Tendering outcomes don't improve as we predicted while tendering processes only partially improve suggesting that H_{0M} is incorrect while H_{1M} more or less fits the empirical evidence. Market-level interventions lead to formalistic compliance (and in some cases not even that) without substantive improvements in outcomes.

TABLE 9. COUNTRY AND MARKET LEVEL EFFECTS ON TENDERING PRACTICES WITH +-180 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATES)

	Dependent variable	Missing call for tender		Non-open procedure type		Short advertisement period	
Country level interventions	Intervention effect	-0.00506**	-0.00359***	-0.00790***	-0.00265***	-0.0247***	-0.0334***
		(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	406952	406898	403651	403597	305373	305351
	Adjusted R2	0.001	0.636	0.001	0.847	0.011	0.075
Market level interventions	Dependent variable	Missing call for tender		Non-open procedure type		Short advertisement period	
	Intervention effect	-0.0357***	-0.0167**	-0.0159***	0.00439**	0.0893***	0.107***
		(0.000)	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	22693	22693	22616	22616	13358	13358
	Adjusted R2	0.003	0.413	0.001	0.910	0.013	0.269

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

Now we turn to our third set of hypotheses postulating heterogeneous effects by country size and level of development. Hence, we look at the differences in tendering outcomes and tendering processes in East and West European countries[17]. Although, the number of cases grouped are not evenly distributed – as there are more cases from East Europe (EE) for country-level interventions and more cases from Western Europe (WE) for market-level interventions[18] – the samples are still sufficiently large and balanced for exploring hypothesis H_{0MS}.

First, we find substantive differences between regions in tendering outcomes both for the country- and the market-level interventions (Table 10). While there is a significant decrease in single bidding and increase in the number of received bids in EE, there is no such effect in WE countries in the case of country-level interventions. Regarding the award to foreign companies, the effects are mixed and largely insignificant which is hardly surprising given the lack of overall effect in this respect. Curiously, the effect is opposite than expected for EE countries, that is a very small drop in foreign firm share, however this impact is not robust to other before-after windows. We find no significant impact on local suppliers in the two separate groups. Again, with the caveat that the number of observations drop due to incomplete

17 East European countries with country level interventions: Poland, BG, CY, LV, PL, SI. West European countries with country level interventions: ES, NL.

18 There are important changes in the number of observations when we look at the market level interventions. This follows from the rule we use for including interventions in the sample. As it was pointed out in section 4, we only included cases with +-50 observations for the half year cut-off point, while +-100 observations in case of the one-year cut-off point. As there are different interventions meeting this limit, the number of observations change accordingly.

administrative records for calculating relative prices, we find that the country-level intervention decreases relative prices, that leads to savings in EE, but not in WE.

With regards to market-level interventions, the analysis reveals contradicting patterns once again. In EE countries, the only significant and robust finding is regarding the number of bidders which increase due to the EC/CJEU interventions. In WE countries, we find no such effect (Table 11).

TABLE 10. EFFECTS OF COUNTRY-LEVEL INTERVENTIONS ON TENDERING OUTCOMES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-180 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATES)

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
East European countries	Intervention effect	-0.0527***	-0.0527***	-0.301***	-0.0422	-0.00297*	-0.00350**	-0.0333***	-0.0262	-0.0207***	-0.0158***
		(0.000)	(0.000)	(0.000)	(0.337)	(0.021)	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	205866	205866	205821	205821	221493	219178	216323	216317	106986	106986
	Pseudo R2 or adjusted R2	0.0416	0.078	0.084	0.157	0.0031	0.1104	0.0021	0.1031	0.003	0.036
West European countries	Intervention effect	-0.000327	0.0136	0.339***	-0.0161	0.00107	0.000379	0.00887	0.00950	0.0253***	0.0211***
		(0.972)	(0.123)	(0.001)	(0.862)	(0.835)	(0.921)	(0.442)	(0.389)	(0.000)	(0.000)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	119286	119232	119286	119232	151145	150728	141940	141887	30628	30589
	Pseudo R2 or adjusted R2	0.0003	0.1247	0.006	0.145	0.005	0.3047	0.0043	0.1361	0.023	0.081

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 11. EFFECTS OF MARKET-LEVEL INTERVENTIONS ON TENDERING OUTCOMES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-180 DAY CUT-OFF POINTS

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
East European countries	Intervention effect	-0.0378	0.0539	3.149***	3.704***	0.0660	0.0957	0.207***	0.108*	0.0895*	0.0546
		(0.606)	(0.410)	(0.001)	(0.000)	(0.052)	(0.060)	(0.000)	(0.035)	(0.010)	(0.151)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	816	814	816	816	817	658	792	790	355	355
	Adjusted R-squared	0.0517	0.3811	0.341	0.709	0.0894	0.4516	0.0627	0.3309	0.068	0.139
West European countries	Intervention effect	0.00777	-0.00403	-0.363	-0.117	0.00950	0.0159*	0.0383	0.0274	0.0459***	-0.0130
		(0.593)	(0.772)	(0.056)	(0.488)	(0.168)	(0.024)	(0.089)	(0.162)	(0.000)	(0.239)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	16104	16102	16104	16104	17899	17830	19202	19200	4177	4177
	Adjusted R-squared	0.002	0.1902	0.049	0.275	0.0097	0.1858	0.0079	0.1276	0.008	0.273

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

Second, we also find substantive differences in tendering processes between EE and WE very much further supporting the explanatory story we have built so far. For country level interventions, in EE countries, our models identify a significant and substantial improvement in tendering processes as the shares of missing call for tenders, non-open procedures, and short advertisement periods all decrease due to the interventions. In WE countries, the picture is less consistent, but overall follow a similar pattern: the shares of missing call for tenders and non-open procedures significantly decrease, while there is no significant impact on short advertisement periods (Table 12).

Largely reflecting the lack of main effect, market-level interventions have a mixed impact on tendering processes in the separate EE and WE samples too. The shares of missing call for tenders and non-open procedures significantly decrease in both EE and WE countries, however, the results are not robust to different before-after window lengths and the inclusion of control variables in the regressions (Table 14). Impacts on short advertisement periods are mixed, with a surprising positive significant effect in EE, which, nevertheless turns out not to be robust in alternative specifications.

Overall, we find supporting evidence for hypothesis H_{0MS}. Country-level interventions' impact on tendering outcomes (competition) as well as tendering processes is stronger in smaller, newer member states, while weaker in larger, older member states. Nevertheless, the difference between EE and WE countries is smaller when it comes to tendering processes pointing at formalistic compliance. These suggest that, indeed, member states with stronger bargaining power in the EU can afford to incompletely implement EC/CJEU decisions while others implement more completely with measurable improvements in outcomes. In line with the overall lack of consistent impacts of market-level interactions, the EE-WE split of the sample also shows weak to no impact of EC/CJEU decisions.

TABLE 13. EFFECTS OF COUNTRY-LEVEL INTERVENTIONS ON TENDERING PRACTICES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-180 DAY CUT-OFF POINTS

	Dependent variable	Missing call for tender		Non-open procedure type		Advertisement period length	
East Europen countries	Intervention effect	-0.00624*** (0.000)	-0.00300*** (0.000)	-0.00671*** (0.000)	-0.00286*** (0.000)	-0.0420*** (0.000)	-0.0506*** (0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	236677	236677	233669	233669	189294	189294
	Adjusted R-squared	0.001	0.751	0.002	0.842	0.004	0.045
West Europen countries	Intervention effect	-0.0318*** (0.000)	-0.00693** (0.009)	-0.0281*** (0.000)	-0.00597*** (0.000)	0.00477 (0.432)	0.00559 (0.317)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	170275	170221	169982	169928	116079	116057
	Adjusted R-squared	0.007	0.581	0.007	0.872	0.048	0.199

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 14. EFFECTS OF MARKET-LEVEL INTERVENTIONS ON TENDERING PRACTICES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-180 DAY CUT-OFF POINTS

	Dependent variable	Missing call for tender		Non-open procedure type		Advertisement period length	
East Europen countries	Intervention effect	-0.0653** (0.005)	-0.00269 (0.323)	-0.0554* (0.014)	-0.0176*** (0.001)	0.316*** (0.000)	0.275*** (0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	824	824	824	824	792	792
	Adjusted R-squared	0.039	0.989	0.038	0.955	0.196	0.588
West Europen countries	Intervention effect	-0.0356*** (0.000)	-0.0179*** (0.001)	-0.0152** (0.002)	0.00530*** (0.000)	0.149*** (0.000)	0.136*** (0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	21869	21869	21792	21792	12566	12566
	Adjusted R-squared	0.003	0.403	0.001	0.913	0.013	0.261

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

6.3 Robustness tests

We carried out three sets of robustness tests to validate our findings. First, we looked at a significantly longer time-window around the interventions: instead of using +/- 180 days, we used +/-360 days. As the length of some tendering procedures might span over 6 months from planning to contract award this wider window gives a more complete picture. Moreover, if actors need some time to adjust to the new rules ensuing the EC/CJEU decision's implementation, a longer window is necessary to capture full impacts. However, taking a longer before-after period also means more (unmeasured) confounders potentially taking place which may bias our results. The estimations from using the longer time-window can be found in Appendix C, Table 22-25.

Second, we also applied a more restrictive matching algorithm which also takes into account tendering processes in addition to the matching variables already listed above. This variant allows for more tightly comparing treated and control tenders at the expense of not being able to investigate the impact of interventions along these tendering process dimensions. Specifically, we included i) procedure type and ii) award criterion as further matching variables. Procedure type was dichotomized to open and non-open procedures; award criterion distinguishes between contracts awarded to the lowest-price bid vs. the most economically advantageous bid (i.e. whether quality considerations were also taken into account). By including these further matching covariates, we further minimize the likelihood of unobserved confounders to drive our results.

Third, as only a handful of countries were subject to EC/CJEU interventions and each of them different sample sizes, it is possible that results are driven by a single large country or a smaller country with extreme values. Hence, we repeat the analysis by removing each country in turn to exclude this possibility.

For the sake of brevity, we do not report the results from the more restrictive matching algorithm and the estimations excluding 1-1 countries. However, all the estimations are confirmatory. First, while using the more restrictive matching method changes some of the results, we find that in most of the cases the relationships we have found remain the same both with regards to their sign and magnitude. Second, we do not find any particular country driving our results.

7. Conclusions and further work

The empirical analysis indicates that in general the European Commission and the Court of Justice of the European Union can contribute to opening up public procurement markets to competition supporting the EU's Single Market. We find that mandating legislative change has a significant and sizable positive impact by increasing number of bidders (1.8-3%), lowering the incidence of single bidding (-3-4%), decreasing the market share of local winners (-3-4%), and increasing price savings (0.4-0.6%). These positive improvements are in line with improving tendering processes which are typically required by EC/CJEU decisions such lower incidence of missing call for tenders, non-open procedures, and very short advertisement periods. However, the other type of intervention investigated which requires change in tendering practice rather than national legislation appear to be largely ineffective in influencing tendering outcomes and competitiveness. Nevertheless, it is effective in improving tendering practices pointing at largely formalistic compliance. When we compare larger, Western European member states' reactions to EC/CJEU decisions with that of smaller, Eastern European member states, we find divergent responses with the latter responding much stronger than the former. This points at the greater bargaining power of larger, older member states in avoiding substantive policy change mandated by supranational courts.

The policy implications of our results are profound. In order to realize an EU-wide single market of government purchases, better monitoring and stronger supranational legal action are needed. Better enforcement is in particular needed in larger older member states in order to safeguard a level playing field across Europe in tenders for government contracts.

Nevertheless, a number of open questions remain which may be further investigated by follow-on research. If before the EC/CJEU decision, certain tenders were not published, but were given to favoured companies, while the decision was effective in enforcing greater transparency (i.e. publication of tenders going to favoured companies) the observed impact may be less openness, whereas in reality openness increased without a substantive improvement in outcomes. Moreover, there are many and diverse ways to limit competition of which we could only track arguably the simplest forms. If the main response of public buyers is to switch to less visible techniques of favouritism, protectionism such as collusion in contract implementation or unfairly scoring bidders, the true impact of EC/CJEU decisions is smaller.

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Appendix A: EC/CJEU decisions used for statistical analysis

TABLE 15. LIST OF EC/CJEU DECISIONS' OFFICIAL EU IDENTIFICATION NUMBERS WHICH WERE USED FOR THE STATISTICAL ANALYSIS – SIMPLE OLS REGRESSIONS (EC/CJEU DOCUMENTS RELATING TO THE SAME CASE ARE INCLUDED IN THE SAME CELL)

CJEU judgements	EC opinions
C-159/11	IP/10/1233
C-161/13	IP/10/1240 IP/10/306
C-182/11 C-183/11	IP/10/1442
C-19/13	IP/10/1558
C-277/13	IP/10/302
C-292/12	IP/10/815
C-386/11	IP/11/1120
C-465/11	IP/11/1266 (IP/12/1249)
C-526/11	IP/11/1441
C-549/13	IP/11/430
C-561/12	IP/12/1020, MEMO/12/708
C-94/12	IP/12/290
T-183/10	IP/12/416
T-48/12	IP/12/533
	IP/12/76
	IP/13/965, MEMO/12/708
	MEMO/13/1005 MEMO/14/470 IP/14/807
	MEMO/13/261
	MEMO/13/583
	MEMO/14/293
	MEMO/14/470

TABLE 16. LIST OF EC/CJEU DECISIONS' OFFICIAL EU IDENTIFICATION NUMBERS WHICH WERE USED FOR THE STATISTICAL ANALYSIS – CEM MATCHED DIFFERENCE-IN-DIFFERENCE ANALYSIS ONLY (EC/CJEU DOCUMENTS RELATING TO THE SAME CASE ARE INCLUDED IN THE SAME CELL)

CJEU judgements	EC opinions
C-159/11	IP/10/1233
C-161/13	IP/10/1240 IP/10/306
C-182/11 C-183/11	IP/10/1442
C-19/13	IP/10/1558
C-277/13	IP/10/302
C-292/12	IP/10/815
C-386/11	IP/11/1120
C-465/11	IP/11/1266 (IP/12/1249)
C-526/11	IP/11/1441
C-549/13	IP/11/430
C-561/12	IP/12/1020, MEMO/12/708
C-94/12	IP/12/290
T-183/10	IP/12/416
T-48/12	IP/12/533
	IP/12/76
	IP/13/965, MEMO/12/708
	MEMO/13/1005 MEMO/14/470 IP/14/807
	MEMO/13/261
	MEMO/13/583
	MEMO/14/293
	MEMO/14/470

Appendix B: CEM matching

Table Z reports the initial sample size and the eventually included number of contracts after the applying CEM. Furthermore, it also displays the number of strata and number of matched strata for all country interventions, and reports the multidimensional L1 imbalance measure (see for example (Iacus et al., 2012). We only report an example of variable level (univariate) imbalance, where it is apparent, that univariate imbalance measures decrease significantly. Applying CEM does not eliminate (or decreases significantly) multivariate imbalance, however, it does alleviate the most important problem from our perspective: it filters out tenders from regions that are rather different compared to the

For example, looking at the full sample shows that there are many tenders in the potential control group in case of the country level intervention in Bulgaria that are hardly comparable (Figure 1). However, after the matching, the regional GDP levels are comparable to the Bulgarian ones (Figure 2). Looking at the control regions included also confirms that most of the bias that would be due to the inappropriately chosen control group is mostly dealt with: the majority of the tenders in the control group are from similar Italian, Romanian and Polish regions[19]

TABLE 17. NUMBER OF MATCHED CONTRACTS ACCORDING TO THE DIFFERENT COUNTRY INTERVENTIONS, NUMBER OF MATCHED STRATA AND L1 MULTIDIMENSIONAL DISTANCE MEASURE. (+-180 DAY TIME WINDOW)

Country	Bulgaria		Cyprus		Spain		Latvia	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	285649	5157	285649	742	300022	18835	285649	7659
Matched	19220	4382	7332	690	110491	18487	6942	6368
Unmatched	266429	775	278317	52	189531	348	278707	1291
Number of strata	7388		7295		7529		7298	
Number of matched strata	219		97		980		193	
L1 measure	0.9982		0.9045		0.9996		0.9977	

Country	Netherlands		Poland		Portugal		Slovenia	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	290324	4451	275663	104100	267989	3004	285649	4343
Matched	37060	4237	25556	97968	48676	2858	63928	4291
Unmatched	253264	214	250107	6132	219313	146	221721	52
Number of strata	7459		7675		7825		7289	
Number of matched strata	365		599		405		405	
L1 measure	0.9999		0.9948		0.9823		0.7415	

[19] Note, that the overall majority of the matched Italian tenders are from Southern Italy, such as Sicily or Campania (NUTS-codes ITF and ITG).

TABLE 18. NUMBER OF MATCHED CONTRACTS ACCORDING TO THE DIFFERENT COUNTRY INTERVENTIONS, NUMBER OF MATCHED STRATA AND L1 MULTIDIMENSIONAL DISTANCE MEASURE. (+-360 DAY TIME WINDOW)

Country	Bulgaria		Cyprus		Spain		Latvia	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	579540	9271	579774	1554	600233	35697	579774	17856
Matched	40838	8261	26875	1454	242215	35154	12196	16716
Unmatched	538702	1010	552899	100	358018	543	567578	1140
Number of strata	9323		9173		9472		9160	
Number of matched strata	323		152		1323		280	
L1 measure	0.9990		0.9720		0.9994		0.9991	

Country	Netherlands		Poland		Portugal		Slovenia	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	588845	8407	546148	201361	569659	5213	579469	8654
Matched	78556	8190	50726	193052	129396	5036	157942	8583
Unmatched	510289	217	495422	8309	440263	177	421527	71
Number of strata	9310		9571		9716		9165	
Number of matched strata	476		808		574		579	
L1 measure	0.9987		0.9943		0.9857		0.7489	

Region (NUTS-1 or NUTS-0 regional codes)	ITC		ITC		UK		DE		IT	
Product market	Refuse disposal and treatment		Refuse disposal and treatment		Medical consumables		Building construction work		Insurance services	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	4024	145	5106	176	32694	902	14125	4390	10127	1515
Matched	1776	145	1917	58	6212	900	4410	4385	6814	1370
Unmatched	2248	0	3189	118	26482	2	9715	5	3313	145
Number of strata	53		52		48		82		54	
Number of matched strata	5		3		7		20		15	
L1 measure	1.00		1.00		1.00		0.76		0.69	

Region (NUTS-1 or NUTS-0 regional codes)	BE		DE		NL		DE		DE	
Product market	Engineering-related scientific and technical services		IT services: consulting, software development, Internet and support		Refuse disposal and treatment		Cleaning services		Provision of services to the community	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	2943	181	3827	514	4342	140	10343	3656	561	257
Matched	1311	179	2150	507	609	140	6518	3637	82	54
Unmatched	1632	2	1677	7	3733	0	3825	19	479	203
Number of strata	54		60		62		61		28	
Number of matched strata	7		19		7		16		5	
L1 measure	0.94		0.81		1.00		0.71		0.56	

Region (NUTS-1 or NUTS-0 regional codes)	DE		PL		BG	
Product market	Security, fire-fighting, police and defence equipment		Security, fire-fighting, police and defence equipment		Repair and maintenance services	
	Control tenders	Intervention tenders	Control tenders	Intervention tenders	Control tenders	Intervention tenders
All	1999	248	2148	383	20261	298
Matched	1065	248	99	379	319	96
Unmatched	934	0	2049	4	19942	202
Number of strata	55		58		83	
Number of matched strata	11		2		5	
L1 measure	0.90		0.38		0.69	

TABLE 19. UNIVARIATE IMBALANCE MEASURES, EXCERPT (CASE: COUNTRY-LEVEL INTERVENTION IN BULGARIA WITH THE +-180 DAY TIME WINDOW)

	L1	mean	min	25%	50%	75%	max
EQI	0.91196	-1.7248	0.23976	-0.98352	-2.3228	-2.2753	-2.6389
GDP (2008, logarithm)	0.97753	-0.4255	-0.01325	-0.35364	-0.27716	-0.3645	-1.2445
works	9.41E-02	-9.41E-02	0	0	0	0	0
supplies	2.47E-01	2.47E-01	0	1	0	0	0
tdistance_mix_alt_fullb_d	5.06E-02	5.06E-02	0	0	0	0	0
tdistance_mix_alt_fulla_d	5.06E-02	-5.06E-02	0	0	0	0	0
lca_contract_value51	8.00E-02	8.00E-02	0	0	0	0	0
lca_contract_value52	7.48E-02	7.48E-02	0	0	0	0	0
lca_contract_value53	4.01E-02	4.01E-02	0	0	0	0	0
lca_contract_value54	1.77E-02	1.77E-02	0	0	0	0	0
lca_contract_value55	4.90E-02	-4.90E-02	0	0	0	0	0
lca_contract_value56	1.64E-01	-1.64E-01	0	0	0	0	0
ca_cpv_div1	0	0	0	0	0	0	0
ca_cpv_div2	0	0	0	0	0	0	0
ca_cpv_div3	8.30E-04	8.30E-04	0	0	0	0	0
ca_cpv_div4	0	0	0	0	0	0	0

TABLE 20. UNIVARIATE IMBALANCE MEASURES, EXCERPT (CASE: COUNTRY-LEVEL INTERVENTION IN BULGARIA WITH THE +-180 DAY TIME WINDOW)

	L1	mean	min	25%	50%	75%	max
EQI	0.76303	0.06258	-0.19531	0.06382	0.06382	0.12723	.
GDP (2008, logarithm)	0.90398	0.067	-0.01325	-0.02	0.32502	0.06489	.
works	6.90E-15	2.00E-15	0	0	0	0	0
supplies	3.40E-14	6.50E-14	0	0	0	0	0
Before intervention	1.10E-14	-1.60E-14	0	0	0	0	0
After intervention	1.10E-14	6.70E-15	0	0	0	0	0
Contract value 1	4.20E-14	1.70E-14	0	0	0	0	0
Contract value 2	2.70E-14	3.70E-14	0	0	0	0	0
Contract value 3	1.90E-14	1.70E-14	0	0	0	0	0
Contract value 4	1.10E-14	1.30E-14	0	0	0	0	0
Contract value 5	1.00E-14	7.30E-15	0	0	0	0	0
Contract value (missing)	1.70E-15	5.00E-16	0	0	0	0	0
CPV code 1	0	0	0	0	0	0	0
CPV code 2	0	0	0	0	0	0	0
CPV code 3	8.90E-17	6.70E-17	0	0	0	0	0
CPV code 4	0	0	0	0	0	0	0

FIGURE 1. DISTRIBUTION OF TENDERS ACCORDING TO REGIONAL GDP LEVELS (2008) BEFORE CEM (CASE: COUNTRY-LEVEL INTERVENTION IN BULGARIA WITH THE +-180 DAY TIME WINDOW)

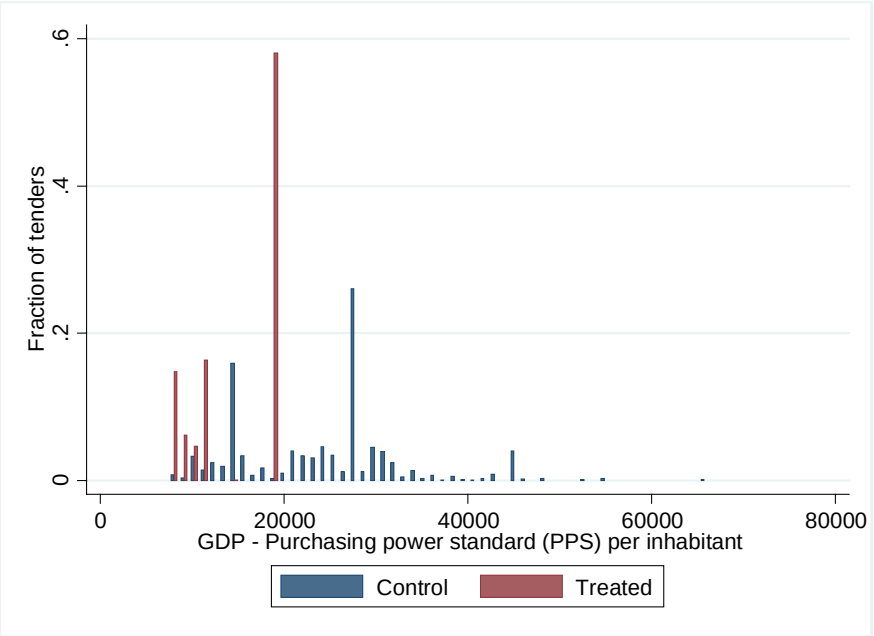

FIGURE 2. DISTRIBUTION OF TENDERS ACCORDING TO REGIONAL GDP LEVELS (2008) AFTER CEM (CASE: COUNTRY-LEVEL INTERVENTION IN BULGARIA WITH THE +-180 DAY TIME WINDOW)

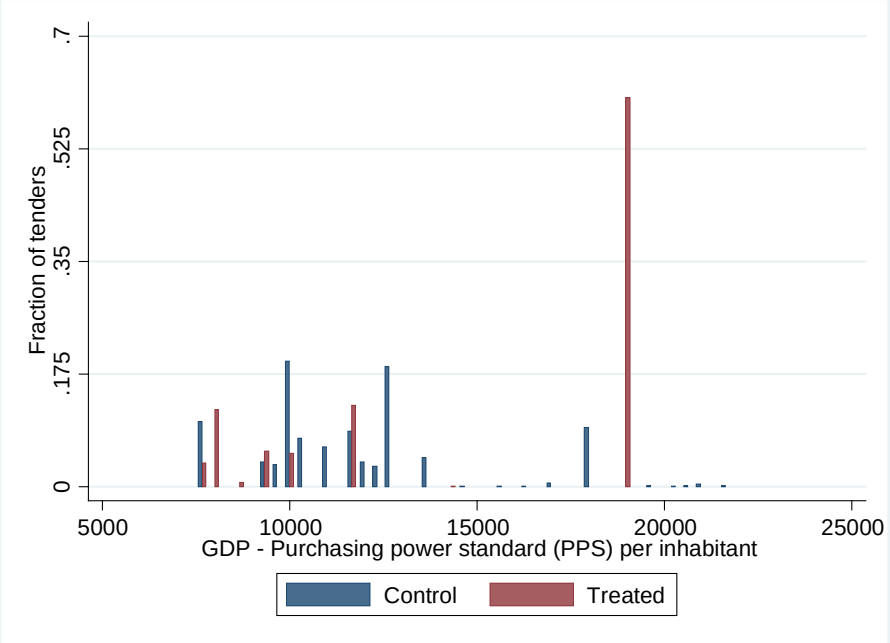

TABLE 21. WEIGHTED NUMBER OF TENDERS IN THE CONTROL AND TREATMENT GROUPS (CASE: COUNTRY-LEVEL INTERVENTION IN BULGARIA WITH THE +-180 DAY TIME WINDOW)

Country	Control	Treated	Total
BE	3	0	3
BG	0	4382	4382
DE	11	0	11
FR	2	0	2
GR	10	0	10
HU	91	0	91
IT	8651	0	8651
LT	0	0	0
PL	1886	0	1886
RO	8559	0	8559
UK	6	0	6
Total	19220	4382	23602

Appendix C: Robustness checks

TABLE 22: COUNTRY AND MARKET LEVEL INTERVENTION EFFECTS ON TENDERING OUTCOMES WITH +-360 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATIONS)

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
Country level interventions	Intervention effect	-0.0435***	-0.0404***	0.116***	0.0612*	0.00125	0.00083	0.0101*	-0.00920*	0.000352	0.00121
		(0.000)	(0.000)	(0.000)	(0.021)	(0.405)	(0.453)	(0.019)	(0.012)	(0.750)	(0.269)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	699520	699399	699474	699357	803579	803458	779905	779791	290678	290597
	Adjusted R-squared	0.0487	0.0964	0.05	0.104	0.0055	0.2046	0.001	0.1048	0.007	0.033
Market level interventions	Intervention effect	0.0319*	0.0230	-0.585***	-0.669***	-0.00136	-0.00100	-0.0188	-0.0104	0.0442***	0.00574
		(0.022)	(0.080)	(0.000)	(0.000)	(0.739)	(0.804)	(0.372)	(0.542)	(0.000)	(0.447)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	34037	34027	34037	34037	37385	37247	40146	40146	9080	9080
	Adjusted R-squared	0.0008	0.1751	0.041	0.247	0.0004	0.1058	0.01	0.0955	0.019	0.215

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 23. COUNTRY AND MARKET LEVEL EFFECTS ON TENDERING PRACTICES WITH +-360 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATES)

	Dependent variable	Missing call for tender		Non-open procedure type		Advertisement period length	
Country level interventions	Intervention effect	0.000161	-0.00663***	-0.000597	-0.000542	-0.0107***	-0.0307***
		(0.880)	(0.000)	(0.412)	(0.063)	(0.000)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	880758	880637	874267	874146	646405	646348
	Adjusted R-squared	0.001	0.619	0.000	0.841	0.012	0.090

	Dependent variable	Missing call for tender		Non-open procedure type		Advertisement period length	
Market level interventions	Intervention effect	-0.0224***	-0.00675	-0.0146***	0.00556***	-0.0629***	-0.0680***
		(0.000)	(0.067)	(0.000)	(0.000)	(0.000)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	45380	45380	45248	45248	26502	26502
	Adjusted R-squared	0.001	0.391	0.001	0.893	0.004	0.212

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 24. EFFECTS OF COUNTRY-LEVEL INTERVENTIONS ON TENDERING OUTCOMES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-360 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATES)

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
East European countries	Intervention effect	-0.0813***	-0.0760***	0.286***	0.324***	-0.000766	-0.000250	0.00791	-0.00504	0.00907	0.0222
		(0.000)	(0.000)	(0.000)	(0.000)	(0.477)	(0.802)	(0.127)	(0.316)	(0.858)	(0.664)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	442110	442110	442064	442064	481937	481937	474362	474362	247024	247024
	Pseudo R2 or adjusted R2	0.0489	0.0801	0.091	0.152	0.0015	0.119			0.000	0.001
West European countries	Intervention effect	-0.00634	0.00213	-0.122	-0.348***	0.00450	0.00322	0.00931	-0.00913	0.116	0.128
		(0.347)	(0.726)	(0.099)	(0.000)	(0.243)	(0.302)	(0.273)	(0.247)	(0.554)	(0.517)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	257410	257289	257410	257293	321642	321139	305543	305429	75021	74940
	Pseudo R2 or adjusted R2	0.0002	0.119	0.006	0.144	0.0049	0.266	0.003	0.137	0.000	0.002

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 25. EFFECTS OF MARKET-LEVEL INTERVENTIONS ON TENDERING OUTCOMES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-360 DAY CUT-OFF POINTS (CEM MATCHED DID ESTIMATES)

	Dependent variable	Single bidding		Number of bids (trimmed)		Foreign winner		Local winner (nuts3)		Relative price	
East European countries	Intervention effect	-0.333***	-0.239**	1.847***	1.988***	0.0191	0.0226	-0.0585	0.0461	-0.114***	-0.0972**
		(0.000)	(0.001)	(0.000)	(0.000)	(0.484)	(0.584)	(0.408)	(0.472)	(0.000)	(0.001)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	871	827	871	871	880	593	859	851	593	593
	Pseudo R2 or adjusted R2	0.025	0.0899	0.038	0.286	0.0168	0.2501	0.0125	0.2043	0.033	0.066
West European countries	Intervention effect	0.0420**	0.0345**	-0.598***	-0.712***	-0.00140	0.0000459	-0.0200	-0.0135	0.0553***	0.0191*
		(0.002)	(0.008)	(0.000)	(0.000)	(0.735)	(0.991)	(0.350)	(0.437)	(0.000)	(0.015)
	Product market		Y		Y		Y		Y		Y
	Contr.body type		Y		Y		Y		Y		Y
	Contr.body sector		Y		Y		Y		Y		Y
	Contract type		Y		Y		Y		Y		Y
	Procedure type		Y		Y		Y		Y		Y
	# of observations	33166	33156	33166	33166	36505	36367	39287	39287	8487	8487
	Pseudo R2 or adjusted R2	0.0016	0.166	0.045	0.244	0.0007	0.1126	0.0102	0.0984	0.021	0.235

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 26. EFFECTS OF COUNTRY-LEVEL INTERVENTIONS ON TENDERING PRACTICES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-360 DAY CUT-OFF POINTS

	Dependent variable	Missing call for tender		Non-open procedure type		Advertisement period length	
East European countries	Intervention effect	0.00568***	-0.00422***	0.00540***	0.000858**	0.00383	-0.00590*
		(0.000)	(0.000)	(0.000)	(0.004)	(0.130)	(0.017)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	516643	516643	510738	510738	404359	404359
	Adjusted R-squared	0.000	0.718	0.001	0.841	0.005	0.058
West European countries	Intervention effect	-0.0325***	-0.0140***	-0.0232***	-0.00272***	-0.0101*	-0.0231***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.023)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	364115	363994	363529	363408	242046	241989
	Adjusted R-squared	0.004	0.573	0.003	0.861	0.042	0.205

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level

TABLE 27. EFFECTS OF MARKET-LEVEL INTERVENTIONS ON TENDERING PRACTICES IN EAST AND WEST EUROPEAN COUNTRIES WITH +-360 DAY CUT-OFF POINTS

	Dependent variable	Missing call for tender		Non-open procedure type		Advertisement period length	
East European countries	Intervention effect	-0.0241	-0.00427	0.00305	0.0138	0.170**	0.226***
		(0.488)	(0.776)	(0.921)	(0.096)	(0.007)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	893	893	893	893	748	748
	Adjusted R-squared	0.057	0.843	0.042	0.939	0.141	0.299
West European countries	Intervention effect	-0.0226***	-0.00639	-0.0155***	0.00462***	-0.0568***	-0.0709***
		(0.000)	(0.089)	(0.000)	(0.000)	(0.000)	(0.000)
	Product market		Y		Y		Y
	Contr.body type		Y		Y		Y
	Contr.body sector		Y		Y		Y
	Contract type		Y		Y		Y
	Procedure type		Y		Y		Y
	# of observations	44487	44487	44355	44355	25754	25754
	Adjusted R-squared	0.002	0.380	0.001	0.896	0.006	0.216

Note: p-value in parentheses; ***=significant at 0.1% level; **=significant at 1% level; *=significant at 5% level