

# Competition in Public Procurement: Evidence from Finland and Sweden

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## Abstract

We study the extent and determinants of competition and its role in determining prices in public procurement using uniquely comprehensive and rich data from Finland and Sweden. We supplement our study with qualitative interviews. Competition is extremely low in both countries. All regions and contracting authority types, and most industries face the issue. Moreover, bidders typically are heterogeneous in size, which likely limits competition further. Competition seems to work as expected as (standardized) prices decrease with the number of actual and potential bidders. The perceived reasons for lack of competition are many and vary across industries but are typically related to communication practices and professionalism in public procurement. Accordingly, we show using contracting authority office level norms as instrumental variables that the use of scoring auctions is detrimental to competition, especially in industries where their use is not typical. Bidder friendly dialog, strategies and practices are proposed as remedies.

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# 1 Introduction

In most countries, a large share of public sector purchases are implemented via public procurement (PP). For example, in the OECD countries PP is estimated to account for about 12% of GDP.<sup>1</sup> Adopting PP is often seen as addressing both issues related to the lack of incentives, inefficiencies and rent-seeking involved in in-house production by the public sector (e.g. Niskanen 1971 and Alchian and Demsetz 1972), and various market imperfections arising in private markets producing public goods. However, recently policy makers in the EU have been increasingly worried that PP does not work as it should due to a severe lack of competition. For example, according to the European Commission (2017), "Public procurement relies on open competition to deliver the best value for public money. This competitive process is either not present or it is losing intensity. Between 2006 and 2016, the number of tenders with only one bid has grown from 17% to 30%. The average number of offers per tender fell from five to three in the same period."

Despite the pressing policy need to understand the implications of this lack of competition, the reasons for it, as well as the possible remedies, the existing evidence is very limited in scope. We seem to be missing a comprehensive picture regarding some of the very basic and fundamental questions about the anatomy of public procurement in any country. Does PP work by and large as intended? How extensive is the lack of competition and how does it vary across contracting authorities, industries, regions and the applied auction mechanisms? Does competition work as the auctioneer would like? How can one attract more potential bidders? What type of potential bidders bid and what type abstain, and can entry be influenced by the auction or contract design?

We leverage rich and large data to provide both descriptive and quasi-experimental evidence on these questions across a wide spectrum of public procurement auctions in Finland and Sweden. The Finnish data is richer in information content, but the Swedish data has many more observations. Finland and Sweden are interesting cases for such analysis as a standard auction mechanism (first-price sealed-bid) with open competition is in use, and the regulatory framework follows the standards adopted in the EU.

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<sup>1</sup>Source: <http://www.oecd.org/gov/public-procurement/> accessed on February 3, 2019.

Our data contain all types of public contracting authorities (central, regional and local governments, and other types of public authorities conducting PP such as public universities, state church, municipal co-operations) and cover all industries throughout the country. In Finland, we have information on the invitations to tender (ITT) and all the bids and registrations, which we argue to be a very good proxy for potential bidders. This allows for a detailed analysis of entry choices. We also have detailed information on all the participating and potential bidders. The Swedish data is limited to the ITT information.

The reason for the lack of prior evidence is that most of the applications using PP data usually analyze special cases, i.e. they use data from a single type of services or goods, or a single type of contracting authority. In cases where more comprehensive data are available and used, often the auction mechanism is non-standard (see Ferraz et al. 2016 for Brazil and Lee 2017 for Korea), or the data are limited in other ways, such as lacking information on all the bids (e.g. Decarolis et al. 2020 for the US). The richest data (aside ours) concern Lithuania (Baltrunaite 2018) and Russia (Vitalijs 2017 and Best et al. 2018), but even in those, and in all the large data sets we are aware of, information on (or a good proxy for) potential bidders is missing. In addition to these data limitations, research questions are usually focused on specific topics – for a good reason – rather than aimed at providing a comprehensive picture of reasons and remedies for the lack of competition.

We make several key observations. First, there seems to be a serious lack of competition both in Finnish and Swedish PP with a median number of actual bidders of only two. This means that for more than half of the auctions, there are either no bidders, a monopoly bidder or duopoly bidders. Even conditional on attracting at least one bidder, the level of competition is low with the median number of actual bidders being three. The issues associated with the lack of competition are likely to be further exacerbated by the large heterogeneity in size between the bidders within tenders that we observe (Cantillon 2008). The lack of competition is an issue especially in small municipalities, but all the different types of contracting authorities and regions face the same challenge, as do almost all industries.

Second, we argue that the lack of competition is likely to be a problem for procuring goods and services as we show competition (both the number of actual and potential bidders) to have by and large

the desired correlations with two standardized price measures (win margin, and the difference between the expected and realized price). Increasing competition has only a minor influence after six or more bidders participate, but less than 10% of the invitations to tender have more than six bidders. This association between competition and prices is not as trivial as would intuitively seem despite standard auction theory (Bulow and Klemperer 1996, Klemperer 2000) arguing that attracting enough competition is crucial in making public procurement auctions work in getting high-quality goods and services at reasonable prices. The reason is that the “Common values effect” (Bulow et al. 1999, Hong and Shum 2002), the “Affiliation effect” (Pinkse and Tan 2005, Hubbard et al. 2012), and the “Entry effect” (Li and Zheng 2009) may limit the benefits of competition or even reverse the relationship between prices and the number of bidders. We describe these mechanisms later and argue that they may explain why the association between competition and standardized prices is not always monotonic.

Third, and crucially for improving the management practices in public procurement, our data offer a unique opportunity to understand the reasons behind the lack of competition, because we observe the potential bidders in Finland. We show that the lack of competition arises to some extent from the lack of potential bidders, but more importantly from some entry costs that prevent potential bidders from submitting bids. Previous experience in bidding and firm location are strongest firm level predictors of entry in our data, and these channels are highlighted in our interviews as resulting from lack of communication and complex bidding procedures. Our results indicate a need to, first, design the contracts in such a way that they appeal to more firms. This can be achieved by active dialog with the bidders both before and after the official process. Second, to design both the contracts and the bidding process so that it is simple to calculate production costs and submit bids.

One possible avenue to simplify contracts is careful consideration of how to contract for quality: minimum quality requirements in price-only auctions or scoring auctions. We show that the use of scoring auctions is associated with lower entry. Interestingly, in both countries, the negative correlation between the use scoring and competition tends to be more pronounced in industries where the use of scoring is less common. This echoes our qualitative interview results that emphasize that reasons and

solutions to lack of competition are industry specific. To provide more compelling causal evidence, we use procurement office level culture and norms as an instrumental variable for the use of scoring mechanism. To achieve this, we look at how often (relative to national industry level means) each PP unit uses scoring in tenders in other industries than the industry of a given tender. In Sweden, the IV results verify the OLS findings, but in Finland the IV results are noisy due to the smaller sample. Our findings complements recent evidence from a laboratory experiment that scoring auction under-perform in terms of both efficiency and optimality due to their higher strategic complexity (Camboni et al. 2019).

Our analysis contributes also to the recent surge of literature in policy-relevant PP questions. These topics include for example, corruption (Bandiera et al. 2009, Mironov and Zhuravskaya 2016), favoritism (Hyytinen et al. 2018), various political economy concerns (Boas et al. 2014, Baltrunaite 2018, Gulzar et al. 2021, Ruiz 2018), (incomplete) contracting on quality (Hart et al. 1997, Asker and Cantillon 2008, Asker and Cantillon 2010, Lewis and Bajari 2011, Lewis and Bajari 2014), litigation concerns (Coviello et al. 2018b), fiscal policy goals (Ferraz et al. 2016, Balat 2017, Lee 2017), and the nature, amount and effects of competition (Hong and Shum 2002, Tukiainen 2008, Li and Zheng 2009, Bergman and Stake 2015, Kang and Miller 2020, Coviello et al. 2018a). To our knowledge, we are the first to provide a comprehensive description of how competition and entry work in PP in any country.

In the next Section, we describe the relevant institutions and how we construct the data. In Section 3, we analyze the extent and implications of competition. Then we turn to qualitative (section 4) and quantitative (section 5) evidence on the determinants of competitions. We conclude in Section 6.

## **2 Institutional setting and data sources**

### **2.1 Institutional setting**

The Swedish Act on Public Procurement (Lag (2016:1145) om offentlig upphandling) is based on EU Procurement Directive 2014/24/EU. Similarly, the EU procurement rules are transposed in Finland to Act on Public Procurement and Concession Contracts (1397/2016). These rules set out obligations for

contracting authorities, i.e., state and local authorities, congregations and enterprises owned by public authorities. EU and national rules require that all contracts exceeding predetermined EU thresholds shall be concluded on the basis of certain pre-determined procedures. In addition, national procurement acts may set requirements for purchases that fall below under EU thresholds. This is the case for both Sweden and Finland.

The procurement procedure in a nutshell is as follows. When a public entity decides to make a purchase that exceeds the threshold value, it must advertise the contract notice and the Invitation to Tender (ITT) in an electronic notice board. The ITT must include all information about the purchase, thus ensuring that complete information is available to all potential bidders. The invitation also sets the timeline for the procurement procedure and informs bidders about the allocation rule. If the contract exceeds also the EU threshold value, the contract notice shall be advertised also in EU's online contract notice service TED (Tenders Electronic Daily). The procedure is the same across EU, but each member states have their own national contract notice online services. In some member states there is one national contract notice online platform like in Finland, but in some countries such as Sweden, there are multiple privately operated contract notice online platforms used by the public authorities and entities.

Two different allocation rules are dominantly used in public procurement in Finland and Sweden. The first mechanism chooses the lowest price from all the bidders who fulfill the minimum (quality) requirements. The second rule allocates the purchase to the "most economically advantageous bidder". In practice, this means using a scoring rule to evaluate quality criteria (Asker and Cantillon 2008, Asker and Cantillon 2010). In the majority of cases, the weight of the quality score is 50% or less, with the remaining weight being allocated to the price. All bids in our samples are submitted as sealed bids and the winning bidder pays the amount bid.

## **2.2 Procurement data**

In both Finland and Sweden the detailed procurement data we use is not collected by a public authority but instead by private companies and thus, as can be expected, the databases differ between the

two countries. They do however both contain the same key information on competition which makes comparing the countries feasible.

While there is a publicly operated notice board called Hilma in Finland, it doesn't gather any detailed information on the contracts or bids. However, a substantial share of public sector entities use electronic procurement software provided by a single private firm Cloudia Oy to conduct their procurement auctions. Cloudia's expansion has been rapid as their software was introduced only in 2010. From 2010, a gradually increasing amount of municipalities and other public sector agents have started using their platform. We use Cloudia data from public procurement auctions held in Finland between June 2010 - September 2017. A large part of our data is from the more recent years.

Our Finnish data contain over 18,000 ITTs with at least one bidder registration, 275,000 auctions and 705,000 bids.<sup>2</sup> Invitations to tender often contain several separate auctions for which bidders submit individual bids. For example, an invitation to tender may be about office stationery, and the individual auctions within it about paper, pens etc. The latest full year in our data (2016) contains about 30% of all the ITTs for that year (in Hilma), totaling 5.3 billion euro in expected costs.<sup>3</sup> Contracting authorities are not forced to disclose the expected cost, and thus, it is missing for approximately 25% of the invitations to tender.

In Sweden there are four private market operators who provide the platform for public procurement notices. One of these operators is Visma Commerce AB (henceforth Visma), which also collects data concerning Swedish public procurements through sourcing systems, databases, and the web pages of contracting authorities. Moreover, data is collected from contract documents, contract award documents and court case documents. This report is based on the data provided by Visma, which has generated the

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<sup>2</sup>We drop most ITTs with zero registrations from our data as for them we cannot disentangle whether it is a real tender, a mistake or some kind of a test in the Cloudia system. Therefore, the real extent of competition may be even lower than we document. We do however include ITTs with zero registrations if we can successfully link them to the Hilma database.

<sup>3</sup>We cross-reference our data with Hilma to ensure there are no pre- or post-announcements which are not meant for bidding or registrations. We also exclude all such announcements from the Hilma database when comparing the two sets of data. Comparison of our data and Hilma data can be seen in Figure A1 in the online appendix.

data by its own initiative and without any intervention by public authorities or the authors.

The Swedish database contains information on most contract notices advertised in Sweden for the years 2012-2018. We limit our analysis to a subset of the data by including only the normal contract notices that are meant for competitive bidding. The Visma data contains information on the contracting authority and some details on contract award such as the contract award criteria, that is, whether they use best price-quality ratio rules or price only to decide on the winner. The data also contain information on who are the bidders, but for most of the contract awards it does not unfortunately contain information on the bids, the winning price nor the expected value of the contract award, even though the latter is mandatory information to be included in a contract notice according to national and EU rules.

In Sweden, one bidder can be observed maximum one time per contract award, even though same bidder can in some rare cases have submitted multiple bids on the same contract award even when the contract award is not divided into many lots. Additionally, there is no information on lots within divided contracts. Hence, it is impossible to analyse of whether a bidder have submitted a bid for a single lot or to several lots within the contract in question. This means that the number of bidders is not always comparable with the number of bids submitted although this ambiguity can be alleviated to some extent by controlling for observing multiple winners.

For both countries, the industry classifications can be obtained from CPV classification codes.<sup>4</sup> Moreover, we can use information on the bidders to infer the industry for the Finnish data.

The data generating process is otherwise similar in both countries, with the exception that the second step explained below only applies to Finnish data. First, a contracting authority makes a decision to procure something and chooses how to conduct the procurement. At this stage most of the procurement process related data are created, including all the ITT-specific variables. These are the objects of the procurement, the engineer-estimated cost, the allocation rule (scoring vs. price only), and whether bidders are allowed to bid on a subset of auctions. We refer to this option of dividing the contract into

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<sup>4</sup>The common procurement vocabulary (CPV) establishes a single classification system for public procurement in the EU aimed at standardizing the references used by contracting authorities and entities to describe procurement contracts.



separate lots as partial procurement. All tenders in our data follow an open procedure.

In the second step, which we can observe only in Finnish data, potential bidders opt-in to an invitation to tender by registering for the ITT in the Cludia system via a link in Hilma. Based on our discussions with several civil servants who conduct public procurement and Cludia employees, registration is a very good proxy for being a potential bidder. Registering requires only a very small (but non-zero) amount of effort, and allows bidders to access the full tender information that is only available to registered firms. Registering firms then choose whether to actually bid in the auctions concerned. It is not possible to bid without registering. We have data on all the firms that have registered in an ITT and all the bids submitted in the auctions. We also observe auctions where no bids were submitted.

In the final step, the contracting authority awards a contract to one or several economic operators that have submitted a bid. We have the information on the chosen winner(s), which is important in the case of scoring auctions, where sometimes the lowest price doesn't win. We do not have detailed information on what kind of scoring rule has been used or how the bids and quality characteristics are translated into scores.

We merge the Finnish procurement data with detailed firm-level data and with Finnish Longitudinal Employer-Employee Data (FLEED) obtained from Statistics Finland. These data contain information on all the approximately 300,000 Finnish firms and their employees up to and including the year 2016. All the data are matched using the business identity codes that exist for all Finnish companies.

The firm data contain all the information found in the firms' financial statements as well as information on the municipalities where the firm is registered for business. The latter allows us to analyze the importance of geographical presence in public procurement. All the firm data are collected by Statistics Finland on a yearly basis.

Approximately 20% of observations on bidders are lost when merging the data due to incorrect or missing corporate ID in procurement data. Hence we conduct most of our analysis without firm level data to grasp the correct state of competition in public procurement. In this study, firm data are used only when analyzing how firm characteristics correlate with entry and competition.

### 3 Quantitative analysis of competition

#### 3.1 Amount of competition

The key practical concern among the public procurement officials in both Finland and Sweden is whether there will be enough bidders in public procurement contract awards. Attracting enough competition also seems to be the central ingredient from both an academic and an intuitive perspective in making public procurement auctions work in getting high-quality goods and services at reasonable prices (Bulow and Klemperer 1996, Klemperer 2000). The first analysis in this section concerns the extent of competition in Finnish and Swedish PP.

In the left part of the Table 1, we describe the Finnish and Swedish data at the ITT level and report the share of ITTs that have a given number of distinct actual bidders (unique actual bidder identities across all the auctions within the ITT), distinct actual bidders conditional on there being at least one, and registrations for the ITT. The first two metrics are also available for both countries while the number of registrations is only available for Finland. In the right part of Table 1, we describe the data at the within-tender auction level. We report the shares of ITTs within a given bracket as the average number of bidders across the auctions within the ITT, both unconditionally and conditionally on there being at least one actual bidder.<sup>5</sup> The difference between the ITT level and the auction level is potentially relevant as one ITT can contain many auctions in which different bidders participate.

As reported in Table 1, 31.7% of Finnish ITTs have no actual bidders (first row of column 2). This is mainly due to the lack of entry of potential bidders as only 7.2% of ITTs have no potential bidders (first row of column 4). 15.2% of tenders have only one actual bidder (row 2, column 2) and 14.4% only two (row 3, column 2). Less than 10% of ITTs have more than seven bidders. A similar picture emerges when we look at the actual auction level within the ITTs, where the real competition takes place (the last two columns in Table 1).

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<sup>5</sup>Certain invitations to tender have several independent contracts that can be awarded. Hence instead of looking at total number of bids (or bidders) in an ITT, we look at the average number of bids across all objects within each ITT.

**Table 1:** Shares of ITTs with a given number of actual or potential bidders in Finland and Sweden

ITT level						Auction level		
Finland				Sweden		Finland		
count	bidders (n)	bidders (n>0)	registrations (N)	bidders (n)	bidders (n>0)	count bracket	bids	bids (n>0)
0	31.72 %		7.17 %	22.95%		0 - 0.99	35.14 %	6.88 %
1	15.15 %	22.18 %	8.81 %	14.93%	19.38%	1 - 1.99	17.23 %	23.37 %
2	14.37 %	21.04 %	10.19 %	15.41%	20.00%	2 - 2.99	15.50 %	22.70 %
3	11.31 %	16.57 %	11.56 %	13.69%	17.77%	3 - 3.99	11.45 %	16.76 %
4	8.01 %	11.73 %	10.50 %	9.86%	12.80%	4 - 4.99	6.94 %	10.16 %
5	5.07 %	7.43 %	9.13 %	6.85%	8.89%	5 - 5.99	4.50 %	6.59 %
6	3.60 %	5.27 %	7.17 %	4.55%	5.90%	6 - 6.99	2.79 %	4.09 %
7	2.35 %	3.44 %	6.24 %	3.04%	3.94%	7 - 7.99	1.86 %	2.72 %
8+	8.43 %	12.35 %	29.22 %	8.72%	11.32%	8 -	4.60 %	6.73 %
obs	17,944	12,253	17,944	131,601	101,397		17,944	12,253

Notes: The left side of the table presents the shares of invitations to tender with the distinct number of actual bidders and registrations (potential bidders) respectively at the ITT level. Bidders are calculated as the number of distinct actual bidders in an ITT who have submitted at least one bid. For Sweden the ITTs with 0 bidders also include ITTs where the amount of bidders is unknown. The shares of ITTs are reported separately for ITTs with at least one bidder. The right half of the table presents the shares of ITTs at the auction level with average numbers of distinct bids per auction in an ITT. These bids are calculated first for each auction with the ITT, then averaged over the ITT, and then categorized into brackets. There are some ITTs where the average number of bids is lower than one even though the number of bidders is one or more, because there can be auctions where a bidder has not bid.

For Sweden, for which we have a significantly larger amount of ITTs in our sample, the story remains very much the same. The share of ITTs with no bidders or unknown number of bidders is 23.0%, while 53.3% have less than three bidders, and less than 10% have more than seven bidders. These ITT level numbers are the upper bound for competition in public procurement in Sweden, as the numbers of bidders would be at best the same at auction level, although this is unlikely as shown in the Finnish case.

Levels of competition seem to be low across all types of contracting authorities in both countries as shown in Tables A1 and A2 in the online appendix. In Finland the median number of bidders is two for large municipalities including the capital area as well as regional contracting authorities. Both central government and small municipalities seem to attract less competition than large municipalities, with the median number of bidders being only one. When excluding ITTs without any bids, we notice

that the small municipalities are a clear outlier in the amount of competition when looking at both the mean and median number of bidders. Finnish small municipalities also receive on average almost two registrations less than their larger counterparts. These results indicate that both lack of potential bidders and low entry are involved in explaining low competition.<sup>6</sup>

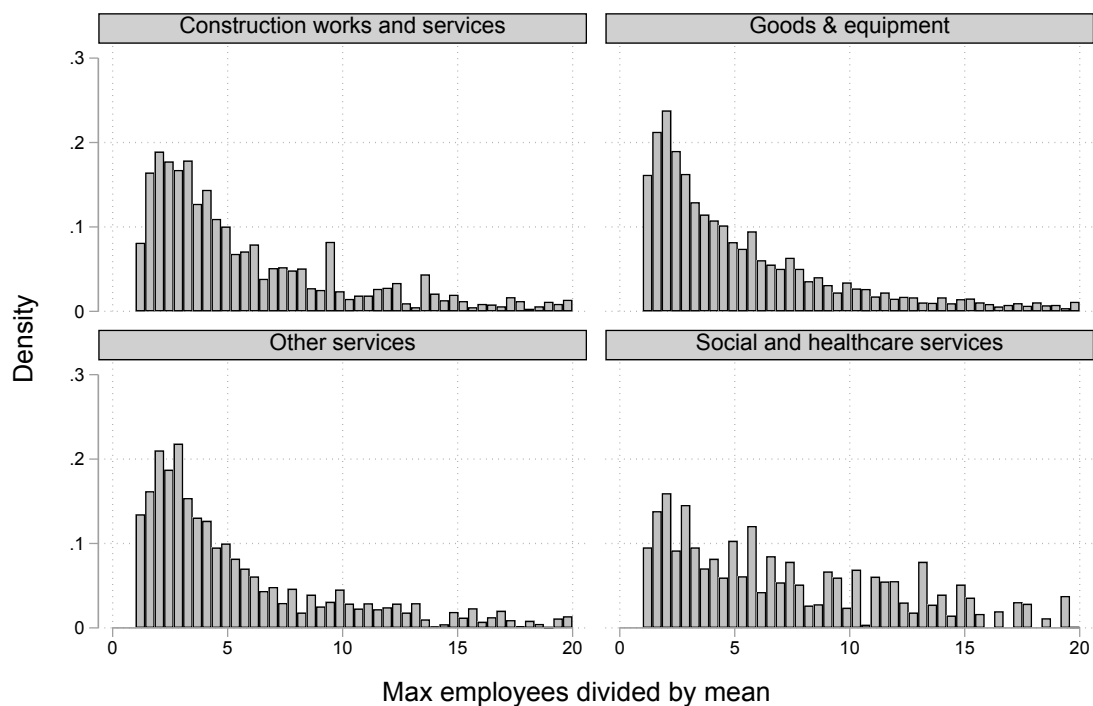
Swedish numbers differ slightly. The median number of bidders for ITTs with at least one bidder is three across different contracting authorities, but when looking at the average number of bidders Swedish regional contracting authorities seem to have roughly one bidder more than other contracting authorities, contrary to the opposite case in Finland. Since we are unable to distinguish between small and large municipal contracting authorities, it is impossible to say whether small Swedish municipalities have a smaller amount competition.

We also look at competition at the industry level and find that aside a few outlier industries, low competition is an issue across most of the industries. In fact, no industry has a median number of bidders larger than three in either country as presented for Finland in Figure A2 and for Sweden in Figure A3 in the Online Appendix.

We also analyze the asymmetry of bidders. Large asymmetries in production costs between bidders lead to less intense competition (Cantillon 2008). Large asymmetries can work both as entry barriers (extensive margin) and also lead to less intense competition between the actual bidders (intensive margin). We study to what extent bidders differ from each other within tenders based on their observed characteristics. Of course, production costs are not observed. In Figure 1, we report the asymmetry of bidders within ITTs based on their employee counts to understand the overall heterogeneity in size. We find that in general there is large heterogeneity in size between bidders within ITTs. This means competition is likely to be even less intense than our analysis of number of actual bidders indicates.

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<sup>6</sup>Relatedly, Table A3 in the Online Appendix reports that while some regional differences in levels of competition within Finland exist, they are not large. In Sweden there are even less regional differences with all regions having the same median distinct bidder count as reported in Table A4 in the Online Appendix.



Notes: Bidder asymmetry is calculated as maximum bidder employee count divided by mean bidder employee count for each invitation to tender. Bidders' employee counts are recorded as an average over the year the ITT took place. Distributions are truncated at 20. The unit of observation is bidder - ITT pair.

**Figure 1:** Distribution of bidder asymmetry in employees, by industry group.

### 3.2 Competition and prices

The second analysis in this section concerns whether competition is associated with prices in Finland. The standard (auction theory) competition argument (“competition effect”) predicts that an increase in competition, i.e. a higher number of actual bidders (denoted with  $n$ ), leads to lower prices (and/or higher quality) in PP. This is because more aggressive bidding is needed to win with more intense competition. However, auction theory (and evidence) also argues that competition may sometimes have the opposite effect. In common-value PP auctions, the winner is the bidder who has estimated the production costs to be lowest (even if the real costs are the same for all bidders). Thus the winner may suffer from the winner’s curse as the real production costs are higher than the winner thought. This underestimation becomes more severe as the number of bidders increases. Rational bidders account for this and bid less aggressively as competition increases. This is called the “Common values effect” (Bulow et al. 1999,

Hong and Shum 2002). A similar winner’s curse may arise in affiliated values auctions where the bidder with the lowest signal on the costs (i.e. the winner) also believes that the other bidders have very low signals, and thus assumes that a lower bid is needed to win that they would assume without the updating of their beliefs resulting from affiliation. A rational bidder who accounts for this bids less conservatively the more competition there is. This is called the “Affiliation effect” (Pinkse and Tan 2005, Hubbard et al. 2012). An “Entry effect” (Li and Zheng 2009) means that the higher the number of potential bidders (denoted with  $N$ ), the less profitable it is to enter due to the more intense competition, and thus it does not make sense to pay the entry costs. Thus an increase in  $N$  does not necessarily reflect in increase in  $n$  or may even lead to a decrease in  $n$  under some assumptions. Due to these concerns, it is an empirical question whether competition has the desired effects. It may also be the case that the effects are nonlinear and the relationship may even reverse at some point. Moreover, the effects of competition are likely to vary case-by-case.

Estimating the effect of competition on prices is tricky, e.g. due to variables being omitted and the selection of bidders via entry. In the auction literature, this is typically addressed with structural models (or experimental designs in the lab). However, the scope of our paper is descriptive. We try to address these issues to some extent through measurement and by providing different types of outcomes for which the methodological issues differ.

First, we use win margin (equation 1), which is available for all auctions with  $n > 1$ , as the key measure.

$$\text{win margin} = \frac{\text{runner-up bid} - \text{lowest bid}}{\text{runner-up bid}} \quad (1)$$

The second measure used is the difference between realized and expected price (equation 2) calculated at an ITT level.<sup>7</sup>

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<sup>7</sup>Expected price is available for about 75% of Finnish ITTs, whereas realized price is available only for about 10% of ITTs. The reason is that while bids are in unit prices we often do not observe the respective quantities of those units. Overall, this

$$\frac{\text{difference between expected and realized price}}{\text{realized price}} = \frac{\text{expected price ("engineer estimate")} - \text{realized price}}{\text{expected price}} \quad (2)$$

These standardizations partially address the omitted variables issues (contract heterogeneity) by differencing across bidders within the same auction, but may involve some other issues such as the win margin and  $n$  having a mechanical relationship.<sup>8</sup> We correlate *win margin* with  $n$  at the auction level and *difference between expected and realized price* with both  $n$  and  $N$  at the ITT level. Using both  $n$  and  $N$  partially addresses the selection issue. However, e.g. collusion may still be an issue. For example, if bidders submit phony bids, then the observed  $n$  is upward-biased from the real level of competition.  $N$  and  $n$  are also somewhat limited in information content if bidders are very asymmetric.

Next, we analyze the correlation between our standardized price measures and the level of competition. These detailed data are available only for Finland. We report both mean and median values, but focus on the median in the analysis as especially mean win margin is very susceptible to outliers.<sup>9</sup> The pattern of results shown in Figure 2 suggests that by and large competition is desirable for contracting authorities as it decreases the win margin. However, the relationship between win margin and  $n$  is not monotonic. This is consistent with case studies (structural econometrics of single industries) reporting non-monotonicity due to the common values effect, the affiliation effect or the entry effect. Moreover, the relationship is nonlinear as the relationship flattens after about three to six actual bidders, depending on industry group.<sup>10</sup> This implies that about six actual bidders seem to be “enough” competition to achieve reasonably narrow win margins.

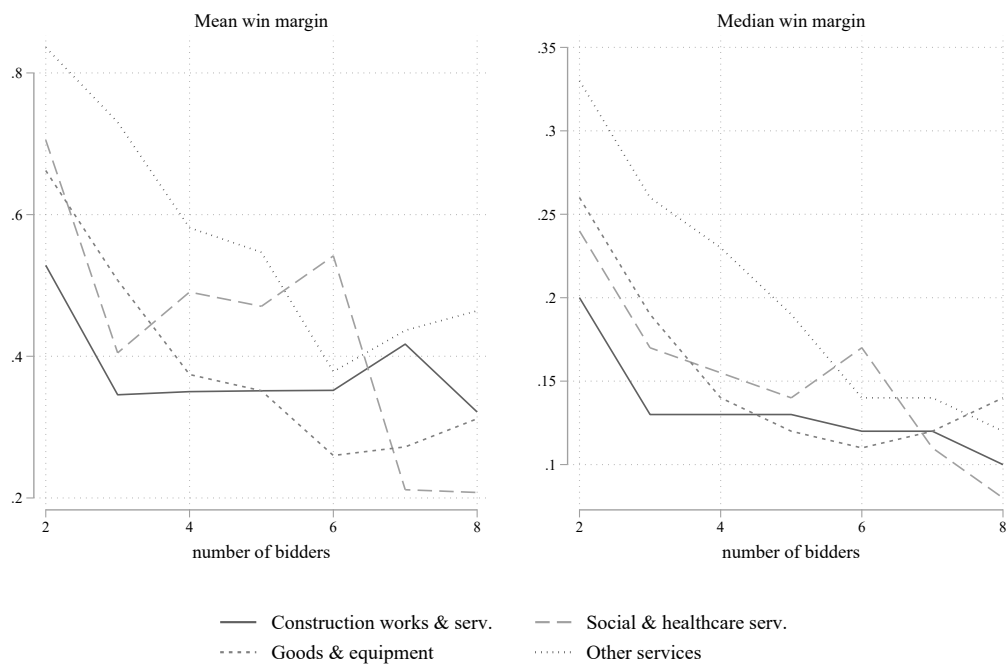
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measure is thus available only for 10% of ITTs.

<sup>8</sup>The more draws are taken from a continuous distribution, the smaller the expected difference between the smallest and the second smallest value gets.

<sup>9</sup>This is due to certain contracts consisting of several objects, for which bidders must submit bids separately. However the contract is based on the combined value of bids across all objects, hence a bidder can bid one euro on all but one object, where a bid for the entire contracts' worth is placed.

<sup>10</sup>This relationship is robust to controlling for the observed ITT characteristics (industry and year fixed effects, contracting authority type and applied auction mechanism.). Results available from the authors.



**Figure 2: Mean and median win margins**

Notes: Win margins graphed as a function of the number of bidders. Graphs are presented by industry group. Win margins are calculated at an auction level. Largest 1% of win margins are deleted as the data contains some unreasonable outliers. Number of bidders is right-censored at 8.



**Table 2:** Mean and median percentage difference in estimated and realized costs

bids	cost difference by bids			cost difference by registrations		
	obs	mean	median	obs	mean	median
1	311	0.28 (0.23)	0.22	112	0.27 (0.19)	0.26
2	390	0.33 (0.26)	0.25	201	0.29 (0.24)	0.21
3	302	0.35 (0.24)	0.29	226	0.31 (0.24)	0.23
4	180	0.40 (0.25)	0.36	218	0.34 (0.26)	0.30
5	143	0.46 (0.26)	0.43	177	0.36 (0.24)	0.30
6	91	0.47 (0.28)	0.47	142	0.37 (0.27)	0.30
7+	184	0.52 (0.26)	0.59	530	0.48 (0.27)	0.49

Notes: Differences are presented only for procurement in the goods category for ITTs where the quantities procured are known. Estimated costs is an engineer estimate posted in the ITT. Realized cost is calculated using data on bids and the amounts procured. Actual contracts might include additional costs not observable in our data. Standard deviations are reported in parentheses below the mean. The unit of observation is ITT.

Table 2 shows that the difference between the expected and realized price also gets larger (expected prices are overestimated more) as the number of bidders increases, providing further support that higher levels of competition are desirable. This result holds both when correlating with number of bidders  $n$  as well as number of registrations  $N$ . Therefore, it seems that the vast majority of Finnish PP would benefit from more actual (and potential) bidders. One caveat of our analysis is that we do not observe the quality of the procured goods and services.

## **4 Qualitative evidence on the determinants of competition**

To understand the reasons and possible remedies for the dramatic lack of competition, we conducted nine interviews both in Sweden (September 2019) and in Finland (February 2020). The selection of interviewees was non-random. Emphasis was given on finding contracting authorities that have a previous track-record of developing their procurement practices, and other organisations (including firm organisation) that have an in-depth understanding of public procurement from bidder perspective across industries. For the purposes of this research, disclosing the identity of the organisations or persons interviewed is not necessary, and thus, the information gathered through these discussions is presented in anonymous manner, which was also promised to the interviewees in order to encourage free discussion. In this section, we briefly summarize the key findings. More details and results are available from the authors.

The concern for lack of competition and reasons for not bidding for public procurement contracts has been extensively looked in earlier interest group surveys (Företagarna 2016, Confederation of Finnish Industries 2018, Svenskt Näringsliv 2019 and Visma Commerce AB 2019). They highlight that many (especially small) firms see PP as too cumbersome. These surveys were in structured electronic form and did not include any interviews. In order to understand the phenomenon more deeply and to develop potential hypotheses for testing via quantitative methods, our one novel contribution is to conduct interviews with key public procurement stakeholders both in Finland and Sweden.

The interviews were semi-structured and based on a general questionnaire (see Appendix C) leaving room for open discussions. Each interview lasted between 30 to 60 minutes. Even though there were only nine interviews per country, the information gathered is very extensive as all interviewed persons were public procurement experts and have years of experience in the field. Here we present only some parts of this information.

## **4.1 Adequate amount of bids**

According to our interviews, it is sometimes difficult to identify a specific number of bids that guarantee enough competition, as this is subject to specific industry and area. Especially in sectors where the companies are specialised in public sector business, or where the market is oligopolistic, it is often the same companies that participate to contract awards, but the competition can still be fierce, even though the number of bids is low. Nonetheless, most respondents considered 3-5 competing bids as a good amount. This is roughly in line with our results on the correlation between number of actual bidders and price in the previous section.

One central purchasing unit stated that the number of competitors cannot be too high or otherwise the process costs become too high for bidders, because the likelihood of winning decreases, and it also becomes too costly for contracting authorities to evaluate. These results are consistent both with the Li and Zheng (2009) entry effect and the concern that the contracting authority may want to limit competition more than the tax-payer simply to avoid the administrative costs of conducting and evaluating the procurement (Kang and Miller 2020).

All interviewed contracting authorities are paying attention to the number of bids they receive. This is not surprising as in this selected sample all of them are also explicitly putting in effort to increase interest towards public procurement. Although most of them attract more bidders than in average, and were chosen for the interview due to their good reputation, they consider there still to be room for improvement. Each had some contracts where only one or no bids were received. One of the interviewed Swedish municipalities (Nacka) reported significant increase in number of bidders after reforming their PP methods. According to information received, the number of bidders there is currently (2019) around 9 bidders per procurement. In the online appendix B, we provide a quantitative case study of Nacka using difference-in-differences method. The results support the claim that the reform in Nacka, for example, implementing extensive dialog with bidders at all stages of contracting, was successful.

According to both contracting authorities and suppliers interviewed, the firms participating in public contract awards are well aware of the other firms that are likely to be bidding in the same contract award,

but not always perfectly. Thus, according to many interviewees, keeping the illusion of competition is more important than the actual number of bids. For example, in a complex health care outsourcing award mentioned during Finnish interviews, a contracting authority only received one bid, but it was very good one both in price and quality. They suspected that the sole bidder was under the impression that there will be more competition.

## **4.2 Reasons for not bidding**

There are numerous reasons for not bidding in public contract awards. The different interviewed organisations give a variety of answers including: market boom (especially affecting certain industries); public sector is not considered an interesting business partner; bidding is resources consuming; administration of bidding is too complicated (complicated rules, complicated procurement documents, no standard forms, each contracting authority asking different things in different manner, requirements to use certain systems and to provide a wide range of documents, there is no time or human resources to draft the bids in SMEs); uncertainty of winning and true value of the contract; the use of “wrong” contract award criteria (price only or best price-quality ratio); contract type (procurement contracts are more attractive to companies than framework agreements due to the uncertainty of the actual amount of purchases and suppliers attached to the latter); ill-designed and atypical procurement for the market in question usually due to the lack of market dialogue (too high, difficult or irrelevant requirements); “wrong” geographical location; language barrier for foreign bidders; lack of trust towards public sector (suspicions that the contract is designed for a certain company or that the bid evaluation is not done correctly) and the lack of contract follow-ups (feeling that bad contractors get away without consequences); bad experience with the contracting authority; difficulties to find the contract notices and difficulties to find the right contracts from the mass of contracts (in Sweden there is no single national database, and there is no culture of active communication by the contracting authorities at a local level in either country) and bad media image (“only lowest prices win” and “unprofessional procurement” headlines scare potential bidders away). We detail focus here on the topics that connect to our quantitative analysis, but overall, there

is strong indication of both information acquisition costs (Levin and Smith 1994) and bid preparation costs (Samuelson 1985) limiting entry.

The reasons for not bidding seem to be often heterogeneous and dynamic, and subject to the firms' experience of contracting with the public sector. First entry barrier relates to information. Public sector is not always considered as a potential business partner. There may not even be knowledge that public sector actually purchases products or services that the firms supply. Moreover, not all firms follow the procurement contract notices regularly, and the lack of centralised contract notice system in Sweden, unlike in Finland, makes finding contracts difficult. Public sector is also often perceived as a very bureaucratic and the award process is viewed as complicated. Furthermore, procurement documents and ESPDs (European Single Procurement Document) are poorly designed and very difficult to understand for potential bidders. This applies especially to companies that do not have previous experience in contracting with the public sector. According to the interviews, these prejudices seem to withdraw, when the companies actually participate to public contract awards. This implies that experience in participating alleviates information frictions. Moreover, many interviewees submitted that if a company participates few times to public procurement procedures without winning any contracts, they eventually give up and lose motivation to spend their resources into unsuccessful bidding. This implies that contract award decisions have dynamic effects on the amount of competition and market structure.

Second entry barrier relates to the complexity of the bidding process. For SMEs the length and complexity of the actual document matters (how many annexes call for tender includes, how much time it takes to go through the requirements, how resources consuming the bidding appears to be, is there additional and/or non-necessary certification requirements that are costly to acquire). Moreover, additional environmental or social requirements make entry difficult as there might not be a possibility, due to the lack of money or other resources, to develop required production processes or to hire and train new personnel. Also experienced and large firms may refrain from entry due to complexity and the characteristics of the contract in question (size, requirements, complexity, extensive designing requirements already at tender stage, requirements to send samples of products and materials, excessive requirements

to describe all kind of processes and practices without actually using them for evaluating the bid).

Third, the reasons for not bidding are also naturally idiosyncratic and may relate to the market situation of a given firm. The firm may have resources already tied elsewhere, or just that B2B trade is more attractive for them. Also the timing of the contract award notice can be relevant, as firms are at times capacity constrained. For example, when there are multiple contract awards at the same time committing to all may not be feasible.

Fourth, in both countries, the impact of the award rule is subject to the industry in question and to the quality differences between companies within a specific industry. The use of scoring auctions involves a certain level of discretion which can worry certain bidders and be perceived arbitrary or preferential. Bidding scoring auctions can also be considered more complex and resources consuming, which indirectly can, in some cases, decrease interest to bid. On the other hand, if a contract is awarded solely based on price, the serious businesses can lose motivation to participate especially on expert service or creative industries. Those bidders that can compete with higher quality and expertise, prefer contract awards where there is a strong emphasis on quality (provided that the quality criteria are of the kind that truly add value and differentiate the potential bidders).

In Finland it seems that the question of the contract award rule (price-only or scoring) is not at the core of the reasons for not-bidding according to the interviews, but many interviewees admit that it significantly affects bidding strategy. On the other hand, in Sweden, the replies concerning the impact of award rule were two-fold. Some suggested that the use of best price-quality ratio increases bidding activity, some the opposite. Their examples revealed that the effect varies across industries. Price only criterion is useful for sectors, where the procured product or service is clear and which contracting authority knows well. If contracting authority understands the market in a specific sector well, it can award the contract based on price only, while simultaneously increasing bidding activity, this is the case e.g. in construction and groceries. This requires that the authority can set the requirements at the right level, the right time period for the flat rate and drafting the price amending clauses in a way that is typical for the sector in question. On the other hand, the use of price or cost only criterion can also decrease

the interest to bid. This is the case for different service sectors e.g. cleaning or transport. Here the use of price only criterion is perceived negatively by the potential suppliers and in a way that the quality of service and personnel's experience would be irrelevant.

### **4.3 How to increase the number of bids**

The medicine to increase the number of bids in both countries according to the interviews is the following: increasing professionalisation and resources of public buyers, considering bidder perspective throughout the process from planning to contract execution: viewing them as future partners instead of counterpart, better and earlier communication throughout the process, understanding industry's characteristics, regular market dialogue practices, long-term procurement planning, better category management, better contract follow-ups, division into lots or smaller contracts and making bidding easier i.e. simpler procurement documents, no unnecessary or irrelevant requirements or placing all risks solely on contractor.

Many of these potential cures for increasing the number of bids are in fact overlapping and interdependent. They could be even summed up to two main points: professionalisation and communication. Professional buyers plan ahead, have strategic goals, have clear procurement objectives and documentation, understand the industry practices and realities from which they are purchasing and aim to have a reputation of a good partner in order to attract the suppliers. Clear communication and dialogue at all stages (also ex-post) of procurement process is important for the potential bidders to find business opportunities, to avoid unnecessary or irrelevant requirements or contract provisions and to avoid that the potential bidders need to a lot time wondering what is said and meant in the procurement documents and whether they should bid or not.

Especially the less experienced companies may need support in learning to bid in public contract awards. Some contracting authorities produce information or even arrange training sessions on how to use the eTendering systems and fulfill the forms. Certain contracting entities are also meeting up with business interest organisations and trying to develop business friendly procuring practices.

It is crucial to make bidding process easier. This is something that contracting authorities in either country, according to the interviews, have not yet addressed properly. In practice easier process can mean pruning procurement documents from all redundant requirements, checking all possible information from public registers instead of requiring bidder to submit multiple proofs or samples. The use of eTendering system has gotten positive feedback from companies and helped to streamline procurement procedures.

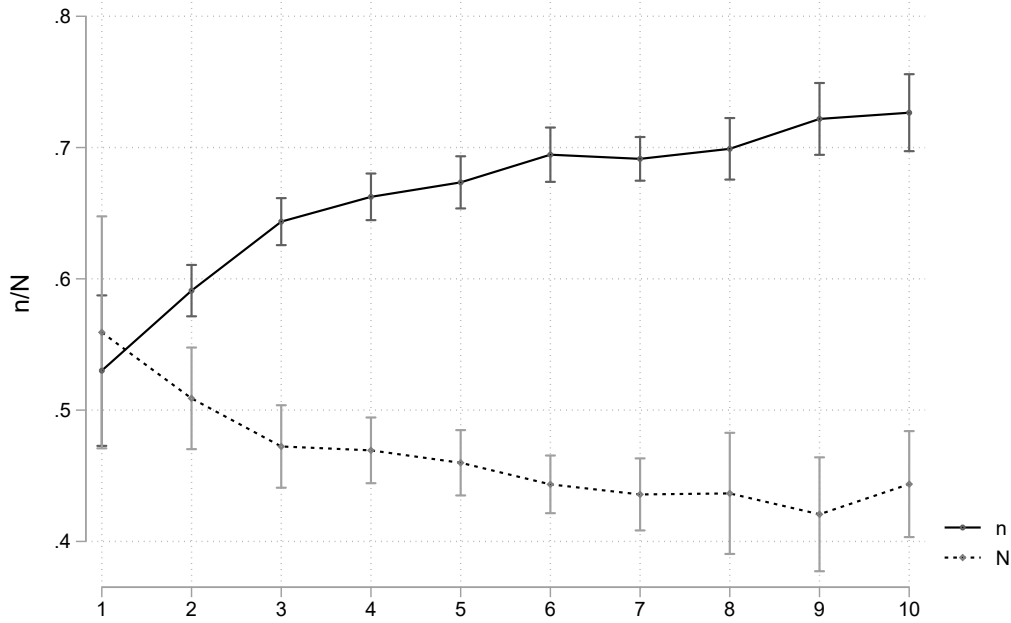
Contracting authorities can have limited knowledge and resources for optimal procurement performance and tend to be tempted to cut their own administrative burden and costs. Too often contracting authorities are planning their contract award processes and criteria from the perspective of what the simple solution from administrative point of view. Some interviewees saw that the detailed legal framework, mandatory contract notices and other official EU procurement documents such as ESPD make it difficult to provide simple and flexible bidding procedure. Some of these difficulties could be addressed by increasing resources at the contracting authorities, increasing the use of central purchasing units, creating centralised procurement units within contracting authorities or enhancing co-operation with other authorities in order to increase resources.

## **5 Quantitative evidence on the determinants of competition**

In this section, we turn to analyzing the lack of competition using quantitative methods. The main goal is to analyze why the levels of competition are so low and whether the data is inline with the qualitative evidence. What are the possible obstacles in attracting more potential bidders and getting potential bidders to actually bid? The key policy design question is whether more competition can be attracted by the means of auction or contract design or by otherwise decreasing entry costs.

We first look at the association between bidding and registering. In Figure 3, we report 95% confidence intervals for the median of  $n/N$  for each  $n$  and  $N$  up to 10. There are two key observations: High level of actual competition ( $n$ ) is achieved when the entry shares are high, but when there are many potential entrants, the entry shares are often low. This leads to one important conclusions that it is rather





**Figure 3:** Predicted mean  $n/N$  for  $n$  and  $N$  respectively

Notes: Predicted means and their 95% confidence intervals are obtained by regressing  $n/N$  on  $n$  and  $N$  dummies respectively. We control for contracting authority and industry group fixed effects as well as the procurement method. Standard errors are clustered at the 2-digit CPV category level. Estimates available only for Finland.

low level of entry than low number of potential bidders that is the key driver of the lack of competition.

In Table 3, we analyze entry patterns in Finnish data by regressing  $n$  (at both the ITT and auction level),  $N$  and  $n/N$  on the ITT characteristics of using scoring and partial mechanisms, ITT size (denoted by engineer estimate), and on how detailed CPV classification is used, while controlling for industry, region and time fixed effects.

*Engineer estimate* shows some interesting patterns. Larger contracts have more potential bidders, but they bid less often as *engineer estimate* negatively predicts  $n/N$ . The resulting actual number of bidders  $n$  remains roughly unaffected. However, the size effects are fairly small in magnitude as the unit is in million euro and typically the contracts are much smaller (median estimated value is 0.157 million euro), implying that adjusting size is of limited practical relevance for affecting competition. The observed auction characteristics have some success in predicting competition and entry. First, *allowing partial bids* is a significant predictor only for the ITT level  $n$  and  $N$ , but that is just mechanical, whereas

**Table 3:** OLS regressions (LPM) on number of registered firms (N), (n) and share of bidders to registrations n/N in Finland

Dependent variable	N		n (ITT)		n (auction)	n/N	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Scoring	0.259 (0.132)	0.361** (0.127)	-0.280** (0.0944)	-0.210* (0.0809)	-0.283* (0.117)	-0.0529*** (0.0127)	-0.0516*** (0.0119)
Partial bids allowed	2.770*** (0.316)	2.712*** (0.330)	1.190*** (0.117)	1.253*** (0.114)	0.207 (0.123)	0.00510 (0.0173)	0.0144 (0.0195)
Engineer estimate (dummy)	-1.133*** (0.152)		-0.0650 (0.140)		-0.0115 (0.107)	0.0861*** (0.0228)	
Engineer estimate		0.0748** (0.0224)		-0.00993 (0.0176)			-0.00469* (0.00218)
Engineer estimate <sup>2</sup>		-0.000214*** (0.0000584)		0.0000244 (0.0000426)			0.0000151* (0.00000582)
Inaccuracy of ITT notice	0.0730* (0.0300)	0.0706* (0.0327)	0.00850 (0.0191)	0.0162 (0.0195)	0.0145 (0.0433)	-0.00600 (0.00355)	-0.00606 (0.00346)
Government	-0.573 (0.501)	-0.750 (0.518)	-0.765*** (0.185)	-0.724** (0.206)	-0.704* (0.304)	-0.0644* (0.0251)	-0.0526 (0.0275)
Region	-4.341*** (0.401)	-1.296* (0.539)	-1.435*** (0.206)	-0.272 (0.371)	-0.987** (0.325)	0.0915*** (0.0190)	0.0800** (0.0258)
Large municipality	-2.434* (1.041)	-2.069 (1.027)	-0.715 (0.598)	-0.619 (0.646)	-0.630 (0.381)	0.175* (0.0731)	0.163 (0.0880)
Small municipality	1.026 (0.841)	1.043 (0.823)	0.157 (1.041)	0.171 (1.030)	-0.449 (0.648)	-0.0365 (0.244)	-0.0403 (0.243)
Constant	6.474 (3.273)	5.242 (3.280)	3.109 (1.722)	3.070 (1.732)	4.169* (1.725)	0.482** (0.147)	0.599*** (0.158)
Observations	12411	10872	12411	10872	169954	11511	10052
R-squared	0.20	0.20	0.13	0.13	0.12	0.11	0.11
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Linear probability model is used in all regressions (1) - (7). Number of bidders (n) is right-censored at 8 and number of registrations (N) is right-censored at 15. Inaccuracy of an ITT notice is measured as the number of zeroes present in the CPV code used in the ITT notice. Regressions were run on the number of bidders (n) for the ITT and auction level respectively. Baseline contracting authority is Capital area. 2-digit CPV classification is used for industry fixed effects. Municipalities are used for area fixed effects. For joint municipalities and healthcare districts, region is used instead. Engineer estimate is available for approximately 75% of ITTs. Engineer estimate is in million euro and is corrected for inflation using 2016 as the base year. The unit of observation is ITT except for regression (5) where the unit is auction. Standard errors are clustered at the industry level. Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

it is not significant at its relevant column of auction level  $n$ .

In contrast, use of *scoring* is statistically significant and negatively associated with actual number of bidders  $n$  as well as the share of bidders to registrations  $n/N$  suggesting that this more complex

auction rule can present an entry barrier. The slightly positive estimate for scoring in column (2) can be explained by potential bidders needing more information about the ITT before deciding on participation.

For Sweden we do not have information on the number of registrations, and thus  $n/N$ , nor on the number of bidders at an auction level. However, a significantly larger number of observations allows us to look at individual industries. In Table 4 we analyze the entry patterns in Swedish data for all industries, as well as construction works, construction services, export services, cleaning services and transport equipment separately.

The number of reported CPV codes (*# of CPV codes*) is positively associated (one more CPV code is associated with 0.026 more bidders) with the number of bidders overall and in all industries except cleaning services. If this correlation would indicate causal relationship, a potential interpretation could be that reporting many CPV codes attracts the attention of more potential bidders who automatically receive contract notices under pre-specified CPV codes. For obvious reason, the *Many winners* dummy, similarly to *Partial bids allowed* dummy in the Finnish case, has a large positive association, because it mechanically captures the contracts that are divided into multiple lots, even though it is not a perfect measure of dividing into lots as other types of contracts can have multiple winners too. However, we see in Table 3 column (5) that dividing a contract into multiple lots might be slightly positively correlated also with the amount of bidders on individual lots.

The most interesting result in the Swedish sample concerns the use of scoring rule. While overall in whole sample the use of *scoring* criterion is not associated in a statistically significant way with the number of bidders, there is interesting heterogeneity in this association across the industries. This finding is in line with the interviews. In particular, in construction works, the use of *scoring* auction is negatively associated with the number of bidders to the extent that use of best price-quality ratio predicts 0.3 less bidders. This seems like a large magnitude given the small mean and median number of bidders. Interestingly, the use of scoring rule was relatively least common in the construction work ITTs.

One of the problems with interpreting the connection between scoring rules and the amount of competition is the endogeneity involving the use of scoring mechanism. We observe that procurement

**Table 4: OLS regressions (LPM) on number of bidders (n) in Sweden**

	All	Construction works	Construction services	Expert services	Cleaning services	Transport equipment
	(1)	(2)	(3)	(4)	(5)	(6)
Scoring	-0.092 (0.075)	-0.292*** (0.024)	0.056 (0.049)	0.194*** (0.056)	0.042 (0.059)	-0.036 (0.045)
Unknown mechanism	-0.400*** (0.113)	-0.708*** (0.041)	-0.321*** (0.094)	-0.163 (0.107)	-0.536*** (0.119)	-0.12 (0.110)
Many winners	3.149*** (0.104)	3.187*** (0.038)	3.583*** (0.053)	3.434*** (0.056)	2.501*** (0.067)	2.307*** (0.093)
# of CPV codes	0.026*** (0.004)	0.020*** (0.003)	0.033*** (0.008)	0.067*** (0.014)	-0.027* (0.015)	0.073*** (0.013)
Contract length	0 (0.0000)	-0.0001*** (0.0000)	-0.0003*** (0.0000)	0 (0.0000)	0 (0.0000)	0.0003*** (0.0000)
In TED	0.213*** (0.030)	0.252*** (0.032)	0.165*** (0.054)	0.158*** (0.059)	0.495*** (0.062)	0.100** (0.048)
Municipal corporation	-0.205*** (0.049)	-0.286*** (0.025)	-0.266*** (0.064)	-0.230** (0.091)	-0.258*** (0.064)	-0.100* (0.058)
Regions	-0.019 (0.064)	0.028 (0.055)	0.259** (0.109)	-0.196** (0.081)	-0.137 (0.128)	-0.209** (0.103)
State agency	-0.092 (0.086)	-0.023 (0.038)	-0.438*** (0.068)	-0.033 (0.066)	0.787*** (0.087)	-0.073 (0.083)
State corporation	-1.454*** (0.086)	-1.326*** (0.072)	-1.249*** (0.236)	-1.896*** (0.113)	-1.621*** (0.172)	-1.520*** (0.128)
Other	-0.864*** (0.065)	-0.859*** (0.063)	-1.280*** (0.207)	-1.125*** (0.202)	-0.26 (0.365)	0.267 (0.472)
N	131,601	42,107	10,311	8,711	7,384	5,314
R <sup>2</sup>	0.277	0.200	0.354	0.302	0.199	0.205
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	No	No	No

Notes: Linear probability model is used in all regressions (1) - (6). Number of bidders (n) is right-censored at 8. Baseline contracting authority is municipality. 2-digit CPV classification is used for industry fixed effects. The unit of observation is ITT. Standard errors are clustered at the industry level for the first regression. Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

of certain industries is much less likely to use scoring rule to determine the winner, while other industries might favor its use. To address this issue and to obtain more robust understanding on the effect of using a scoring rule on the amount of competition, we construct an instrument for scoring which we then use to explain the number of bidders in a two-stage least squares regression. We repeat this exercise for both Finnish and Swedish data.

Intuitively, our instrument exploits the tendency that a given contracting authority is more (or less) likely to award contracts using scoring rule than the national industry averages for all their ITTs. They may have a habit or norm of using similar procedures across the different ITTs within a unit despite the contracting for different types of goods or services. Formally, we construct our instrument  $Z_{ik}$  for contracting authority  $i$  and industry  $k$  using the difference between contracting authority's use of scoring rule in other industries  $l \neq k$  and the national prevalence of using a scoring rule in industries  $l \neq k$  to determine how likely (or unlikely) the contracting authority is to use scoring for any given ITT  $j$  in the industry  $k$ . We assume that contracting authority's tendency to use (or not to use) scoring in other industries it procures does not affect the amount of competition in the industry studied thus fulfilling the exclusion restriction. At the same time we assume that a contracting authority that is more likely to use scoring rule in ITTs for other industries is also more likely to use scoring rule in the industry and ITT studied. The first stage can be written as

$$scoring_{ik} = \alpha_0 + \alpha_1 Z_{ik} + \alpha_2 X_{ij} + \varepsilon_{ik} \quad (3)$$

where  $Z_{ik}$  is the instrument defined above and  $X_{ij}$  is a set of contracting authority and ITT specific controls. The results of the first stage regressions are presented in Table 5. We see that in Sweden (regressions (4) - (6)) the first stage returns strong results that are robust to including fixed effects ITT characteristics<sup>11</sup>. For Finland our 1st stage estimates are statistically significant but the instrument is less powerful in explaining the use of scoring in an ITT, especially when controlling for various fixed

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<sup>11</sup>ITT characteristics include partial dummy, engineer estimate and inaccuracy of ITT notice for Finland. For Sweden they include unknown mechanism dummy, many winners dummy, of CPV codes, contract length and TED dummy.

effects.

The first stage results are interesting also on their own. We find strong evidence of unit specific norms and habits. This suggest that many contracting authorities may not be thinking carefully enough about the optimal mechanism for each case.

**Table 5:** First stage regressions for Finland and Sweden

	Finland			Sweden		
	(1)	(2)	(3)	(4)	(5)	(6)
ScoringIV	0.534*** (0.023)	0.256* (0.030)	0.255* (0.030)	0.733*** (0.035)	0.699*** (0.031)	0.703*** (0.033)
Constant	0.521*** (0.004)	-0.289* (0.117)	-0.242* (0.117)	0.470*** (0.051)	0.386*** (0.015)	0.351*** (0.012)
N	12370	11571	11571	120233	120233	120233
R <sup>2</sup>	0.035	0.273	0.274	0.071	0.164	0.168
ITT characteristics	No	No	Yes	No	No	Yes
Year FE	No	Yes	Yes	No	Yes	Yes
Month FE	No	Yes	Yes	No	Yes	Yes
Region FE	No	Yes	Yes	No	Yes	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Contr. auth. type FE	No	Yes	Yes	No	Yes	Yes

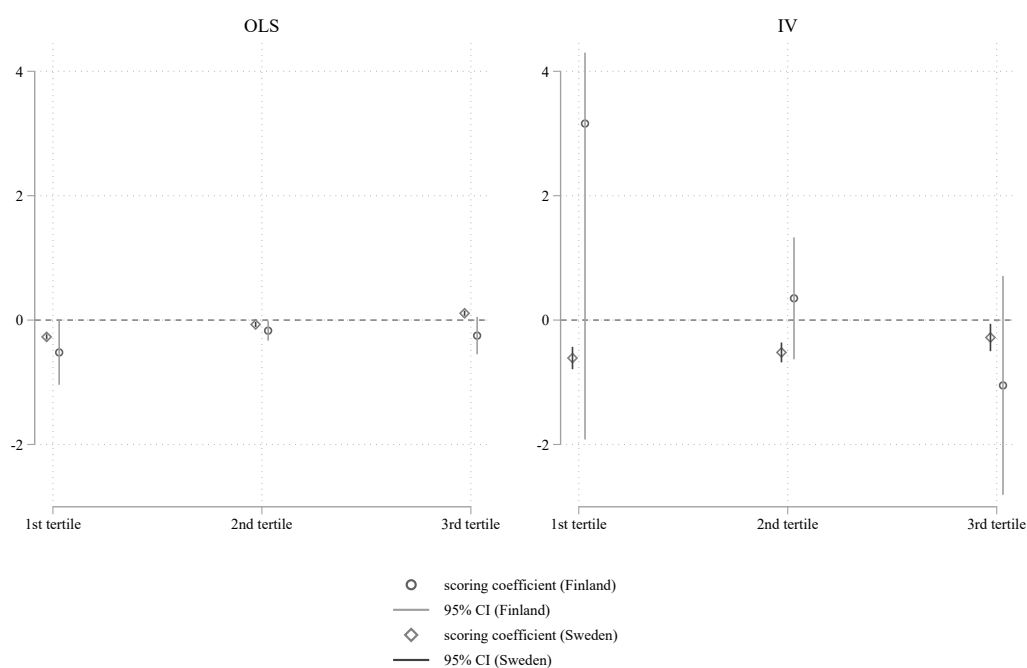
Notes: We regress the instrument on the scoring dummy which indicates whether scoring rule was used in an ITT. ITT characteristics include ITT specific attributes such as engineer estimate, allowance of many winners, allowance of partial bidding, contract length and number of bidders. 2-digit CPV classification is used for industry fixed effects. The unit of observation is ITT. Standard errors are heteroskedasticity-robust. Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

In the second stage we regress the number of bidders in ITT  $n_{ijk}$  on the instrument  $Z_{ik}$  and a contracting authority, ITT and industry specific controls  $X_{ijt}$ .

$$n_{ijk} = \beta_0 + \beta_{ik}^{IV} \text{scoring}_{ik} + \beta_2 X_{ijt} + v_{ijt} \quad (4)$$

The controls in  $X_{ijt}$  are same as in the regressions used in tables 3 and 4, thus varying slightly across the two countries.

To confirm our findings about industry heterogeneity in Table 4, we divide our data into tertiles of equal size based on the prevalence of scoring rules within the industry. We use tertiles to ensure a large enough number of observations in each subgroup. First tertile includes the third of the ITTs with least prevalent use of scoring rule at the industry level, while the third tertile includes the third of all ITTs where the use of scoring rule is most common. We run the same aforementioned specification for all tertiles and both countries. The estimates  $\beta_{ik}^{IV}$  from these regressions are presented in Figure 4 together with the scoring estimates  $\beta_i$  from OLS regressions conducted on the same tertiles.



**Figure 4:** Scoring coefficient for OLS and 2SLS regressions.

Notes: Figure shows coefficients for scoring when regressing on the number of bidders in an ITT. Controls used in the regressions are same as in tables 3 and 4 for Finland and Sweden respectively. Tertiles are created by dividing data equally into three groups based on how popular the use of scoring rule is within in industry. Using scoring rule is least common in the first tertile and most common in the third tertile. Regressions are done separately for each tertile. Confidence interval for 1st tertile coefficient from Finnish data is shown only partly as it extends to 8.24.

We see a negative correlation between how commonly used the scoring rule is in an industry and the association between scoring rule and number of bidders. ITTs in industries where the use of scoring is rare (e.g. construction works) have a larger drop in the number of bidders. Results seem to hold for both countries in OLS analysis. Importantly, the results clearly hold for Sweden also when using the instru-

mental variable approach. For Finland our IV estimates are not statistically significantly different from zero. The confidence intervals are wider due to the smaller sample and weaker instrument. Therefore, we do not learn whether there is a causal relationship between the use of scoring and competition for Finland or not. For example, the use of scoring can be correlated with something else, for example the general complexity of the ITT. We also test whether the results are similar when using full sample. We see in Table A5 in the Online Appendix that the *scoring* coefficient from 2SLS regression is significant and negative (-0.501) for Sweden, but not statistically significantly different from zero for Finland.

Our observations are in line with how people working in practice in public procurement view the issue of low competition. A representative of one contracting authority admitted that the use of scoring rule has problems and that it is likely fully understood only by those bidders who commonly participate in public procurement.<sup>12</sup> Bidders have also voiced their concerns in public about publicly procured contracts being too complex and demanding, thus discouraging especially smaller firms from participating.<sup>13</sup>

Finally, we turn to data on individual bidders and analyze the firm level entry choices of the registered potential bidders in Finland. Here we use the combined public procurement and firm register data. Based on Table 6, locality (*present in the same municipality or region*) correlates strongly with entry. Previous experience in bidding is also a strong predictor of entry, in line with arguments made in the interviews. Other firm characteristics have less predictive power. Another interesting result that echoes our previous findings is that the use of scoring auctions seems to correlate with less entry (as long as fixed effects are included).

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<sup>12</sup>Source (in Finnish): <https://kuntatekniikka.fi/2019/04/29/julkisiin-hankintoihin-turhan-vahan-tarjouksia-karkaavatko-kustannukset-kasista/> accessed on October 31, 2019.

<sup>13</sup>Source (in Finnish): <https://www.talouselama.fi/uutiset/julkiset-kilpailutukset-jaavat-usein-ilman-tarjouksia/cd1099d3-b5c3-42d9-9574-2241688718b8> accessed on October 31, 2019.



**Table 6:** Regressions on entry decision conditional on registering

Dep. var.: Has bid conditional on registration	Logit		LPM	
	(1)	(2)	(3)	(4)
Has bid in previous year	0.851*** (0.0698)	0.739*** (0.0505)	0.191*** (0.0113)	0.159*** (0.00851)
Has bid in previous year (same region and industry)	0.234*** (0.0379)	0.255*** (0.0421)	0.0578*** (0.00963)	0.0611*** (0.0100)
Has registered in previous year	-0.824*** (0.0828)	-0.720*** (0.0606)	-0.184*** (0.0208)	-0.154*** (0.0138)
Present in same municipality	0.254*** (0.0406)	0.256*** (0.0420)	0.0615*** (0.00988)	0.0603*** (0.00966)
Present in same region	0.180** (0.0559)	0.187*** (0.0486)	0.0430** (0.0135)	0.0443*** (0.0112)
Backlog	0.0000197 0.0000182	0.0000159 0.0000151	0.00000451 0.00000439	0.00000417 0.00000371
Backlog/Turnover	-0.0000403** (0.0000139)	-0.0000144 (0.0000149)	-0.00000931** (0.00000300)	-0.00000378 (0.00000345)
Turnover	0.000112 (0.000197)	0.000131 (0.000262)	0.0000269 (0.0000422)	0.0000286 (0.0000541)
Turnover <sup>2</sup>	-0.000000874 (0.000000997)	-0.00000104 (0.00000118)	-0.000000199 (0.000000183)	-0.000000222 (0.000000210)
Engineer estimate/Turnover	0.00000349 (0.0000118)	0.00000662 (0.00000961)	-0.00000552*** (0.00000538)	-0.000000362 (0.000000209)
(Engineer estimate/Turnover) <sup>2</sup>	-0.71e <sup>-11</sup> (1.07e <sup>-11</sup> )	-9.41e <sup>-12</sup> (8.87e <sup>-12</sup> )	-1.52e <sup>-13</sup> *** (2.99e <sup>-14</sup> )	-7.06e <sup>-14</sup> (1.14e <sup>-13</sup> )
Employees	0.00398 (0.00211)	0.00421 (0.00263)	0.000940 (0.000484)	0.000979 (0.000581)
Scoring	-0.173 (0.0957)	-0.287** (0.0931)	-0.0409 (0.0228)	-0.0655** (0.0206)
Partial	0.222 (0.118)	0.171 (0.102)	0.0512* (0.0243)	0.0387 (0.0215)
Engineer estimate	-0.0219 (0.0273)	-0.0185 (0.0266)	-0.00373 (0.00221)	-0.00296 (0.00186)
Engineer estimate <sup>2</sup>	0.000112 (0.000328)	0.0000875 (0.0000290)	0.00001211* (0.00000561)	0.0000101* (0.00000467)
Constant	-0.232 (0.143)	0.142 (0.243)	0.441*** (0.0335)	0.528*** (0.0529)
Observations	67,517	67,457	67,517	67,470
Industry FE	No	Yes	No	Yes
Region FE	No	Yes	No	Yes
Year FE	No	Yes	No	Yes

Notes: Specifications (1) - (2) use a logit and (3) - (4) use a linear probability model. Dependent variable is a dummy indicating whether a firm has bid in any auction in an ITT conditional on registering for the given ITT. Backlog, turnover and tender values are in million euro. Employees are in 100s. Backlog is calculated taking the sum of the values (engineer estimates) of tenders awarded to the firm in our data during one year prior to the observed ITT. Standard errors are clustered at the industry level. Observations are registered firm - ITT pairs. Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## 6 Conclusion

We use unique, comprehensive and rich data on Finnish and Swedish public procurement and qualitative interviews to provide a set of novel results on the extent, implications and determinants of competition. First, we document a serious lack of competition in both Finnish and Swedish PP in general and across almost all industries, and all regions and contracting authority types. While the lack of such heterogeneity is in itself an argument in favour of the external validity of our results, the lack of competition seems not to be limited to Finland and Sweden, as similar patterns are observed also in Russian (Vitalijs 2017) and Lithuanian data (Baltrunaite 2018), and in the EU in general (European Commission 2017), as well as in the US (Kang and Miller 2020).

Second, the lack of competition seems to be a problem for tax payers as competition has the desired and expected associations with standardized price measures. Third, the lack of competition results in particular from potential entrants not actually bidding, but also to some extent from the lack of potential entrants. As such this calls for the contract design and other procedural improvements to make contracts more attractive and to decrease entry costs.

Our interview results indicate that there are numerous reasons for the lack of competition and they relate both to bidder side, contracting authorities procedures and regulation. Often the entry barriers relate to information constraints and the complexity of the procedures. The suggested cures can be summed up to two main points: professionalisation and communication. Professional buyers plan ahead, have strategic goals, have clear procurement objectives and documentation, understand the industry practices and realities from which they are purchasing and aim to have a reputation. Clear communication and dialogue at all stages (also ex-post) of procurement process is important for the potential bidders to find business opportunities, to avoid unnecessary or irrelevant requirements or contract provisions and to allow the potential bidders to make entry decisions easily. The interview reveal also that many concerns are industry specific. For example, scoring are perceived to decrease competition but only in some industries.

In line with these interviews, we use both OLS and IV estimation to show that the use of scoring auctions is detrimental to competition, in particular, in industries where their use is not typical. This indicates one potential auction rule based remedy, at least if there are other feasible ways to contract for quality. However, in practise it may be difficult to attract substantially more competition. Therefore, a more rigorous use of reservation prices could be implemented to limit the high prices that the lack of competition leads to (Myerson 1981, Gentry and Li 2014 and Vitalijs 2017).

However, another consideration is that perhaps not all auctioneers want to engage in attracting more competition, but rather have their favoured producers. In some cases such discretion may be warranted and optimal (Kang and Miller 2020, Coviello et al. 2018a), but it can also be motivated by favoritism (Hyytinen et al. 2018) or corruption (Boas et al. 2014, Baltrunaite 2018, Gulzar et al. 2021, Ruiz 2018). Moreover, there can be principal-agent problems between the tax payer and the auctioneer as the auctioneer may want to limit competition simply to avoid the administrative costs of conducting and evaluating the procurement (Bajari and Tadelis 2001, Bandiera et al. 2009 and Kang and Miller 2020). We leave the analysis of contracting authorities' know-how and incentives for further research.

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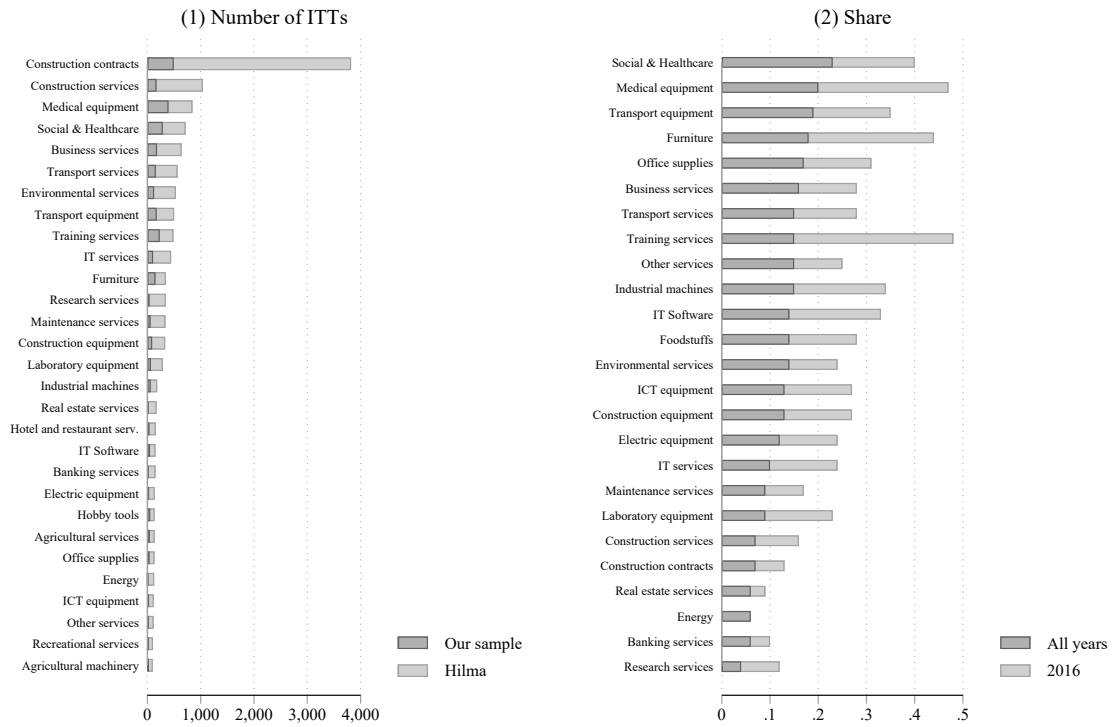
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# Online appendix

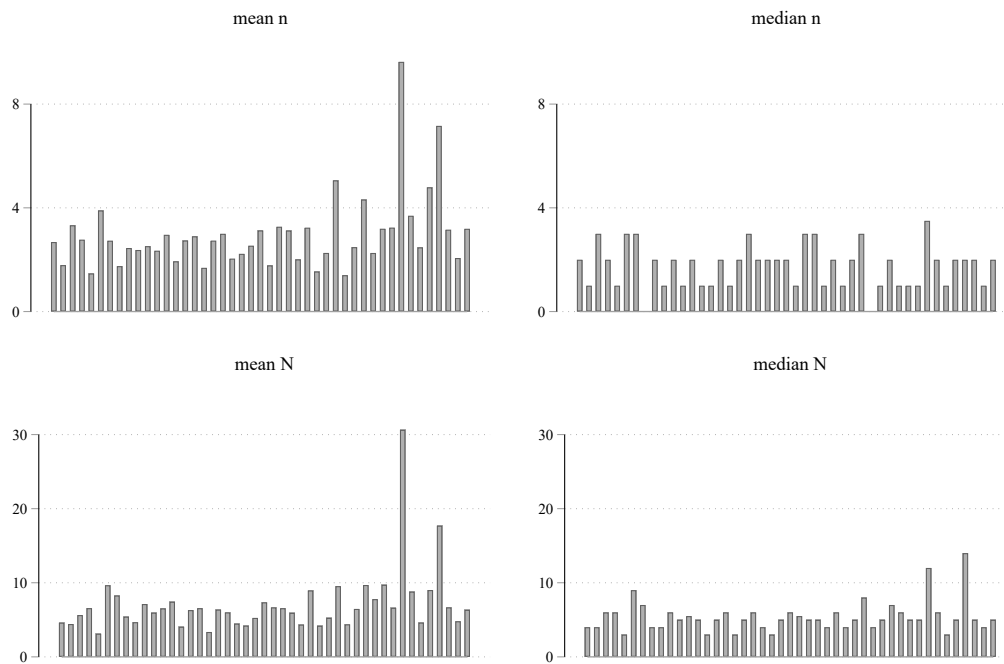
## 6.1 Appendix A: Additional figures and tables



**Figure A1: Comparison of our sample to Hilma database**

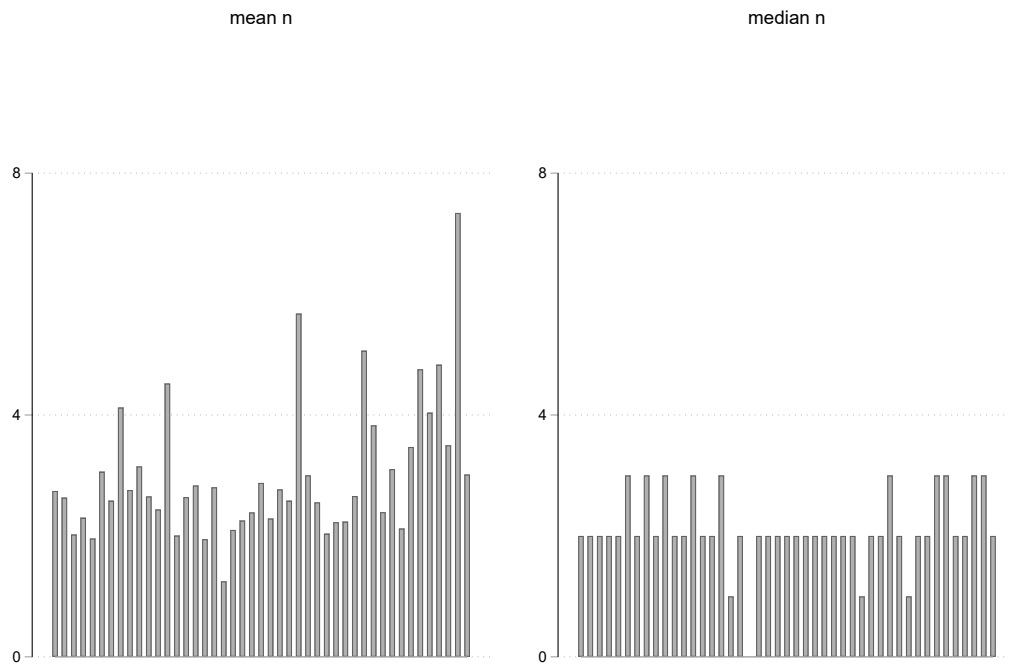
Notes: Graph (1) presents the number of invitations to tender in year 2016 in our sample and the Hilma database. Graph (2) displays the representativeness of our data as the share of ITTs in our sample compared to Hilma database in the whole sample period (2010 - 2017) and its most representative year (2016). Hilma database contains information on all public procurement in Finland. Categories are based on the CPV classification.





**Figure A2: Mean and median numbers of bidders and registrations by industry in Finland**

Notes: Each bar represents an industry categorized at 2-digit CPV classification. The two clear outliers are forestry and social and healthcare services. Forestry services are an anomaly in our data as it is common that up to 30 winners are awarded in ITTs where over a hundred companies have registered. Social and healthcare services similarly have several ITTs with very large numbers of bidders, inflating especially the mean values.



**Figure A3:** Mean and median numbers of bidders by industry in Sweden

Notes: Each bar represents an industry categorized at 2-digit CPV classification.

**Table A1:** Mean and median distinct bidders, avg. bids in auctions and registrations in Finland

		bidders	bidders n>0	bids	bids n>0	registrations
Government	mean	2.79	4.90	1.86	3.28	8.88
	median	1	3	1	2	4
	obs	2,228	1,268	2,228	1,268	2,228
Region	mean	3.70	5.19	2.90	4.07	7.98
	median	2	3	1.98	3	5
	obs	2,526	1,800	2,526	1,800	2,526
Capital area	mean	2.64	3.74	2.04	2.88	5.88
	median	2	3	1.50	2	4
	obs	3,353	2,369	3,353	2,369	3,353
Large municipalities	mean	3.02	4.18	2.35	3.25	6.66
	median	2	3	2	2.63	5
	obs	9,279	6,697	9,279	6,697	9,279
Small municipalities	mean	1.90	2.50	1.67	2.21	4.88
	median	1	2	1	2	4
	obs	553	419	553	419	553

Notes: Registrations (potential bidders) depict the number of distinct firms registered for an ITT. Bidders are calculated as the number of distinct actual bidders in an ITT who have submitted at least one bid. Bids are calculated first for each auction, then averaged for the ITT, and then for the industry. Bidder and bid statistics are also calculated for the whole sample as well as separately for ITTs with at least one bidder. The unit of observation is ITT.

**Table A2: Mean and median distinct bidders in Sweden**

		bidders	bidders n>0
Government	mean	3.27	4.27
	median	2	3
	obs	26,154	20,071
Region	mean	4.36	5.27
	median	3	3
	obs	13,157	10,876
Municipal corporation	mean	2.92	4.05
	median	2	3
	obs	28,420	20,456
Municipality	mean	3.33	4.20
	median	2	3
	obs	61,272	48,565
Other	mean	2.50	4.54
	median	1	3
	obs	2,598	1,429

Notes: Government includes both government agencies and corporations. Bidder statistics are also calculated for the whole sample as well as separately for ITTs with at least one bidder. The unit of observation is ITT.

**Table A3: Mean and median distinct bidders, avg. bids in auctions and registrations by region, Finland**

region		bidders	bidders n>0	bids	bids n>0	registrations
Central Finland	mean	2.17	3.69	1.82	3.10	5.38
	median	1	2	1	2	4
	obs	492	289	492	289	492
Central Ostrobothnia	mean	2.38	2.63	2.22	2.45	3.94
	median	2	3	2	2.47	4
	obs	145	131	145	131	145
Kainuu	mean	3.34	3.89	2.65	3.09	7.24
	median	3	3	2	2.67	6
	obs	500	429	500	429	500
Kymenlaakso	mean	3.41	4.33	2.53	3.22	6.97
	median	2	3	2	2.55	5
	obs	734	578	734	578	734
Lapland	mean	2.38	3.41	1.88	2.69	5.18
	median	1	2	1	2	4
	obs	395	276	395	276	395
North Karelia	mean	3.10	3.66	2.50	2.95	6.38
	median	2	3	2	2	5
	obs	1,856	1,573	1,856	1,573	1,856
Northern Ostrobothnia	mean	2.64	3.43	2.16	2.81	5.53
	median	2	2	2	2	4
	obs	1,615	1,241	1,615	1,241	1,615
Northern Savonia	mean	2.90	4.18	2.06	2.97	6.62
	median	2	3	1.69	2.32	5
	obs	1,050	728	1,050	728	1,050
Ostrobothnia	mean	2.51	3.53	2.11	2.96	6.09
	median	2	3	2	3	5
	obs	104	74	104	74	104
Pirkanmaa	mean	3.38	5.13	2.58	3.92	8.05
	median	2	4	1.50	3	6
	obs	1,130	744	1,130	744	1,130
Päijänne Tavastia	mean	2.77	4.44	2.23	3.58	7.26
	median	1	3	1	3	5
	obs	353	220	353	220	353
Satakunta	mean	2.07	3.68	1.78	3.17	5.97
	median	1	3	1	2.50	4
	obs	1,230	692	1,230	692	1,230
South Karelia	mean	2.50	3.35	2.13	2.85	5.36
	median	2	3	2	2	4
	obs	256	191	256	191	256
Southern Ostrobothnia	mean	2.11	3.04	1.73	2.48	4.96
	median	1.50	3	1	2	4
	obs	148	103	148	103	148
Southern Savonia	mean	2.30	3.02	1.99	2.61	4.99
	median	2	2	2	2	4
	obs	538	409	538	409	538
Southwest Finland	mean	2.77	4.38	2	3.17	6.65
	median	1	3	1	2	4
	obs	865	546	865	546	865
Tavastia Proper	mean	3.67	5.45	2.25	3.34	7.67
	median	2	4	1.93	2.84	5
	obs	263	177	263	177	263

**Table A4: Mean and median distinct bidders by region, Sweden**

region		bidders	bidders n>0
Greater Stockholm	mean	3.72	5.04
	median	2	3
	obs	21,432	15,813
Skåne	mean	3.53	4.4
	median	3	3
	obs	11,470	9,183
South-West	mean	3.43	4.41
	median	2	3
	obs	11,001	8,544
South Central	mean	3.34	4.11
	median	2	3
	obs	11,892	9,665
North Central	mean	3.29	4.06
	median	2	3
	obs	14,883	12,052
South-East	mean	3.27	4.14
	median	2	3
	obs	7,238	5,718
Address missing	mean	3.23	4.27
	median	2	3
	obs	29,786	22,558
East	mean	3.12	4.13
	median	2	3
	obs	9,167	6,939
Southern Norrland	mean	3.03	3.97
	median	2	3
	obs	7,953	6,077
Northern Norrland	mean	2.51	3.51
	median	2	3
	obs	6,779	4,848

Notes: Bidders are calculated as the number of distinct actual bidders in an ITT who have submitted at least one bid. Bidders are calculated separately for whole sample and for ITTs with at least one bidder. The unit of observation is ITT.

**Table A5:** Full sample IV 2SLS regressions on number of bidders  $n$  for Finland and Sweden

	Finland	Sweden
	(1)	(2)
ScoringIV	0.764	-0.501***
	(0.992)	(0.094)
Constant	2.597	2.401***
	(1.725)	(0.098)
N	11,571	120,233
$R^2$	0.07	0.26
ITT characteristics	Yes	Yes
Year FE	Yes	Yes
Month FE	Yes	Yes
Region FE	Yes	Yes
Industry FE	Yes	Yes
Procurer FE	Yes	Yes

Notes: We regress the instrument on the number of bidders for full sample. Scoring coefficient shown for full model. ITT characteristics include ITT specific attributes such as engineer estimate, allowance of many winners, allowance of partial bidding, contract length and number of bidders. 2-digit CPV classification is used for industry fixed effects. The unit of observation is ITT. Standard errors are heteroskedasticity-robust and clustered on industry. Standard errors in parentheses. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## 6.2 Appendix B: Nacka case study

In our interviews, Nacka municipality is viewed as exemplary case for increasing competition and adopting market friendly procurement practices. Since mid-2016 Nacka has adopted new purchasing policy (Nacka Inköspolicy 2017) and process guidance (Nacka Inköpsprocessen 2016) and has set market friendly procurement one of its most important objective of its business strategy (Nacka Näringslivstrategi 2018). For example, the municipality is to create prerequisites for small-business-friendly procurement and to support innovative and entrepreneur friendly business culture through developing early stage procurement dialogues and follow-ups in order to benefit of the suppliers' innovations, development and market knowledge (Nacka Näringslivstrategi 2018). These new guidelines have led to estab-

lishment of novel purchasing procedures. Market friendly approach, dialogue throughout the contract's cycle and SME friendly practices are also underlined at the purchase policy level (Nacka Inköpspolicy 2017). First, all contract awards start with some kind of market dialogue depending on the product / service category and contract type well in advance. Second, category management and procurement strategies were introduced and implemented, category level procurement calendars and plans are drafted well in advance, and the market is informed of upcoming procurements through different communication measures in advance. Third, Nacka has made efforts also in designing the documents so that administration of bidding would be easier. The procurement documents, division into lots or bundling of different contracts are designed so that they reflect the market realities and characteristics. There is a continuous dialogue with the market extending also to post-award phase. Fourth and relatedly, contract follow-ups became a part of routine. Our interview results suggest that these measures were a success.

Here, we analyse whether our quantitative data is consistent with the qualitative results. To understand better whether the increased competition in Nacka can be attributed to the changes in their public procurement practices or some other factors, we conduct difference-in-differences (DID) analysis. Contract awards in Nacka constitute the treatment group. The control group consists of four municipalities that are of similar size and similar contract award activity in our data as Nacka. The idea is to look whether changes in the amount of competition after they changed their procurement practices are specific to Nacka or do they happen also elsewhere in similar municipalities. We define the treatment period as 2017 and 2018, and estimate a separate treatment effects for these two years. In Table A6, we analyse the same two number of bidders measures as before, the one where missing information is coded as zero bidders, and the other where we omit all zero bidder cases. We also analyse contract award cancellations. For all outcomes, we report the standard DID equations, and thus, it includes the year FE, the baseline for Nacka, and the interaction between Nacka Dummy and the two after period dummies. The effects of interest are the coefficients for  $Nacka*2017$  and  $Nacka*2018$ . They tell how much more competition (or propensity to cancel) changed in Nacka in 2017 (or 2018) than it changed in the control group. In the other three columns, we add the same extensive set of controls as in the previous analyses to check that



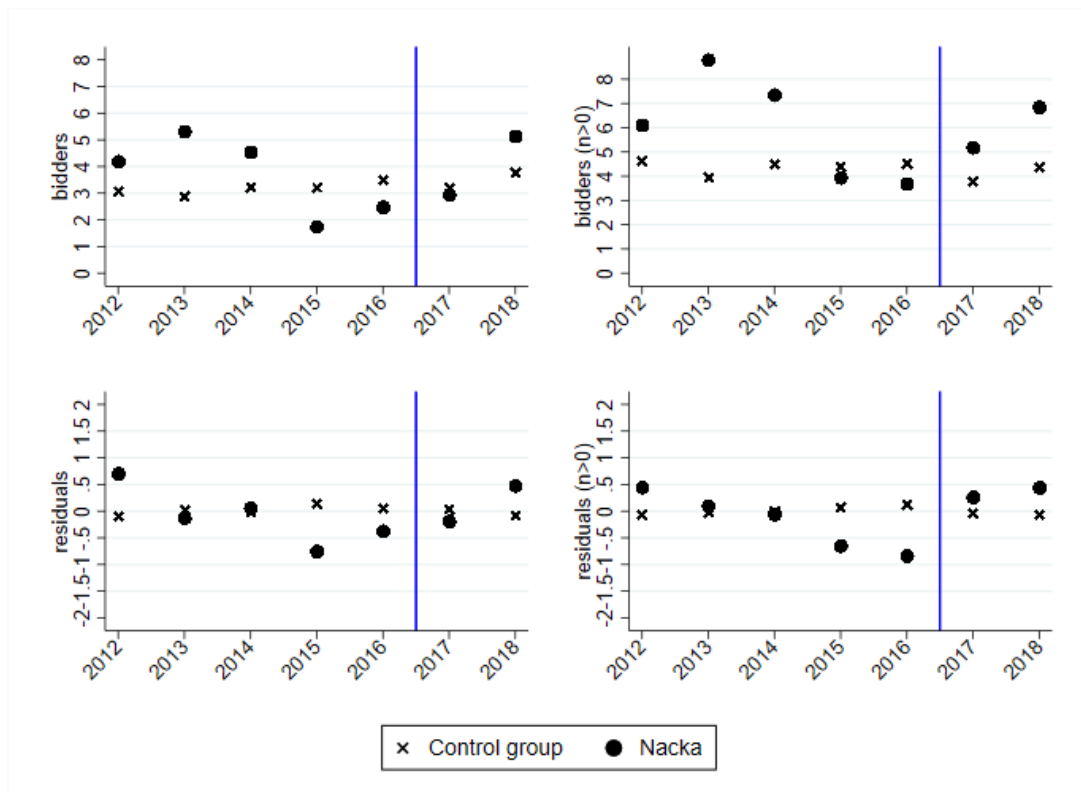
the changes in competition do not results from possible changes in the composition of contract awards.

**Table A6:** Shares of ITTs with a given number of bidders in Sweden

	bidders	bidders	bidders (n>0)	bidders (n>0)	cancelled	cancelled
Nacka (2012 - 2016)	-0.233 (0.173)	-0.561* (0.283)	0.417* (0.221)	-0.346 (0.247)	0.001 (0.017)	-0.013 (0.029)
Nacka*2017	-0.092 (0.348)	-0.043 (0.244)	0.626 (0.557)	0.556* (0.300)	0.016 (0.033)	0.04 (0.041)
Nacka*2018	0.988* (0.544)	0.761*** (0.261)	1.126** (0.550)	0.774*** (0.259)	-0.034 (0.041)	-0.028 (0.039)
Tender type FE	yes	yes	yes	yes	yes	yes
Contracting Authority FE	no	no	no	no	no	no
Year FE	yes	yes	yes	yes	yes	yes
Month FE	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes
CPV FE	yes	yes	yes	yes	yes	yes
N	3529	3529	2611	2611	3529	3529
R <sup>2</sup>	0.01	0.296	0.02	0.297	0.004	0.0056

Notes: Unit of analysis is contract award. Treatment group is Nacka and control group consists of four municipalities of similar population as Nacka. Standard errors are clustered at CPV level and reported in the parentheses. \*\*\* indicate statistical significance at 1% level, \*\* at 5% level and \* at 10% level.

The cancellation result is not statistically significant. According to the competition results, the procurement practices reform in Nacka managed to increase the number of bidders by about one bidder. This is an important achievement. In Figure A4, we evaluate whether the competition result can be plausibly causal. If absent of changes if the procurement practices, Nacka would have followed the same trend as the control group, DID estimates a causal effect. This assumption can be indirectly tested with the common pre-treatment trends test. Based on Figure 3, our control group does not follow the same trend as Nacka in the pre-period. The control group is quite stable in trend, whereas Nacka is more volatile and has roughly a decreasing trend. Therefore, causal interpretation is not warranted, but nonetheless, our evidence is consistent with the efforts in Nacka being successful.



**Figure A4:** Difference-in-differences analysis of Nacka

Notes: Win margins graphed as a function of the number of bidders. Graphs are presented by industry group. Largest 1% of win margins are ignored to combat outliers. Number of bidders is right-censored at 10.

## 6.3 Appendix C: Interview questionnaire

### Questions

Across Europe, there are concerns of the amount of bids in public procurement. We conduct research that looks into the amount of bids and the reasons thereto. We use both quantitative procurement data as well as qualitative interviews. Thank you for replying to the questions below. In our research report, your replies will be treated anonymously. In the discussion of the results, research outputs identify solely the roles of the organisations that were interviewed e.g. "central purchasing unit", "municipality", "procurement consult / attorney" or "bidder".

*CA=contracting authority, B=bidder*

### Background

1. CA: Do you track the number of bids in your contract awards?  
B: Do you track the number of bids in the contract awards to which you participate?
2. CA: How many competing bids you receive in average for each contract or lot?  
B: How many competing bids there are usually in those awards to which you submit a bid?
3. CA: Do you usually get too much, adequate amount or too little bids?  
B: Is there usually too much, adequate amount or too little competition?
4. CA: What is an adequate amount of bids?  
B: Do you sometimes refrain from bidding due to too extensive competition?

### Reasons for low amount of bids

5. CA: Have you had experience of contract awards where you have not received any bids or any appropriate bids?

B: Have you sometimes been awarded a contract via a direct award due to the fact that on a previous contract award the contracting authority has not had any bids or any appropriate bids?

6. CA: If the amount of bids is low, is the lack of competition visible also in the pricing or quality of the bid?

7. CA: Is the low amount of bids a challenge throughout industries or are some sectors more problematic in this regard than others? What about procurement or contract types (e.g. framework agreement v contract, awarding rule: price only v best price-quality ratio), are there differences between these and has the amount of bids decreased or increased over time?

B: Is the low amount of bids more common on certain sectors than other or does it concern more often a certain kind of contracts or contract types and has the situation changed over time?

8. CA: Do you consider how to attract more bidders in your procurement planning stage or how to make bidding easier? If yes, elaborate how. If not, elaborate why.

B: In your opinion, do contracting authorities consider how to attract more bidders to their contract awards or how to make bidding easier? If yes, elaborate how and if no, elaborate why you think they don't. Is bidding too difficult? Do contracting authorities favour some bidders over others in your opinion? If yes, elaborate how.

9. CA: what are the reasons for low amount of bids?

10. CA+B: In general, what are biggest concerns related to public procurement currently?

11. CA: When awarding a contract, are you concerned that someone will complain and start legal proceedings at court? Do you take the potential risk of litigation into account when planning a contract award? If yes, how?

B: in your opinion, does it show in public contract awards that contracting authorities would be concerned on possible litigation? If yes, elaborate how. Does the possibility to complain on the award decision have an impact in your bidding and business activities?