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Transport infrastructure expenditure in Czechia: law compliance in the public procurement

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Abstract

This paper intends to contribute to the discussion on public procurement by searching for patterns in information published on official portals connected to procurement projects in the Czech Republic. This article creates and uses a unique match of two datasets related to (1) procurement projects announcements and (2) the publication of public contracts, both compulsory by law in pre-defined sets of cases. To check the compliance and patterns in missing data, we focus on the spread of the estimated and final prices for individual procurement awards. In order to control for characteristics of the awards, we employ regression analysis to explain the spread more precisely.

Our preliminary results are: we observe high compliance of publishing the contracts, we observe high censorship that may turn publishing contracts into a formal exercise, we find a high volume of legal exceptions (both not to announce and not to publish a contract, interestingly the latter without a monetary limit). The regression results confirm the expectations set by prior research (the number of bidders and open regimes lead to more savings of public resources), as well as bring new insights on the relation of spread to mistakes and publishing compliance (missing contract in a case when the contracting authority is legally bound to publish it is correlated with worse economic outcome of the procurement process; missing information signals worse outcomes as well).

Keywords: public procurement, law compliance, transparency

JEL Classification: D73, H57, K23, L74

Background

Reflecting the numerous corruption scandals in the Czech Republic, as well as extraordinarily high road construction costs, the main aim of this project is to look closer into the transportation related construction costs and see if the unit costs show unexpected patterns across the regions, contracting authorities or suppliers. After a detailed screening of publicly available contracts, the initial task proved to be unattainable due to heavy censorship in prices of individual items done by the suppliers with a reference to business confidentiality protection. The new core of our research consists of a unique cross-check of the public procurement database and the contract publishing database where we have identified missing contracts (possible lawbreaking) as well as

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a considerable amount of missing information. On the overall mapping of published information and compliance, we have investigated the patterns in publishing with respect to observable characteristics published in public procurement.

1. Introduction / Relevant Literature on Public Procurement

The area of public procurement accounts for approximately 14% of Gross Domestic Product of all EU countries (European Commission, 2019) and thus the importance of efficiency and transparency of the related mechanisms of allocation can be hardly overestimated. The Czech Republic with above-average government spending, 47,5%, close to the EU average (Eurostat 2021), has a rather below-average position in government spending efficiency and several gaps to be improved in the process (for assessment, see for example European Commission, 2019). Since two key laws were passed in the past six years (namely Act No. 340/2015 on publication of contracts and Act No. 134/2016 Public Procurement Act), we use this as an interesting opportunity to test multiple questions regarding possible effects of these laws.

Efficiency and transparency of public procurement markets had been the subject of discussions for decades (see for example works Kelman, 1990; Brown & Potoski, 2003; Ohashi, 2009; McCue et al., 2015; Flynn & Davis, 2014; Patrucco et al., 2017, Bauhr et al., 2019). Academics and policymakers seem to be in agreement regarding the prevalence of the positive effects of public procurement open auctions in all cases when the allocated amount is sufficiently large enough to outweigh the related administrative costs. Thus, governments in most EU countries adopted open auctions with the aim of increasing transparency and boosting the competition among suppliers: this, in turn, is expected to bring higher efficiency (getting maximum output with minimum costs and decreasing the space for possible corruption); see summary in European Commission (2019).

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[4] Accessible online at https://www.hlidacstatu.cz/VerejneZakazky

A large number of studies show beneficial effects, both theoretically and empirically (Karjalainen, 2011; Grandia & Meehan, 2017; Chever et al., 2017); on the other hand, the additional administrative and transaction costs, less space for the application of specific knowledge owned by officials or specific barriers to innovation should not be ignored (Soliño & Gago de Santos, 2010; Hessami, 2014; Uyarra et al., 2014).

One of the main focuses of interest is the effects of institutional settings on resulting prices: other things being equal, the lower the price for public works and services the better. A number of academic works have shown the positive effects of auction introduction (Amaral et al., 2009; Haruvy & Katok, 2012), as well as analyse which specific factors contribute to price decreases (Plaček et al. 2019b; Plaček et al. 2019c; Palguta, 2019; Baltrunaite et al., 2018). Accompanying focus is the concern about the quality and the timeliness of contracted works. In order to keep the auctions comparable, academic works focus on specific subsets of auction objects (Golden & Picci, 2005; Kenny, 2009; Lewis-Faupel et al., 2016). Moving to the analysis of effects on the above parameters, a special branch of literature deals with behavioural responses of public officials that may be connected with threshold avoidance (Palguta & Pertold, 2017), political influence (Titl & Geys, 2019), or even corruption (see the review of Fazekas & Tóth, 2018, Locatelli et al., 2017; and Owusu et al., 2019).

Our work builds on the outcomes of the studies above. Specifically, we intend to investigate how Czech public agencies respond to mandatory publishing legislation and what can be learned from patterns in compliance and published information. We will focus on the recently introduced systems of publishing, both directly related to public procurement auctions. Two major information portals, the Public Procurement Bulletin and the Register of Contracts (both defined below) were launched recently. This allows us to check compliance with the two new laws and to test the hypotheses related to omissions, errors, and censorship of information. Both information portals have been in place for a few years, however, no thorough cross-check of compliance has been done so far since the systems are separated and allow no overall data collection (and statistics); only individual searches are possible and aggregated (unmatched) exports are possible.[5]

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[5] There are two indices computed regularly bringing useful performance ranking information, but no thorough statistical assessment. 1) Z-Index, using real data, measures how transparent and cost-effective a particular authority has been and whether it has been exposed to economic risks (https://www.zindex.cz). 2) K-Index is an indicator of the level of risk factors - these factors are associated with the risk of corruption or wasteful use of public funds (https://www.hlidacstatu.cz/kindex). These indicators are valuable for transparency and provide individual ratings for selected entities, but do not offer overall comprehensive statistics or cross-check analyses.

We used the most up-to-date data processing techniques to overcome this issue and to merge the information from the two databases. Our unique fusion of existing datasets allowed us to test hypotheses (explained below) and to perform additional checks. We intend to add to the discussion on law design, compliance and next, to the new insights we will bring to policy recommendations. Since all procurement projects in the assessed period are extremely diverse (falling under thousands of different common procurement vocabulary codes - CPVs), in line with the research referred to above we have decided to focus on a specific subfield of procurement connected to infrastructure. Firstly, we expect homogeneity and thus comparability to a certain extent in this subset. Secondly, special rules and exceptions apply to this subset of projects (higher thresholds for publishing duty - explained below in detail). Thirdly, the large size of the projects, low competition, and high complexity of the projects make them prone towards inefficiency or even corruption (Fazekas & Tóth 2018, Charron et al. 2017). With the increasing number of projects as well as volume in the past decade, this area is the subject of a substantial body of literature with growing interest (see extensive reviews Le et al., 2014; Owusu et al., 2019; Zhai et al., 2021). Lastly, the Czech Republic may serve as a specific example of extraordinarily high construction costs (academic works Schneiderova Heralova et al., 2014 or Schneiderova Heralova, 2015; analyses from NGO´s, i.e. Oživení, 2010; and a number of daily media releases, i.e. Hospodářské noviny, 2013 or iRozhlas, 2019).

Moving on to academic relevance, we believe that a deeper understanding of the effects of these two laws (similar laws are in place in most of the EU countries) on public officials' behaviour is important, since the public procurement market accounts for approximately 14% of the Gross Domestic Product (European Commission, 2019) and the overall size of the public procurement market in the Czech Republic reached a value of EUR 25.94 billion in 2019, which is 11.78 % of Czech GDP (Ministry of Regional Development, 2020; Plaček et al., 2019a). At the same time, our data shows that approximately 30 % of auctions end with one bidder only (!) and thus the strength of competition is questionable. With a large size of projects, even a small percentage of increase in efficiency via better understanding or/and policy design would bring significant savings to society.

2. Czech Legal Environment and Related Context

In terms of governmental administrative structure, the Czech Republic may be considered as one of the most territorially decentralized countries in the European Union with the highest level of municipality fragmentation: it is divided into 14 district regions and a total of 6,258 municipalities (Matějová et al., 2017; Czech Statistical Office, 2020). Individual self-governing regions and municipalities, independently in their territorial district, are obliged to take care of creating conditions for the development of social care and for satisfying the needs of its citizens in accordance with local preconditions and local customs (Act No. 129/2000 Coll., on Regions; Act No. 128/2000 Coll., Municipal Law). In this context, it is primarily meant to satisfy the need for elementary schools, kindergartens, children's homes, nursing homes, social housing, theatres, libraries, museums, free-time activities facilities, water quality and delivery, gas and electricity delivery, public space cleaning, cemeteries, public roads, public lighting, public transport, municipal police, and firefighters (Nemec et al., 2016; Plaček, 2017). Property of the region and municipality must be used efficiently and economically in accordance with its interests and tasks arising from the scope defined by law. The municipality is also obliged to take care of the preservation and development of its property (Act No. 129/2000 Coll., on Regions; Act No. 128/2000 Coll., Municipal Law).

In relation to this, the state institutions and local governments must also care for sound and sustainable public finances, while providing appropriate support for economic and social development, employment, and intergenerational cohesion (Act No. 23/2017 Coll., On the rules of budgetary responsibility). Therefore, it is essential to ensure a maximum level of economic efficiency and most importantly the principles of transparency during reallocation of public funds, as these financial means are intended for the benefit of society as a whole and not just particular entities (Ochrana & Pavel, 2013; Man et al., 2014; Nemec et al., 2021). However, the very high territorial decentralization might have a significantly negative impact on the efficiency of the public procurement, as described for example by Plaček (2017) and high transaction costs (Dufek, 2013; Nemec & Soukopová, 2016).

To meet the above-mentioned legal obligations, various ways and forms of providing public goods and services, such as privatization, public-private partnership (PPP), and semi-PPP projects are commonly used within the Czech environment (Soukopová et al., 2017). However, one of the most

significant methods of delivering public services in the Czech Republic is contracting out through public procurement procedures (Plaček et al., 2019a).

Before we turn to a deeper introduction of the Czech system, we need to define the key terms related to the area of public procurement in our context. The main element of public procurement processes under question is the *procurement projects*, which are simple or complex tasks (for example the reconstruction of a specific road intersection) set by a contracting authority in search of suppliers. These searches may be done under different procurement regimes and through various procurement procedures. Particular differences between procurement regimes and procurement procedures are explained in the text below. Procurement projects may be further divided into separate *awards* that mean specific subtasks of the whole contract that are set to separate subcontractors (for example construction of signal lights as a part of intersection reconstruction). These individual awards lead to public contracts, that represent a conclusion of a legal agreement for pecuniary interest between a contracting authority and an economic operator. Most of our analysis goes to the level of awards (and corresponding contracts) unless stated otherwise.

Generally, the area of public procurement can be defined as the total amount of financial funds spent by contracting authorities on purchases or investments in services, supplies, or construction works. The overall size of the public procurement market in the Czech Republic reached a value of EUR 25.94 billion (CZK 666 billion) in 2019 which represented 11.78 % of Czech GDP. *Public contracting authorities* accounted for EUR 21.81 billion (CZK 560 billion, equal to 9.91 % GDP) and *sectoral contracting authorities* accounted for the remaining EUR 3.97 billion (CZK 106 billion, equal to 1.88 % GDP). Despite the fact that public procurement market size decreased slightly in 2019 by 0.1 pp. to 11.78% GDP, which is lower than the ten-year average (2009-2018) of 12.62% GDP, such a value represents an important and wide part of the Czech economy (Ministry of Regional Development, 2020; Plaček et al., 2019a). In the European context, the public procurement market accounts for over 14% of the EU's GDP (European Commission, 2019).

Act No. 134/2016 Coll. (Public Procurement Act) also serves as a control mechanism related to the management of the public funds, primarily by regulating the rules for the public procurement process, selection of suppliers, and for the conclusion of a contract between contracting authority and selected supplier. The Czech legal system distinguishes between three basic types of public procurement regimes: a) small-scale procurement projects, b) below-threshold procurement

projects, and c) above-threshold procurement projects, divided according to the estimated overall value of the contract (see Table 1).

Moreover, the above-mentioned individual types of regimes differ mainly in some specific conditions, conducting, and deadlines within the public procurement procedure. According to Czech legislation (Act No. 134/2016 Coll), there are various types of public procurement procedures, each of which may be applied if the conditions laid down by the legal framework are met. Contracting authorities, therefore, have a possibility to choose the so-called simplified below-threshold procedure for a below-threshold procurement project and open procedure, restricted procedure, negotiated procedure with prior publication, negotiated procedure without prior publication, competitive dialogue, or innovation partnership procedure for both - below-threshold procurement projects and above-threshold procurement projects (see Table 2). The information about the distribution of projects across the categories (procedures and regimes) is regularly published by the Ministry of Regional Development (for example 2020) and we will use the year 2019 for brief reference (a year sufficiently distant from the introduction of the system, as well a year not touched by COVID-19 pandemics.

In 2019, 13,472 public projects were awarded summing up in total value CZK 342 bn. (EUR 13.2 bn.). In terms of the number of contracts and also in terms of the share of the overall contract value, the open procedure was the most frequently used (45% of all projects, 57% of value). The other most commonly used procurement procedure is a simplified below-threshold procedure (37% of all projects, 11% of value). Lastly, projects set by the negotiated procedure without prior publication or restricted procedure count for 7% each and together with procedures above sum up to 98% of projects with 91% value.

To meet the principle of transparency, contracting authorities are obliged to embed prepared contract proposals and their specifications in the publicly available e-information system, so-called *Public Procurement Bulletin* ("Věstník veřejných zakázek"). However, the Czech legal framework also allows many exceptions where the contracting authority is not obliged to publish the contract proposal, especially in the case of so-called small-scale procurement projects where the contract value does not exceed the upper limit of CZK 2 million (EUR 75,632) when contracting supplies and services, and the upper limit of CZK 6 million (EUR 2263,895) when contracting construction works. Among other exceptions when the contracting authority is not obliged to award the public

contract using the procurement procedure are for example following cases stated in Table 4 (Act No. 134/2016 Coll).

Due to all legal exceptions listed above, the share of 61.26% of the total value of all procurement projects was published in the e-information system in 2019, whereas remaining contracts are not included in the *Public Procurement Bulletin (PPB)* and thus are not publicly available (Plaček et al., 2016; Ministry of Regional Development, 2020).

Mandatory information related to the procurement projects is entered into this e-information system via various standardized forms, depending on the specific type of public procurement regime defined above. Among this information are for example: name, identification number, address including NUTS code, telephone number, e-mail address and Internet website of the contracting authority, type of contracting authority and main activity exercised, CPV codes, NUTS code for the main location of works, description of the procurement procedure (nature and extent of the works, nature and quantity or value of the supplies, nature, and extent of the services), criteria for the selection of the supplier, which were used for the award of the procurement project or procurement projects, date of conclusion of the contract. Moreover, for each contract awarded - address, including NUTS code, telephone number, electronic address, internet website of the selected supplier and value of the contract (or the highest and lowest bids taken into consideration) during the award of the contract (Decree No. 168/2016 Coll.).

An essential part of the public procurement procedure is the conclusion of a legal agreement between the contracting authority and the selected supplier. To meet the principle of transparency, this document must also be accessible to the public with identification of both contacting entities, concluded timeline, the content of the concluded contract, and final price of the contract. According to the Czech legal framework, all government and public institutions, territorial self-governing units, state enterprises, legal entities in which the state or territorial self-governing unit has a majority ownership share, and other similar institutions are obliged to publish all concluded agreements with a value above EUR 1.948 without VAT (CZK 50.000) in the e-information system called *Register of Contracts* ("Registr smluv"). From the 1st July 2017, publication of the agreement in an open and machine-readable format, including metadata in the *Register of Contracts (RC)* is an essential condition for the legal effectiveness of these agreements. However, even in this case, the law defines several exceptions when the contracting authority is not obliged to publish the agreement. For example an agreement to which at least one of the contracting parties

is a municipality without extended competencies or an organisation established by such a municipality or a legal entity in which such municipality alone or with other such municipalities has majority ownership; a contract concluded by a public university within a complementary activity or by a public research institution; a contract arising from a legal transaction with a natural person; a contract for the provision and reimbursement of health services covered by public health insurance; or a contract protected by banking secrecy (Act no. 340/2015 Coll. on Special Conditions for the Efficacy of Some Contracts, Publication of These Contracts, and on Register of Contracts).

Even with a highly developed legal framework and information systems in place, the Czech Republic ranks among the EU's worst-performers in the context of public procurement evaluation. According to the European Commission's performance evaluation of public procurement, the Czech Republic received an "unsatisfactory" evaluation in seven indicators out of an overall twelve, measuring key influences on public procurement performance in 2019. In particular, the Czech Republic was evaluated "unsatisfactory" in the areas of single bidder (proportion of contracts awarded where there was just a single bidder), cooperative procurement (the proportion of procurement procedures with more than one public buyer), award criteria (the proportion of procedures awarded solely because the offer was the cheapest one available), procedures divided into lots (proportion of procurement projects that have been divided into lots), missing calls for bids (the proportion of contracts awarded after a call for procurement projects whose name and conditions were not clear), missing seller registration number (the proportion of procedures that did not include the registration number of a seller) and missing buyer registration number (the proportion of procedures that did not include the buyer's registration number) (European Commission, 2019).

This low rating received by the Czech Republic adds to our motivation to look deeper into the errors, omissions, and missing information in the Czech *Public Procurement Bulletin (PPB)* and *the Register of Contracts*. In the Figure 1, we offer a simplified distinction of public projects with respect to the duty of public (and publicly owned) institutions to publish in the Public Procurement Bulletin (PPB) and with respect to the duty to publish the contracts in the Register of Contracts (RC).

Area (A) represents the realm of all public projects that use public funds for purchases of goods and services from external suppliers. Their subsets (B)+(C) shall be announced in the Public

Procurement Bulletin and part of these announcements indeed happens (C).[6] On the other hand, there is a subset of contracts of public institutions that needs to be published in the *Register of Contracts* - all of them in the green segment. They may be divided into those that relate to the published public procurement offers (D) and (E) and those that do not fall under compulsory public procurement, but still with an obligation to publish (subsets (F)+(G)).

In the current system, there is no aggregate information of what contracts should be expected in the *Register of Contracts,* one may only find the contract individually based on the registration number of publisher or supplier (or other identification). Thus, the whole distribution of contracts is unknown, especially concerning public procurement. In this paper, we use the wealth of information on the overlap of Public Procurement Bulletin Register of Contracts, specifically subsets (D) and (E). We will inspect the characteristics of the instances of procurement projects with missing contracts (D), omissions and errors in (C), (D) and (E). Our aim will be to describe these subsets and check for patterns across the missing or erroneous information, as further described below.

As explained above, we have further restricted our focus to procurement projects that are closely linked to transport infrastructure. Since the vast majority of the infrastructure procurement projects contain more than one CPV code, we decided to use a broader point of view when including the categories. Next to the construction of infrastructure itself (meaning all types of transport, i.e., aviation, road, rail, and water), we have included those aspects that are closely linked to the transport infrastructure, such as the supply of materials for construction works, services related to construction, maintenance of the infrastructure, or signalling equipment, road barriers, spreading salts, control systems, security systems, traffic lights, snowplows, landscaping, etc. Out of the total number of 9,453 CPV codes, we have included in our analysis 672 of them, which we considered to be the most relevant and closely related to the transport infrastructure. 84.2% of these codes fall under three main categories: 34-Transport equipment and auxiliary products to transportation, 44-Construction structures, and materials; auxiliary products to construction and 45- Construction work, and the rest too closely related categories to transportation. In the later part of this work, we will restrict the categories with the aim of additional checks explained below.

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[6] Please note that the proportions are given purely according to graphical needs and do not represent real shares of respective segments.

3. Data

Sources, processing and issues

As is probably by now already clear from the text above, the data for our research is coming from two major sources. Firstly, from the above-mentioned *Public Procurement Bulletin (PPB)*, an official web portal of the Ministry of Regional Development of the Czech Republic. Here, all the information from the area of public procurement (for below-threshold and above-threshold procurement projects) is required to be published and is done so in the shape of structured "forms" displaying the above-discussed information about the contracting authorities, the suppliers, and the conditions of the procurement projects (mainly the expected price, for closed tenders, the final price, and the date of signing the corresponding agreement, etc.) together with the CPV code that helps us to recognize whether the investment is related to transport infrastructure. Thanks to the *Open Data* initiative (a portal by the Ministry of the Interior of the Czech Republic), the data can be downloaded in the form of Excel sheets, which is what we did. However, as we found later on in our research, these sheets do not reflect the original data perfectly, and so we had to complement it by web-scraping the missing information from the original *PPB* web.

The second source of data is the *Register of Contracts (RC)*, an official web portal of the Ministry of Interior of the Czech Republic. Here, we hoped to find all the information on legal agreements that public authorities in the Czech Republic have to publish. Unfortunately, this portal does not provide data for bulk download, so some forms of web-scraping would have to be used to get all the data we needed for our research. On the other hand, fortunately for us, a significant amount of work in this field has already been done by the initiative *Hlídač Státu* (*State Warden*),[7] whose mission is to increase the transparency of the Czech state administration. The programmers of this initiative are web-scraping publicly available information from various sources, including the *Register of Contracts*, and make them available to everybody through an efficient search engine as well as a developer's API. We used this API to search for the legal agreements resulting from the procurement projects we had downloaded from the *Public Procurement Bulletin*.

More precisely, we were iterating over all procurement projects related to transport infrastructure that we got from the *PPB*, and we searched through the *State Warden* API to see whether there was a corresponding concluded legal agreement (or agreements) to be found. Unfortunately, there

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[7] More information about the organization at https://www.hlidacstatu.cz/

is no direct identification between procurement projects and resulting agreements – even though both have to be published (with the above-mentioned exceptions), the two publishing systems are completely independent. This is probably why, to our knowledge, no other researchers from academia or from initiatives such as *State Warden* or *Transparency International* tried to investigate the joint information from the two systems on such a disaggregated level, which makes our approach and our results very unique in the context of the public procurement in the Czech Republic.

Before we continue, there is one important feature of procurement project forms that has to be explained here. Each procurement project can be (and often is) divided into several awards related to different parts of the procurement object (e.g. a new road is constructed - in the procurement project, one award can be dedicated to terrain preparation, another to laying down asphalt, and another one to traffic signs installation). While there are characteristics that are common to all the awards (the contracting authority, the legal form of the tender, etc.), there are also characteristics that define each award (the supplier, the number of offers etc.). Also, the resulting contract is typically related to each award. In our dataset, the observations correspond to these awards.

To be able to link the two data sources we use, we searched in several iterations. First, we characterized each procurement award by the tax ID of the contracting authority, the tax ID of the supplier, and by the date on which the concluded agreement was signed (according to our data). Then, we searched through the *State Warden* API for a legal agreement with the same characteristics. Second, we realized that sometimes there are mistakes in the tax IDs and we repeated the same process with the names of the contracting authority and the supplier instead of tax ID. And third, we discovered that the date of signing the agreement in the *Public Procurement Bulletin* dataset was sometimes different from the actual date of the signature of the agreement (typically by several days), so we repeated the process again while allowing the date of the signature of the agreement to vary over an interval of two weeks.

By this complicated and lengthy procedure, followed by extensive data cleaning (especially for cases when the procurement project-agreement pairing was not exactly 1:1), we obtained a dataset of over 19 000 observations spanning years 2018 to 2020, where approximately 80% of procurement projects were matched with a legal contract. It has to be said that this match is not always perfect, in the sense that the price resulting from the procurement project does not correspond perfectly to the price written in the contract. This is due to the fact that, first, there is

no legal requirement that these prices should correspond[8] and second, the procurement award-contract correspondence does not have to be 1:1 (i.e., one procurement award may result in several contracts or a contract can cover the outcome of several procurement awards). Hence, for the cases in which the correspondence was not perfect, we decided to count as a matching contract any contract that was signed between the two parties in the interval of two weeks around the indicated date. We are aware of the fact that we may have introduced some mistakes here, but we preferred to be rather conservative in finding procurement awards that have no matching contract. In other words, the non-compliance that we find is likely even underestimated in our research.

Our main focus in this research are those procurement awards that were not matched with any contract - these represent 20% of observations in our dataset. Within these, there was a significant part of contracting authorities realized by public institutions that have the obligation to publish the information on the procurement project but not on the related legal agreement (these are typically small communes and organizations owned by them), which we then inspected manually to verify their status[9] and we took them apart. Nonetheless, there was also a non-negligible part of procurement projects realized by institutions that have the obligation to report the resulting agreement and the agreement was still missing. For a representative subset of these, we performed a manual check and we confirmed that the problem was not in our automatic algorithm and that the agreement was really missing in the register. We will return to this issue in the final part of our paper.

Data overview

After operations and cleaning above, we were left with 19,132 awards related to transport infrastructure announced in the years 2018-2020. Their cumulative value across these years is EUR 26.3 bn. with the smallest value of 6.5 bn. in the year 2020, which may be attributed to the COVID-19 crisis and subsequent delays in most of the construction works and related services. We begin the overview of our collection of data with classification according to procurement regimes and procedures. Table 4 offers a cross tabulation of public procurements according to procurement

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[8] This was quite surprising for us but, as we were informed by the law experts from Transparency International, a large gap between the tender price and the contract price is not likely to happen, since it would raise objections by competing firms that participated in the given tender. However, it is impossible to say what gap would be considered as "too large" in general.

[9] Note that this work is still not completely done, since for some cases, we need a more detailed consultation with lawyers – specialists on the procurement system. So far, we stayed on the safe side and kept in the dataset only those organizations who either report voluntarily or for whom we are sure that they have the obligation to report.

regimes and procedures. The cross-tabulation does not reveal any violation of the law (in terms of selected procedures), on the contrary 491 procurements (value EUR 59,352,838) publish their announcements voluntarily. What had proved during its construction is that the Public Procurement Bulletin uses unclear terms that do not fully correspond to the definitions stated in the Public Procurement Act (Act No. 134/2016, Coll.). This finding is in line with claims of Econlab institute, co-author of the Z-Index (evaluation tool of public contractors).[10] Thus, we have chosen to combine some of the categories and create a correct set that fully corresponds to Act No. 134/2016, Coll.

Looking at other categorical variables, the data show that out of 19,132 awards, 14,282 (74,5%) belong to construction works, 2,982 (15,5%) to services and 1,922 (10%) to supplies. This confirms that our selection of CPV codes mostly covered the construction works as initially intended and included the services and supplies connected to them.

In the following tables, we offer an overview of quantitative variables. Before we do so, we have to clarify one thing about how the information on public procurement is presented on the *PPB* portal. There are three types of forms that are used for publishing the information on public procurement projects, denoted as CZ03, F03 and F06. Form CZ03 is typically used for procurement projects of small scale and below-threshold, whereas forms F03 and F06 are used for above-threshold procurement projects. The compliance to this rule is not perfect, as can be seen in Table 5, since some part of small-scale and below-threshold procurement projects are in fact published in the F03 and F06 forms, but this number seems to be declining over time. In the later analysis, we will in many situations deal with CZ03 forms and F03 and F06 forms separately, for the reason that the information contained in these is organized a little bit differently. For the sake of easier orientation of the reader, we are going to refer to projects published in CZ03 forms as below-threshold procurement projects and to projects published in F03 and F06 forms as above-threshold procurement project, even though we realize that this is just an approximation of the reality.

The first situation in which we are distinguishing between the types of forms is the presentation of quantitative variables that we are using in our analysis two separate tables Table 6. Table 6a shows selected quantitative variables that are connected to below-threshold public procurement projects. It has to be noted that the CZ03 form designated for these procurement projects contains the

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[10] Link to the Z-Index and its explanation: http://wiki.zindex.cz/doku.php?id=en:druhy_rizeni

estimated price of the public contract for the whole procurement project (as a sum of all its sections or awards), but it does not contain the estimated price for each award separately. The table shows that the Estimated values of the public contract are on average higher than Final values, which may signal that the procurement projects lead to cost savings. However, from information on hand, we are not able to conclude if the prices are systematically overestimated or savings are generated by the competition of suppliers. We will look into this question closer into the ratios of estimated and real prices below. We have to note that 33% of bids are connected to two or less bidders, and 17% to only one bidder. Interestingly, the award contract value is on average higher than the Final price of the public contract per award. This can be caused by some mistakes in the contract values that we observe in our data (we can see that there are mistakes here e.g. from the negative value of the minimum), but more likely by the fact that, as explained above, there is not always a 1:1 correspondence between award and contract and several awards can result in one contract (e.g. in situation where the same firm won in more than one awards of the procurement project).

Table 6b shows selected quantitative variables that are connected to above-threshold public procurement projects. It should be noted that the F03 and F06 forms designated for these procurement projects contain the estimated values of the public contracts for the individual awards, but, unlike the CZ03, it does not contain the estimated price of the whole procurement project. Similarly, as in case of CZ03 forms, Table 6b shows that Estimated values of the public procurement are on average higher than actual Final values, which may signal that the procurement projects lead to cost savings. Again, from the information on hand, we are not able to conclude if the prices are systematically overestimated or savings are generated by the competition of suppliers. We will also look into this issue in the sections below. We would like to note that 37% of bids are connected to one bidder only, which poses questions on the efficiency of some portion of the public procurement market.

Interestingly, the Public procurement contract value is on average lower than the Final price of the public contract per procurement, which is the contrary of the above presented CZ03 form for below-limit procurement projects. As well as before, this may be caused by mistakes in the data, but more likely, it means that for above-limit procurement projects, we did not observe awards being covered by one contract that often, but rather the opposite situation, with one award to several contracts.

4. Cross-checks of compliance

One of the main motivations of creating the relevant legislation and information portals described above was to increase the transparency of the public procurement market and to publish both announcements of the actions as well as the resulting contract content. In what follows, we offer a unique check of the compliance for all auctions that were announced in the prescribed form (in the Public Procurement Bulletin, PPB) and check how they correspond to published contracts in the Register of Contracts (RC).

Table 7 offers an overview of all public procurements related to transport infrastructure published in the PPB 2018-2020. The first interesting fact mirrors the legal conditions: only a fraction of the public procurements is required to appear in PPB (see the legal exceptions above), but out of them, again approximately 10% of them have no obligation to publish the contracts in the RC. As the data below show, voluntary compliance is very low. Interestingly, 592 contracts in total were not found. This set is a combined outcome of law exceptions (17 different classes of them - for example, security, strategic state interests, etc.) that cannot be filtered out from the data automatically as well as an outcome of potential non-compliance to the law (again, for various reasons ranging from errors and omissions to intention). We will look closer into these missing contracts in the sections below. The share of contracts missing ("missing rate" in Table 7) does not show any significant trend over the years - one may expect a learning curve - perhaps improvement in time. The missing rate in terms of total values seems to show a rather decreasing trend from 8.37% to 5.29%.

High compliance might indicate that the legislation serves its purpose to increase the transparency and mitigate the inefficiencies, or possible corruption. On the other hand, it may partly be the case that the legislation works only partly since the substantial part of the information is not published, combined with a number of other exceptions, especially the censorship in the information published in the contracts.

We will continue the inspection into the patterns in missing contracts through an overview of descriptive statistics of the public procurements. Table 8 compares the basic statistical categories of the value (or final price) of awards with successfully matched contracts as opposed to the remaining categories. Table 8 shows that the procurements "With publishing duty, contract not found" are on average nearly twice as large as those that are published. Even though the median

is smaller, this still contradicts the intuitive expectation that these contracts may be omitted because of their minor importance (for example small value).

Throughout our research, we were struggling with the fact that the source data, especially from the Public Procurement Bulletin, are rather messy and some important characteristics were not found there. Since we want to explore the idea that the precision of the compliance with the form structure can be some indicator of the quality of the procurement, in Table 9 we present how many missing values we observe in this data, while highlighting in bold the information that is required by the directive. At the same time, we explain the exact meaning of the variables, since we use them later in our regression. The variables differ slightly for different regimes (below-threshold and above-threshold), which is why we offer this overview in separate columns.

We can see that from Table 9 there are some variables that are never missing - we always know the name of the contracting authority and the supplier as well the supplier's address, including its country of origin. There are some missing values in terms of tax identification numbers, which is in line with the above-reported critique by the European Commission (2019), but their number is moderate.[11]

What is slightly more problematic are the missing values in variables denoting the contracting authorities' and the suppliers' regions and counties. For what concerns the contracting authorities, the reason here is that even though the information on the institution's address is present on the *PPB* portal, it was omitted from the bulk download data that we used and so we had to complement this information later through web scraping techniques, which did not always lead to finding the address. For the suppliers, the address was present in the data, but even then, it was not always possible to automatically assign the corresponding district and region, especially in cases (unfortunately far from rare) where the postal code was not correct. We believe that in further research, we may try to improve on the algorithm for assigning the correct region and obtain thus a more accurate image of the geography of public procurement in the Czech Republic.

Another important variable to mention here is the number of bids - it is missing in approximately 10% of cases for the CZ03 forms (for below-threshold procurement projects). Originally, this information was missing for all the observations concerning these forms and we managed to add it to the data by web scraping techniques for 90% of cases so far (again, we believe that an

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[11] It has to be added though that in addition to missing values, we encountered a relatively large number of mistakes (typos) in these ID numbers in the original data, which did not make the data processing an easy task.

improvement is possible here). At this point of time, we are reluctant to make any firm conclusions regarding this missing information (required by the Decree) - we need to exclude all errors in the data in the next steps.

For what concerns the variables on project's prices, we see that there are relatively few missing values for the Final price of individual awards, but relatively many missing values for the Final price of the whole procurement project, at least for the below-threshold CZ03 forms (for the above-threshold forms, the information is complete). In this case, at least for a subset that we checked manually, the price is indeed missing in the original form and it is again one of the aspects that decreases the transparency of the whole system. Similarly, as above, we are reluctant to make any firm conclusions regarding this missing information (required by the Decree) - we need to make further manual checks to assess this problem more precisely.

The estimated prices (for the whole project and for the individual awards) have also a relatively high share of missing values, even though it has to be repeated here again that the estimated price of the individual awards is never present in a CZ03 form (there is actually no field for it) and the estimated price of the whole project is never present in an F03 or F06 form (same reason) - which is why we show these missing values in gray italics only. However, note that for the F03 and F06 forms, the estimated values are missing in approximately 50% of observations, which is rather disturbing both from the point of view of the procurement process transparency as well for the sake of our quantitative analysis and we definitely plan to investigate this issue further in the future.

5. Difference between the estimated and the final price

The most often analysed measure of the success of the procurement process is the difference between the estimated and the final price of the procurement project. This is quite understandable since one of the main goals of the public procurement is to save funds from the public budget. In our analysis, we focus on this measure too, but we take advantage of the uniqueness of our dataset and we try to find some relation between the savings made through public procurement and the compliance with the obligation to publish the contracts, where our main hypothesis is that in cases where there are some irregularities in the procurement project, leading possibly to higher final price than necessary, the compliance in regards of contract publication is also likely to be weaker. It has to be said from the beginning that we do not claim to search here for any causality, we are simply looking for prevailing patterns in our data. We also do not want to say that potential issues

both in the procurement project have to be intentional, we expect that in many cases, these are caused by inexperience or sloppiness rather than blatant corruption. Still, we believe that pointing out the problematic points in the process can lead to policy recommendations of how to improve the system so that it is more robust to both intentional and unintentional errors from the side of contracting authorities.

We base our analysis on standard linear regressions that allow us to discover the analysed patterns and to test for their statistical significance. These regressions are run separately for below-threshold projects and above-threshold projects, first because, as mentioned previously, the structure of the data we have at our disposition slightly differs between these two (depending on the publication in CZ03 form or F03 and F06 forms respectively), and, second, because we believe that the two types of projects may display different characteristics patterns.

The outcome variable in all our regression is a standardized difference between the estimated price and the final price either of the whole procurement project (for below-threshold projects) or of the individual awards (for above-threshold projects), depending on what information we have in the data.[12] We call this variable *spread* and the formal definition is

$spread_i = \frac{P_i^e - P_i^f}{P_i^e}$ where i denotes the i-th observation, P_i^e is estimated price and P_i^f is the final price for a given observation i. Note that the definition of the variable means that the higher the value, the lower the final price is as opposed to the expected price and so the higher the saving of the public budget is. Hence, any variable that contributes to higher *spread* is improving the procurement process in an economic sense.

Table 10 shows the descriptive statistics of the *spread* separately for below-threshold (CZ03 forms) and above-threshold (F03 and F06 forms) separately. Note that we deleted from the dataset observations for which the final price was more than twice larger than the expected price since we considered these observations (representing less than 1% of our data) to be clear outliers due to error and we did not want them to affect our results.

We can see from Table 10 that in more than 75% of observations, the expected price is larger than the final price, which is in line with the literature and our proper expectations. The table also reveals one potential problem of our analysis - there are many missing values of expected prices

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[12] Note though that the unit of observation is always the award, since many variables we work with are disaggregated at this level.

for above-threshold projects, as we already know from Table 9, and so the spread, as the outcome variable of our regression, is also missing, meaning that for the above-threshold projects, we are basing our analysis only on approximately half or theoretically available data. So far, we know that it definitely diminishes the statistical significance of some of our results, but we intend to explore this problem further to see whether the censoring of this variable does not have some non-random pattern that would also affect the magnitude of our coefficients.

The independent variables for our regressions are chosen in line with the previously discussed literature that clearly indicates that the difference between the expected price and the final price depends on the type of procurement regime and the number of bids obtained. We thus include dummy variables indicating the different regimes as well as the number of bids in a quadratic form that allows for non-linear dependence. To be able to observe potential regional differences, we also include dummies for the different regions, and to control for possible differences between types of public procurement, we use dummies indicating whether the project is related to construction works, supplies, or services.

In addition to the papers we reviewed in previous sections of our text, we add a variable that measures potential problems in the publication of the result of the procurement in the *Public Procurement Bulletin* called *the Number of missing values on PPB*. The construction of the variable is the following: the variable is incremented by 1 for each missing value of one of the following columns in the original data obtained from the *Public Procurement Bulletin*: the limit of the project, the tax ID of the contracting authority, the tax ID of the supplier, the estimated price of the award (for below-limit contracts) and the estimated price of the whole project (for the above-limit contracts). The value of this variable in the data we are using for our regressions is equal to 0 in 93% of cases, and to 1 or 2 in 7% of cases.

As highlighted in the previous text, we consider the strongest point of our analysis to be the unique link between the public procurement projects and the resulting contracts (if found). This allows us to see how the success of the public procurement, measured here by the spread between the expected price and the final price, is linked with the information on whether the contract resulting from the project award could be found, and if yes, whether it was in line with the legislative obligations. Thus, we extend the previous research on factors associated with the spread (Plaček et al. 2019b; Plaček et al. 2019c; Palguta, 2019; Baltrunaite et al., 2018) with new related factors.

To explore these relationships closer, we provide two sets of regressions. In the first set, we include in our model dummy variables indicating whether the award falls into one of the following categories: the award was matched with a contract, the award was not matched with a contract but the contracting authority is not obligated to publish it, and the award was not matched with a contract although the contracting authority is obligated to publish it (the distribution of which can be seen in Table 8). In the second set, we focus only on observations for which we found the corresponding contract, and there, we added to our dataset some additional variables, using the analysis performed by the *State Warden* platform. This platform characterizes all published contracts as displaying (or not) some potential issues, assigned automatically based on the characteristics of the contract and its publication. We were focusing only on issues that the *State Warden* platform denoted as "major" (these include missing identification of the supplier, invalid price, incorrect digital format of the contract, etc.) or "fatal" (the contract was not published within the legally binding deadline). The relative occurrence of these issues is on average between 1-9%, depending on the type of the issue.

We present the results of our analysis in Table 11, where the first set of coefficients (denoted All awards) comes from the regressions run on the whole sample and the second set of coefficients (denoted Awards matched with contract) comes from the regressions on the sub-sample of awards that we matched with a contract.

We can see from the table that the increasing number of bids improves economically the outcome of the public procurement since it increases the spread between expected and final prices. This is completely in line with the previous research as well as with our expectations. What is a bit more surprising for us is the positive coefficient on the second power of this variable, which signals rather increasing than decreasing returns to the number of bids (even though the size of the coefficient is relatively moderate). We investigated this result further graphically and we plotted the dependence of the spread on the number of bids both in terms of its distribution (represented by boxplots) and in terms of the overall volume of the awards (in EUR) in Figure 2 and Figure 3 for below-threshold (CZ03 forms) and above-threshold (F03 and F06 forms) respectively. The figures confirm positive quadratic dependence with increasing returns.

The results also confirm our expectation that if there are any missing values (other than for variables that we use directly in the regression) in the *Public Procurement Bulletin*, the spread between expected and final prices tends to be smaller, even though the coefficient is statistically

significant only for the below-threshold projects in the regression run over the whole sample. We believe that this may be some proxy for a general sloppiness in the procurement process for these observations, which is likely to be connected to an economically worse outcome.

The coefficients on dummy variables representing different procurement regimes confirm quite clearly our expectations that restriction to the openness of the regime affects the economic outcome negatively - the coefficient on the restricted procedure dummy is negative across both regressions in both samples and significant except for above-threshold projects in the whole sample. What does not seem to matter for the economic success of the procurement is a simplification of the administrative procedures - at least for the whole sample, the dummy representing the simplified procedure is significantly positive. What also seems to work well is the negotiated procedure without prior publication as opposed to the negotiated procedure with prior publication (displaying positive and negative coefficients respectively), which is so far a little bit surprising finding for us. The results confirm large differences between regions, but in this respect, they are quite inconsistent when comparing below-threshold and above-threshold procurements. The geographic aspect of public procurement is interesting and it is clear that in further research, this issue should be analysed in further detail.

When we focus on the whole sample (results denoted All awards), we see probably the most important result of our analysis: we prove for both below-threshold and above-threshold projects that the fact that no matching contract is found in a case when the contracting authority is legally bound to publish it is correlated with a worse economic outcome of the procurement process - a smaller spread between the expected and final prices. This result is statistically significant. Regarding the cases in which no matching contract is found and the contracting authority is not legally bound to publish it, we find a similar and statistically significant result for below-threshold projects, whereas for the above-threshold projects, the sign if the coefficient (still statistically significant) is opposite. We plan to analyse further this rather unexpected result, so far we believe that it confirms that the below-threshold and above-threshold projects display different patterns in their characteristics. It is also known from previous research that in some cases, contracting authorities intentionally construct the procurement project so that it falls below the threshold (see Palguta & Pertold, 2017), and hence it probably is not that surprising to see a relation between non-compliance (yet here not required by law) and a worse economic result of the procurement especially in the below the threshold category.

When we focus on the subsample of awards that were matched with the corresponding contract, we can see that our main variable of interest here - the dummy indicating whether the State Warden assigned some issue to the contract - fails to be significant. We performed some additional cross-checks of the relation between potential flaws in the contracts and the result of the procurement process, but actually, none of them provided statistically convincing evidence. However, we suspect that this may be due to a relatively small number of observations concerning a small share of the possible contract issues, so we plan to explore the idea further in our future research.

6. Conclusions and further avenues for research

This paper contributes to the discussion on the public procurement process, which is believed to enhance transparency and economic efficiency of the government acquiring goods, services, or works from an external source. Our regression results confirm the expectations set by the prior research, e.g. the number of bidders and open regimes lead to more savings of public resources. However, we take the debate much further by focusing on an ex-post verification of the result of this process – the contract signed between the public institution and the winner of the procurement tender.

Under Czech law, there is a legal obligation to publish these contracts in a publicly available database, which should theoretically enable anybody to check how well public institutions govern public spending. Yet, in the context of the Czech Republic, such a check is complicated for two main reasons. First, there are a number of exceptions from the legal obligation to publish the contract, affecting around 10% of all procurement tenders in our sample. Second, the two databases (procurement projects and published contracts) are completely autonomous and there is no direct automatic way of assigning the resulting contract (when it is published) to the given procurement project. The main contribution of our research lies in overcoming the latter issue by linking the public procurement database with the data on contracts through sophisticated algorithms. We explore then the compliance to the legal obligation to publish these contracts and its relation to the economic efficiency of the procurement process.

We find that procurement projects with no matching contract found (even when the contracting authority is legally bound to publish it) are correlated with a worse economic outcome of the procurement process: this may be considered to be (at least) a possible sign of incompetence of the contracting public authority. Moreover, our results show that the current policy excludes a great part of procurement projects from associated legal obligations (some of them regardless of

their value) may not work efficiently and the principle of transparency may be neglected. Last, but not least, we observe high censorship in the text of contracts that may turn their publishing into a formal exercise.

Overall, based on our results, we see the publication of contracts as an essential tool of improving the transparency and efficiency of the procurement process and we derive from there the following policy recommendations: first, the exceptions to the legal obligation to publish the contracts should be significantly reduced, second, the censorship of prices in contracts should be revisited and, third, the public procurement projects and the resulting contracts should be linked by a unique identifier allowing better control of the procurement process and its results.

Our dataset had brought a new wealth of information that opened a number of questions. In the following, we list further avenues for research, most of them to be taken during the next development of this paper.

Below-threshold and above-threshold projects vs. the spread

One of the interesting results of our analysis was that the situation where when no matching contract is found (in cases when the contracting authority is legally bound to publish it), it is correlated with a worse economic outcome of the procurement process. This is consistent for both groups of forms in case of the legal duty to publish the contract, however for cases when the contracting authority is not legally bound to publish it, this holds only for below-threshold projects and brings opposite signs for above-threshold projects.

Missing compulsory information

As explained in the section above, estimated values of projects are missing in approximately 50% of observations for above-threshold contracts. We intend to explore this problem further in order to see whether the censoring of this variable does not have some non-random pattern that would affect the magnitude of our coefficients. We will need to combine automatic scraping from the forms (since official exports fail to work here) with hand-checking of random subsamples.

Geographic patterns

Other open questions include a more detailed analysis of the regions - so far we have used the dummy variables rather as controls in the regression, but we may look closer if the differences between regions are large enough and consistent and in the next turn to compare with a measure

that rates the overall level of governance (or inversely corruption) across the regions. This area of research could be expanded with another dimension - analysis of media articles and other outputs dealing with, for example, corrupt behaviour within the construction of transport infrastructure and the use of public financial funds. Research can then be followed by a comparison of whether any statistically significant results correspond to real and revealed corruption cases.

Agencies with publishing duty, contract not found

Within the analysis, we identified public entities with the most cases in which we weren't able to successfully pair a given public contract with its associated legal agreement. After excluding the cases where the public contractor is not obliged to publish legal agreements covered by one of the legal exceptions (especially the fact that state-owned enterprises were not obliged to publish legal agreements until 1st November 2019 and various of above-mentioned other exceptions), we identified a relatively high number of cases where these entities did not fulfil their legal obligation to publish the contract in the Register of Contracts. Subsequently, we compared our results with the evaluation of these public entities within the K-Index (evaluation tool for public contractors) and thus partially verified our thesis that some important state or state-owned entities may not be fulfilling their legal obligations. To better and more thoroughly analyse these entities and their related public contracts, our results will be consulted with Transparency International, with whom further steps will be taken. We will offer the results of this legal analysis in the later versions of this paper.

Unit prices comparison

During our analysis of the public contracts related to public infrastructure, we also identified another potential area worthy of attention and deeper research. Within the CPV codes which we identified as the most relevant in the context of transport infrastructure, several items can be considered as highly homogeneous. Identification of these very specific and homogeneous items opens up a possibility for a thorough comparison of the final unit prices of these items within various public procurement projects. For example, we took a closer look at public contracts concluded for the supply of road salt. After the analysis of a total of twenty different legal agreements between contracting authorities and tender winning suppliers, we found out that the unit price of road salt in these contracts differs from CZK 1,399/ton (EUR 53.96) to CZK 2,399/ton (EUR 92.53) with a mean value of CZK 1,817 (EUR 70). Although this price difference may be

caused by seasonal fluctuations or other market imbalances, such a high difference may on the other hand signal an inefficient allocation of public resources. Therefore, we consider the comparison of final unit prices related to homogenous goods and services within the public procurement market as a highly relevant research direction for the future.

References

Act No. 128/2000 Coll.*, Act on municipalities (municipal Establishment)* (2000). https://www.zakonyprolidi.cz/cs/2000-128

Act No. 129/2000 Coll.*, Act on regions (regional establishment)* (2000). https://www.zakonyprolidi.cz/cs/2000-129

Act No. 134/2016 Coll., *Public Procurement Act* (2016). https://www.zakonyprolidi.cz/cs/2016-134

Act No. 23/2017 Coll., *Act on the rules of budgetary responsibility* (2017). https://www.zakonyprolidi.cz/cs/2017-23

Act no. 340/2015 Coll., *Act on special conditions of effectiveness of certain contracts, publication of these contracts and on the register of contracts (act on the register of contracts)* (2015). https://www.zakonyprolidi.cz/cs/2015-340

Amaral, M., Saussier, S., & Yvrande-Billon, A. (2009). Auction procedures and competition in public services: The case of urban public transport in France and London. *Utilities Policy*, *17*(2), 166-175. https://doi.org/10.1016/j.jup.2008.07.006

Baltrunaite, A., Giorgiantonio, C., Mocetti, S., & Orlando, T. (2018). Discretion and Supplier Selection in Public Procurement. *Bank of Italy Temi di Discussione (Working Paper) No. 1178*. Available at SSRN: https://ssrn.com/abstract=3210748 or http://dx.doi.org/10.2139/ssrn.3210748

Bauhr, M., Czibik, Á., de Fine Licht, J., & Fazekas, M. (2019). Lights on the shadows of public procurement: Transparency as an antidote to corruption. *Governance*, *33*(3), 495-523. https://doi.org/10.1111/gove.12432

Brown, T., & Potoski, M. (2003). Managing contract performance: A transaction costs approach. *Journal Of Policy Analysis And Management*, *22*(2), 275-297. https://doi.org/10.1002/pam.10117

Charron, N., Dahlström, C., Fazekas, M., & Lapuente, V. (2017). Careers, Connections, and Corruption Risks: Investigating the Impact of Bureaucratic Meritocracy on Public Procurement Processes. The Journal Of Politics, 79(1), 89-104. https://doi.org/10.1086/687209

Chever, L., Saussier, S., & Yvrande-Billon, A. (2017). The law of small numbers: investigating the benefits of restricted auctions for public procurement. *Applied Economics*, *49*(42), 4241-4260. https://doi.org/10.1080/00036846.2017.1279270

Czech Statistical Office (2020). Small Lexicon of Municipalities of the Czech Republic – 2020. Retrieved from: https://www.czso.cz/csu/czso/small-lexicon-of-municipalities-of-the-czech-republic-2020

Decree No. 168/2016 Coll., *Decree on the publication of forms for the purposes of the Public Procurement Act and the requirements of the contracting authority's profile* (2016). https://www.zakonyprolidi.cz/cs/2016-168

Dufek, L. (2013). Measuring private transaction costs of public procurement: Case of the Czech Republic. *Acta Universitatis Agriculturae Et Silviculturae Mendelianae Brunensis*, *61*(2), 317-325. https://doi.org/10.11118/actaun201361020317

European Commission (2019). Performance per policy area – Public Procurement. Retrieved from: https://ec.europa.eu/internal_market/scoreboard/performance_per_policy_area/public_procurement/index_en.htm

Eurostat (2021). Government revenue and expenditure. Retrieved from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_finance_statistics#Government_revenue_and_expenditure

Fazekas, M., & Tóth, B. (2018). The extent and cost of corruption in transport infrastructure. New evidence from Europe. Transportation Research Part A: Policy And Practice, 113, 35-54. https://doi.org/10.1016/j.tra.2018.03.021

Flynn, A., & Davis, P. (2014). Theory in public procurement research. *Journal Of Public Procurement*, *14*(2), 139-180. https://doi.org/10.1108/jopp-14-02-2014-b001

Golden, M., & Picci, L. (2005). PROPOSAL FOR A NEW MEASURE OF CORRUPTION, ILLUSTRATED WITH ITALIAN DATA. *Economics And Politics*, *17*(1), 37-75. https://doi.org/10.1111/j.1468-0343.2005.00146.x

Grandia, J., & Meehan, J. (2017). Public procurement as a policy tool: using procurement to reach desired outcomes in society. *International Journal Of Public Sector Management*, *30*(4), 302-309. https://doi.org/10.1108/ijpsm-03-2017-0066

Haruvy, E., & Katok, E. (2012). Increasing Revenue by Decreasing Information in Procurement Auctions. *Production And Operations Management*, *22*(1), 19-35. https://doi.org/10.1111/j.1937-5956.2012.01356.x

Hessami, Z. (2014). Political corruption, public procurement, and budget composition: Theory and evidence from OECD countries. *European Journal Of Political Economy*, *34*, 372-389. https://doi.org/10.1016/j.ejpoleco.2014.02.005

Hospodářské Noviny (2013). České dálnice jsou předražené. Kilometr stojí 416 milionů, mohl by být o pětinu levnější [Czech highways are overpriced. Kilometer costs CZK 416 million, could be less by one fifth]. Retrieved from: https://domaci.hn.cz/c1-60372380-nku-ceske-dalnice-jsou-predrazene

iRozhlas (2019). V Česku chybí na tisíc kilometrů základní dálniční sítě, říká nový šéf silničářů Mátl [Thousands of kilometers of basic roads infrastructure are missing in the Czech Republic, says Mátl, the new head of road construction]. Retrieved from: https://www.irozhlas.cz/zpravy-domov/dalnice-reditelstvi-silnic-a-dalnic-stavba-vladimir-kremlik-radek-matl-ano_1908071950_gak

K-Index (2021). Index klíčových rizik [Index of key risks]. Retrieved from: https://www.hlidacstatu.cz/kindex

Karjalainen, K. (2011). Estimating the cost effects of purchasing centralization—Empirical evidence from framework agreements in the public sector. *Journal Of Purchasing And Supply Management*, *17*(2), 87-97. https://doi.org/10.1016/j.pursup.2010.09.001

Kelman, S. (1990). *Procurement and Public Management: The Fear of Discretion and the Quality of Government Performance*. AEI Press.

Kenny, C. (2009). Transport Construction, Corruption and Developing Countries. Transport Reviews, 29(1), 21-41. https://doi.org/10.1080/01441640802075760

Le, Y., Shan, M., Chan, A., & Hu, Y. (2014). Overview of Corruption Research in Construction. *Journal Of Management In Engineering*, *30*(4), 02514001-025140017. https://doi.org/10.1061/(asce)me.1943-5479.0000300

Lewis-Faupel, S., Neggers, Y., Olken, B., & Pande, R. (2016). Can Electronic Procurement Improve Infrastructure Provision? Evidence from Public Works in India and Indonesia. American Economic Journal: Economic Policy, 8(3), 258-283. https://doi.org/10.1257/pol.20140258

Locatelli, G., Mariani, G., Sainati, T., & Greco, M. (2017). Corruption in public projects and megaprojects: There is an elephant in the room!. *International Journal Of Project Management*, *35*(3), 252-268. https://doi.org/10.1016/j.ijproman.2016.09.010

Man, P., Matějková, J., Jurčík, R., & Heidu, R. (2014). The Key Factors of Transparency of the Public Procurement in the Czech Republic. *Procedia Economics And Finance*, *12*, 379-386. https://doi.org/10.1016/s2212-5671(14)00358-x

Matějová, L., Nemec, J., Křápek, M., & Klimovský, D. (2017). Economies of Scale on the Municipal Level: Fact or Fiction in the Czech Republic?. *Nispacee Journal Of Public Administration And Policy*, *10*(1), 39-59. https://doi.org/10.1515/nispa-2017-0002

McCue, C., Prier, E., & Swanson, D. (2015). Five dilemmas in public procurement. *Journal Of Public Procurement*, *15*(2), 177-207. https://doi.org/10.1108/jopp-15-02-2015-b003

Ministry of Regional Development (2020). Výroční zpráva o stavu veřejných zakázek v České republice za rok 2019 [Annual report about public procurement for year 2019]. Retrieved from: https://portal-vz.cz/wp-content/uploads/2013/07/Výročn%C3%AD-zpráva-za-rok-2019-f-1.pdf

Nemec, J., & Soukopová, J. (2016). Mixed system: Transformation and current trends in the provision of local public services in the Czech and Slovak Republics. In H. Wollmann, I. Koprić, & G. Marcou (Eds.), *Public and social services in Europe: Governance and public management* (pp. 151-168). London, England: Palgrave Macmillan.

Nemec, J., Kubák, M., Donin, G., & Kotherová, Z. (2021). Efficiency of Public Procurement in the Czech and Slovak Health Care Sectors. *Transylvanian Review Of Administrative Sciences*, *17*(62), 115-133. https://doi.org/10.24193/tras.62e.7

Nemec, J., Šumpíková, M., Orviska, M., Bušina, F., & Grega, M. (2016). Transaction Costs in the Public Procurement: Selected Findings in Czech and Slovak Conditions. In Tomas Loster and Tomas Pavelka (Eds). *The 10th International Days of Statistics and Economics*. Praha: Melandrium, 2016, pp. 1749-1758. ISBN 978-80-87990-10-0.

Ochrana, F., & Pavel, J. (2013). Analysis of the Impact of Transparency, Corruption, Openness in Competition and Tender Procedures on Public Procurement in the Czech Republic. *Central European Journal Of Public Policy*, *7*(2), 114-135.

Ohashi, H. (2009). Effects of Transparency in Procurement Practices on Government Expenditure: A Case Study of Municipal Public Works. *Review Of Industrial Organization*, *34*(3), 267-285. https://doi.org/10.1007/s11151-009-9208-1

Owusu, E., Chan, A., & Darko, A. (2019). Thematic Overview of Corruption in Infrastructure Procurement Process. *Journal Of Infrastructure Systems*, *25*(2), 02519001. https://doi.org/10.1061/(asce)is.1943-555x.0000484

Oživení (2010). Cena dálnic [Price of Highways]. Retrieved from: https://www.oziveni.cz/wp-content/uploads/2010/01/cenadalnic_cast1_predrazenedalnice.pdf

Palguta, J. (2019). Political representation and public contracting: Evidence from municipal legislatures. European Economic Review, 118, 411-431. https://doi.org/10.1016/j.euroecorev.2019.06.003

Palguta, J., & Pertold, F. (2017). Manipulation of Procurement Contracts: Evidence from the Introduction of Discretionary Thresholds. American Economic Journal: Economic Policy, 9(2), 293-315. https://doi.org/10.1257/pol.20150511

Parlamentní listy (2017). Spolek chce projektovat železnice. Využil mezeru v zákoně o zadávání veřejných zakázek [An association wants to design railways. It exploited a loophole in the public procurement legislation]. Retrieved from: https://www.parlamentnilisty.cz/arena/monitor/Spolek-chce-projektovat-zeleznice-Vyuzil-mezeru-v-zakone-o-zadavani-verejnych-zakazek-505012

Patrucco, A., Luzzini, D., & Ronchi, S. (2017). Research perspectives on public procurement: Content analysis of 14 years of publications in the journal of public procurement. *Journal Of Public Procurement*, *17*(2), 229-269. https://doi.org/10.1108/jopp-17-02-2017-b003

Plaček, M. (2017). The Effects of Decentralization on Efficiency in Public Procurement: Empirical Evidence for the Czech Republic. *Lex Localis - Journal Of Local Self-Government*, *15*(1), 67-92. https://doi.org/10.4335/15.1.67-92(2017)

Plaček, M., Nemec, J., Ochrana, F., Schmidt, M., & Půček, M. (2019a). Analysis of Factors of Overpricing in Public Procurement: A Study for Low-performing EU Countries. International Journal Of Public Administration, 43(4), 350-360. https://doi.org/10.1080/01900692.2019.1636393

Plaček, M., Ochrana, F., Schmidt, M., Nemec, J., & Půček, M. (2019b). The factors causing delays in public procurement: the Czech Republic versus the UK. *Public Money & Management*, *40*(2), 131-139. https://doi.org/10.1080/09540962.2019.1651034

Plaček, M., Schmidt, M., Ochrana, F., & Pucek, M. (2016). Impact of Selected Factors Regarding the Efficiency of public procurement (the Case of the Czech Republic) with an Emphasis on Decentralization. *Ekonomicky casopis*, *64*(1), 22.

Plaček, M., Soukopová, J., Vaceková, G., Ochrana, F., & Schmidt, M. (2019c). Another One Bites the Dust: Recurrent Procurement Contracts in the Czech Republic. *Public Works Management & Policy*, *25*(4), 365-385. https://doi.org/10.1177/1087724x19876647

Rozpočet (2019). Rozpočet Státního fondu dopravní infrastruktury [The budget of the State Transport Infrastructure Fund]. Retrieved from: https://www.sfdi.cz/soubory/obrazky-clanky/rozpocet/2019_rozpocet2019.pdf

Schneiderova Heralova, R. (2015). Highway Projects: Prices in Public Bids. *Procedia Engineering*, *123*, 496-503. https://doi.org/10.1016/j.proeng.2015.10.101

Schneiderova Heralova, R., Hromada, E., & Johnston, H. (2014). Cost Structure of the Highway Projects in the Czech Republic. *Procedia Engineering*, *85*, 222-230. https://doi.org/10.1016/j.proeng.2014.10.547

Soliño, A., & Gago de Santos, P. (2010). Transaction Costs in Transport Public–Private Partnerships: Comparing Procurement Procedures. *Transport Reviews*, *30*(3), 389-406. https://doi.org/10.1080/01441640903037941

Soukopová, J., Vaceková, G., & Klimovský, D. (2017). Local waste management in the Czech Republic: Limits and merits of public-private partnership and contracting out. *Utilities Policy*, *48*, 201-209. https://doi.org/10.1016/j.jup.2017.09.005

Titl, V., & Geys, B. (2019). Political donations and the allocation of public procurement contracts. European Economic Review, 111, 443-458. https://doi.org/10.1016/j.euroecorev.2018.11.004

Uyarra, E., Edler, J., Garcia-Estevez, J., Georghiou, L., & Yeow, J. (2014). Barriers to innovation through public procurement: A supplier perspective. *Technovation*, *34*(10), 631-645. https://doi.org/10.1016/j.technovation.2014.04.003

Z-Index (2021). Hodnocení zadavatelů veřejných zakázek [Evaluation of public contracting authorities]. Retrieved from: https://www.zindex.cz

Zhai, Z., Shan, M., Darko, A., & Chan, A. (2021). Corruption in Construction Projects: Bibliometric Analysis of Global Research. *Sustainability*, *13*(8), 4400. https://doi.org/10.3390/su13084400

APPENDIX - TABLES AND FIGURES

Table 1. Definition of public procurement regimes

	Estimated value of the contract (Excluding VAT)
Small-scale public contracts	Equal to or lower than: ● CZK 2,000,000/EUR 77,143 for supplies and services ● CZK 6,000,000/EUR 231,428 for construction works
Below-threshold public contracts	Exceeding the values of small-scale public contracts and below the threshold of above-threshold public contracts.
Above-threshold public contracts	Exceeding the following values: ● CZK 3,568,000/EUR for supplies and services for contracting authorities at the state level (i.e., government institutions, state-subsidized organizations) ● CZK 5,494,000/EUR 137,622 for supplies and services for contracting authorities at a lower state level (i.e., self-governing units, organizations controlled by self-governing units, subsidized contracting authority) ● CZK 10,989,000/ EUR 422,653 for supplies and services for the sector contracting authorities ● CZK 137,366,000/EUR 5,298,388 for construction works for all types of contracting authorities

Source: Act No. 134/2016 Coll, Ministry of regional development (2020)

Table 2. Types of procurement procedures

Public procurement regime	Public procurement procedure	Comments
Small-scale public contracts	-	The contracting authority is not obliged to award small-scale public contracts through a procurement procedure, the only obligation is to follow the basic principles of the procurement process (publish the contract on the contracting authority's profile/official board).
Below-threshold public contracts	Simplified below-threshold procedure	This type of procedure can be used for all below-threshold public contracts except for the case of construction works whose estimated value (price) exceeds CZK 50 million/EUR 1,928,566 For the below-threshold public contracts, procurement procedures for above-threshold contracts can also be used, with certain simplified conditions (these are related to the negotiated procedure with prior publication and the negotiated procedure without prior publication).
Above-threshold public contracts	Open procedure	The most common type of procurement procedure - an invitation to an unspecified number of suppliers to submit a procurement project for the performance of a given public contract.
	Restricted procedure	Similar to the open procedure, but the contracting authority is entitled to limit the number of suppliers invited for submitting a procurement project.
	Negotiated procedure with prior publication	This type of procedure is only admissible where the contracting authority has unsuccessfully attempted to award a public contract through the open, restricted, simplified below-threshold procedure or a competitive dialogue. Based on this notice, tenderers submit a request to participate and demonstrate that they meet the qualifications (preliminary procurement project). The contracting authority negotiates with the tenderers on the improvement of the preliminary procurement projects.

	Negotiated procedure without prior publication	This type of procedure is in principle procedurally similar to the negotiated procedure with a publication, with the difference that the negotiation of the conditions of performance takes place before the actual submission of procurement projects. The use of the negotiated procedure without publication may occur in several situations: (a) the public contract has already been put out to procurement project in an open, restricted, or simplified sub-limit procedure, but no procurement projects or requests to participate have been submitted, or the procurement projects submitted did not meet the conditions; (b) the contract can only be performed by a specific supplier - if the subject of performance is a unique work or performance, or where competition is not present for technical reasons or for the protection of exclusive rights (intellectual property), (c) an urgent circumstance which the contracting authority could not have foreseen and was not caused by the contracting authority and the situation requires the contract to be performed as quickly as possible and the time limits for the open procedure, the restricted procedure and the negotiated procedure with publication cannot be met.
	Competitive dialogue	This type of procurement procedure is intended for the award of a particularly complex public contract The essence of the competitive dialogue is to enable the award of a public contract for which the contracting authority has no clear idea of how it will be carried out and seeks a suitable solution together with the supplier(s). Once a suitable solution has been found, interested parties are invited to submit procurement projects and the contracting authority then selects the most suitable procurement project.
	Innovation partnership procedure	The contracting authority may award a public contract in the innovation partnership procedure where the need for the development of an innovative supply or service or innovative works and the subsequent purchase of the resulting supplies, services, or works cannot be met by solutions already available on the market.

Source: Act No. 134/2016 Coll

Table 3. Selected exceptions as set by the Act No. 134/2016 Coll

General exceptions	Exceptions for below-threshold public contracts
- where the conduct of the procurement procedure would threaten protection of the basic security interests of the Czech Republic; - where confidential information would be disclosed; - where its main purpose is to enable the contracting authority to provide or operate a public communications network or to provide to the public one or more electronic communications services; - where it is awarded according to the binding rules of an international organization; - and with regard to specific legal services.	- for supplies, services, and works provided by the Prison Service of the Czech Republic to the Czech Republic; - for supplies or services relating to provision of humanitarian aid; - being awarded by intelligence service pursuant to the Act on Intelligence Services; - having as its subject-matter acquisition of things or a set of things intended for a museum collection, cultural heritage or another object having cultural significance; - having as its subject-matter production, purchase or repairs of military material for armed units of the Czech Republic.

Source: Act No. 134/2016 Coll

Table 4. All awards s related to transport infrastructure 2018-2020 according to procurement regimes and procedures

Regime / Procedure Count Value (EUR)	Negotiated procedure without prior publication	Negotiated procedure with prior publication	Open procedure	Restricted procedure	Simplified below-threshold procedure	Competitive dialogue
Small-scale public contracts	491 59,352,838	3 82,372	62 5,793,142	2 498,610	43 5,634,536	
Above-threshold public contracts	329 538,248,390	70 900,221,772	3417 11,298,015,782	2702 5,799,003,592		3 98,472,529
Below-threshold public contracts	280 120,631,855	16 12,088,279	1720 1,883,543,800	744 966,886,610	7896 3,268,688,799	

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 5. All awards s related to transport infrastructure 2018-2020: forms used for announcement

Type of form	Year	Small-scale procurement projects	Below-threshold procurement projects	Above-threshold procurement projects
CZ03	2018	58	3743	1
CZ03	2019	26	3205	
CZ03	2020	19	3081	
F03	2018	451	392	2404
F03	2019	16	133	2403
F03	2020	16	92	1095
F06	2018	1	3	182
F06	2019	14	4	282
F06	2020		3	154

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 6a. All awards related to transport infrastructure 2018-2020 - selected quantitative variables Form CZ03

Variable name	Estimated price of the procurement project (EUR)	Final price of procurement project (EUR)	Final price of the award (EUR)	Value of contract corresponding to award (EUR)	Number of bids
count	9,212	9,442	10,783	6,981	9,715
Mean (EUR)	725,006	638,176	592,390	986,641	4.16
Std	2,571,387	2,335,216	2,193,358	20,356,693	2.81
Min (EUR)	0	0	0	-465,493*	1
25% quartile	256,642	215,999	178,943	113,747	2
50% quartile	424,285	372,350	344,832	306,218	4
75% quartile	807,204	713,494	674,287	634,498	6

| Max (EUR) | 215,999,383 | 215,999,383 | 215,999,383 | 1,646,334,538 | 26 |

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 6b. All awards related to transport infrastructure 2018-2020 - selected quantitative variables Form F03 and F06

	Estimated price of the award (EUR)	Final price of procurement project (EUR)	Final price of the award (EUR)	Value of contract corresponding to award (EUR)	Number of bids
count	4,074	8,349	8,349	6,057	8,349
Mean	4,371,513	22,752,379	2,389,185	1,856,967	3.90
Std	29,620,498	37,573,534	17,637,143	10,581,581	3.21
Min	0	0	1	-329,597*	1
25% quartile	63,755	232,932	24,035	14,381	1
50% quartile	303,276	1,861,486	87,118	74,720	3
75% quartile	1,542,853	73,285,505	545,791	385,713	6
Max	1,112,396,822	817,915,368	817,915,368	252,856,551	31

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 7. All awards related to transport infrastructure 2018-2020 as matched to Register of Contracts

Year	2018		2019		2020		All years	
	Count	Value (EUR)	Count	Value (EUR)	Count	Value (EUR)	Count	Value (EUR)
Contract found	6,599	9,767,258,241	5,403	7,102,474,007	3,420	5,288,506,067	15,371	22,158,238,315
Without publishing duty, contract not found	1,036	932,905,993	910	766,617,952	1,226	886,805,371	3,169	2,586,329,316
With publishing duty, contract not found	186	977,692,804	172	267,984,578	234	344,801,477	592	1,590,478,859

			2.66					
With publishing duty, contract not found - missing rate	2.39%	8.37%	%	3.29%	4.81%	5.29%	3.09%	6.04%
All public procurements	7,786	11,677,857,038	6,477	8,137,076,537	4,869	6,520,112,916	19,132	26,335,046,490

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 8. All awards related to transport infrastructure 2018-2020 - summary of matched contracts

	Contract found	Without publishing duty, contract not found	With publishing duty, contract not found
count	15,371	3,169	592
mean (EUR)	1,441,561	816,134	2,686,620
std (EUR)	12,478,407	3,264,302	19,930,451
min (EUR)	0	6	24
25% (EUR)	43,353	222,809	23,517
50% (EUR)	231,318	369,892	154,181
75% (EUR)	619,438	685,712	757,757
max (EUR)	817,915,368	102,956,724	414,599,320

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 9. All awards related to transport infrastructure 2018-2020 - Missing values in the public procurement forms

Form (determined by the regime of the project)	CZ03	F03	F06
Procurement procedure	704	646	58
Type of project (construction, service, supply)	**0**	**0**	**0**
Contracting authority - Tax identification number	**16**	**9**	**1**
Contracting authority - name	**0**	**0**	**0**
Contracting authority - district	3,184	855	78

Contracting authority - region	3,184	855	78
Procurement regime	**0**	**0**	**0**
Number of bids	**1,122**	**0**	**0**
Supplier - Tax identification number	**9**	**67**	**1**
Supplier - name	**0**	**0**	**0**
Supplier - city	**0**	**0**	**0**
Supplier - state	**0**	**0**	**0**
Supplier - district	78	406	109
Supplier - region	78	406	109
Final price of the procurement project	**1,395**	**0**	**0**
Estimated price of the procurement project	**1,625**	*7,648*	*701*
Final price of the award	**54**	**0**	**0**
Estimated price of the award	*10,837*	3,933	342
Total forms	10,837	7,648	701

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 10. Descriptive statistics of the outcome variable (spread between expected and final price)

	Below-threshold projects (CZ03 forms)	Above-threshold projects (F03 and F06 forms)
count	8,502	3,995
mean	0.107987	0.094751
std	0.211151	0.258393
min	-0.985651	-0.842478
25%	0.001858	0
50%	0.070616	0.000012

75%	0.196132	0.133889
max	1	1

Source: data from Public Procurement Bulletin and the Register of Contracts; our processing

Table 11. Regression results - All awards related to transport infrastructure 2018-2020

Dependent variable: standardized spread between expected and final prices		All awards		Awards matched with contract	
		Form CZ03	Form F03 and F06	Form CZ03	Form F03 and F06
Contract not matched, obligation to publish (dummy, ==1 if True)		-0.0459**	-0.0399*		
		0.0182	0.0238		
Contract not matched, no obligation to publish (dummy, ==1 if True)		-0.0392***	0.0789***		
		0.0129	0.0268		
Contract is having some issues on State Warden (dummy, ==1 if True)				-0.0084	0.0475
				0.0203	0.0353
Number of missing values on *PPB*		-0.0199*	-0.0168	-0.0187	-0.0606
		0.0105	0.0126	0.0303	0.0478
Number of bids		0.0155***	0.0059*	0.0179***	0.0245***
		0.0021	0.003	0.0026	0.0055
Number of bids squared		0.0006***	0.0007***	0.0007***	-0.0001
		0.0002	0.0002	0.0002	0.0005
Regime dummies (==1 for given regime, baseline regime is "Tender has no prior publication")	Negotiated procedure with prior publication	-0.1283	-0.0268	0.1072	-0.1282*
		0.0944	0.0756	0.1827	0.07
	Open procedure	0.0105	0.0655	-0.0064	0.0078
		0.018	0.0456	0.0254	0.0462

	Restricted procedure	-0.0882***	-0.0485	-0.1032**	-0.0858*
		0.0196	*0.0468*	*0.0284*	*0.0473*
	Negotiated procedure without prior publication		0.0969**		-0.0177
			0.0471		*0.0505*
	Simplified below-threshold procedure	0.0403**		0.0264	
		0.017		*0.0243*	
	Competitive dialogue		0.0278		
			0.1424		
Region dummies (==1 for given region, baseline region is capital city Prague)	South Moravian	-0.0076	0.0567**	-0.0052	0.0813***
		0.0095	*0.0253*	*0.0101*	*0.024*
	South Bohemian	-0.0195*	-0.0990***	-0.0191	0.008
		0.0115	*0.0171*	*0.0118*	*0.0235*
	Karlovy Vary	-0.0404***	-0.0296	-0.0407***	0.0034
		0.0144	*0.0411*	*0.0142*	*0.0336*
	Hradec Králové	0.0066	0.0009	0.0083	0.0234
		0.0125	*0.0138*	*0.0133*	*0.0144*
	Liberec	0.0063	0.1574***	0.01	0.1432***
		0.0136	*0.0228*	*0.0137*	*0.0239*
	Moravian-Silesian	0.0358***	0.2385***	0.0227**	0.1798***
		0.0107	*0.0215*	*0.0111*	*0.0253*
	unknown	0.0542***	-0.0430*	0.0275	0.0036
		0.0131	*0.0229*	*0.0184*	*0.0325*
	Olomouc	-0.0343***	-0.016	-0.0059	0.0242

		0.0114	*0.0291*	*0.012*	*0.0297*
	Pardubice	-0.0205	0.0014	-0.0145	0.036
		0.0143	*0.0332*	*0.015*	*0.0298*
	Plzeň	0.1295***	0.0045	0.1242***	0.0368*
		0.0114	*0.0209*	*0.0117*	*0.0204*
	Central Bohemian	-0.0024	0.0347	0.0043	0.046
		0.0127	*0.0338*	*0.0127*	*0.0326*
	Vysočina	-0.0413***	0.2664***	-0.0651***	0.0748***
		0.0123	*0.0197*	*0.0134*	*0.0227*
	Zlín	0.0006	-0.032	0.0032	0.0193
		0.0157	*0.0431*	*0.0163*	*0.0446*
	Ústí nad Labem	0.0572***	-0.1048***	0.0608***	0.0211
		0.0132	*0.0177*	*0.0137*	*0.0248*
Type of project dummies (==1 for given type, baseline type is Supplies)	Services	0.0769***	0.1561***	0.1458***	0.1671***
		0.0166	*0.0125*	*0.02*	*0.0135*
	Construction works	-0.0537***	0.0136	0.0203	0.0101
		0.0112	*0.0111*	*0.0131*	*0.0117*
Intercept		0.0535**	-0.0199	-0.0187	-0.0606
		0.0222	*0.0473*	*0.0303*	*0.0478*
N	N	7,768	3,995	4784	1960
R2	R2	0.15	0.2	0.19	0.23
Adjusted R2		0.1483	0.1919	0.1871	0.2249

Standard errors in italics. Statistical significance: * p<.1   ** p<.05   ***p<.01

Figure 1. Types of public projects with respect to publishing duty
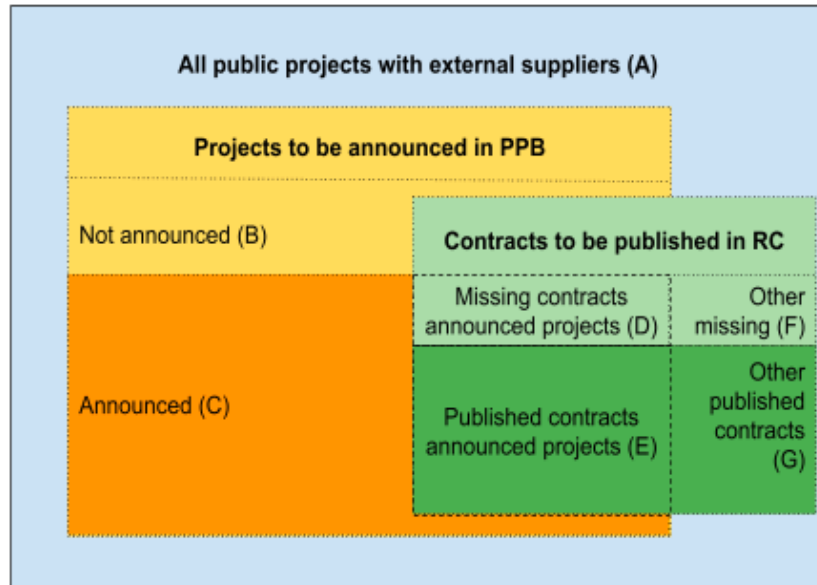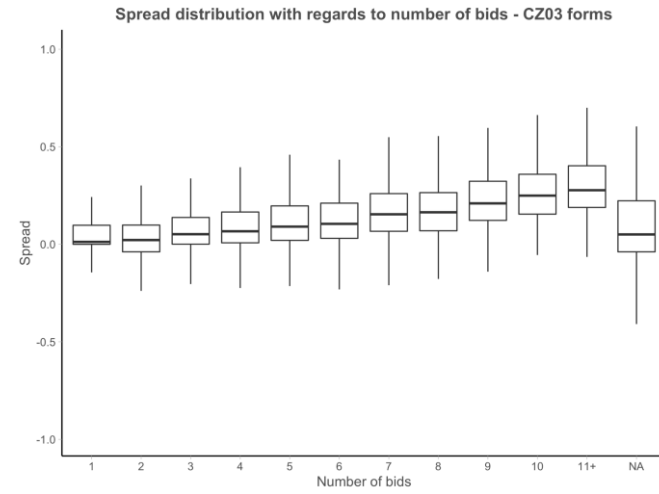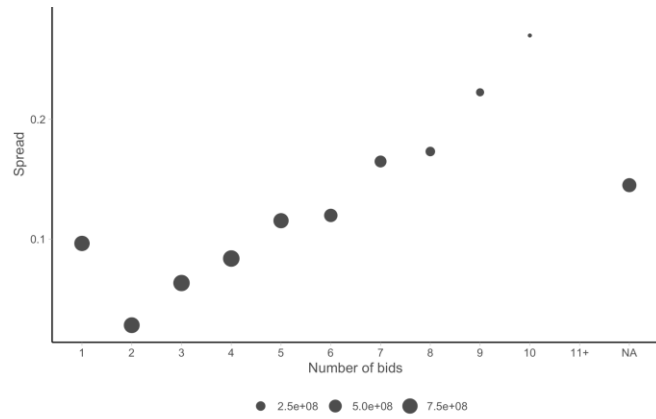
Figure 2. Spread vs. the number of bids - CZ03 form

Figure 3. Spread vs. the number of bids - F03 and F06 form