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Entry barriers in public procurement: Evidence from conjoint survey experiment

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ABSTRACT

Limited competition in public procurement remains a persistent concern, yet the reasons for low participation are not well understood. We conduct a conjoint survey experiment that targets both potential and actual bidders in Finland. We present real firms with hypothetical tender scenarios, randomly varying key attributes values, asking which tender they would enter. The time required to prepare a bid is the most significant entry barrier. Moreover, tenders evaluated solely on the lowest price, those involving cross-border participation, and higher expected competition reduce entry. Uncertainty over the number of competitors deters entry as much as for certain facing high competition.

JEL Classification: C83, D44, H57, L22

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1 Introduction

Public procurement (PP) plays an important role in the economy, allocating nearly a third of public funds and representing one of the most significant sources of demand in modern economies. Yet, concerns have grown that PP markets are not functioning as intended because of limited entry into PP auctions (e.g., Li and Zheng 2009, Lewis-Faupel et al. 2016, Haile et al. 2010, Jääskeläinen and Tukiainen 2019, Kang and Miller 2022; Titl 2025). Echoing this, policymakers have expressed alarm over the low or declining number of bidders for public contracts (e.g., European Court of Auditors 2023).[1] Whereas buyers may in certain contexts prefer not to attract many bidders (Kang and Miller 2022) or even restrict entry (Spagnolo 2012), in general more bids tend to decrease prices (Onur and Tas 2019; Jääskeläinen and Tukiainen 2019).[2] Nonetheless, we know surprisingly little about *why* bidders' willingness to participate remains limited.

One natural reason for the limited entry are (high) participation costs (McAfee and McMillan 1987; Li and Zheng 2009), i.e., the fixed expenditures a potential bidder must incur before it can enter a PP auction and submit a valid bid. These include the costs of identifying and interpreting tender opportunities, preparing technical and administrative documentation, meeting legal and certification requirements, and allocating managerial or engineering resources to bid preparation. Taken together, these costs can amount to a substantial fixed burden that discourages participation. For example, using a structural model and data on highway mowing auctions from Texas, Li and Zheng (2009) find that the mean entry costs are 8% of the winning bid, explaining in part why less than one third of the potential bidders actually submit a bid in those auctions. However, structural estimation methods are not informative on what constitutes these entry costs.

Although important, entry costs are only one of the numerous factors potential bidders must weigh when deciding whether to enter a PP auction. Theory predicts that potential bidders enter an auction if the expected net profitability of entry is positive (e.g., McAfee and McMillan 1987; Levin and Smith 1994, Li and Zheng 2009). When comparing the cost of entry against its expected benefits, a potential bidder has to consider a diverse set of factors that influence both the expected probability of winning and the profits conditional on winning. Besides the firm's efficiency (production costs), the expected profitability can depend for example on the scale of the project relative to the firm's capacity, how well the firm's

[1] For example, European Court of Auditors (2023) concludes that "[...] the level of competition for public contracts to deliver works, goods and services, decreased over the past 10 years in the EU single market" and that "[t]here is a lack of awareness for competition as prerequisite for value for money procurements."

[2] As for example Spagnolo (2012) discusses, limiting entry may be desirable when there is e.g. a need to provide rents to participants to induce them to provide a sufficient degree of non-contractible quality.

product matches the tender specifications, its experience with similar contracts, expected competition, nature of the procurement organization and the award criteria it uses, and the risk of (ex post) litigation. Many of these factors are unobservable in observational data, complicating empirical efforts to disentangle their separate roles and relative importance in the participation decisions of potential bidders.

This paper builds on the insight that lack of systematic data on how potential bidders perceive and evaluate tender opportunities limits our understanding of entry behavior in PP. That is, bidder preferences over various PP designs and contexts remains unexplored. While observational data may reveal which firms participate and how they bid, such data provide little information on the underlying trade-offs that shape firms' participation decisions. Yet understanding the determinants of entry choices are crucial for designing policies to facilitate entry. To overcome this limitation and to advance the literature, we conduct a conjoint survey experiment (see Stantcheva 2023; Hainmueller et al. 2014; Bansak et al. 2019).[3] A conjoint experiment, a type of stated choice experiment, infers preferences from respondents' observed choices between alternatives that systematically vary across multiple attributes, thereby revealing the relative importance of each attribute and the trade-offs respondents are willing to make between them (Hainmueller et al. 2014).

In our conjoint experiment, respondents are real owner-managers of firms that have participated or are potentially interested in participating in PP tenders. We present these industry experts with a series of realistic but hypothetical tender scenarios that vary randomly across attributes, mirroring PP context and factors driving participation costs, expected probability of winning, and expected profit conditional on winning (see Levin and Smith 1994; Li and Zheng 2009). The data generated by the respondents' choices allow us to estimate the causal effect of different tender characteristics on the attractiveness of entry and to quantify which of the characteristics most strongly influence participation decisions. Regression analysis of the choices adjusts for the simultaneous variation of all attributes, allowing us to uncover unbiased estimates of their independent effects and thereby reveal firms' true underlying preferences. This feature of the analysis is particularly valuable in complex procurement settings, where asking respondents to rank attributes in isolation would likely be problematic and yield biased inferences, as the respondents might condition their responses on their own expectations about the other tender features (Tukiainen et al. 2024, Cunningham and de Quidt 2015).

Because of these features, a conjoint survey experiment is uniquely suited to provide novel

[3]Besides in marketing science and political science (see Hainmueller et al. 2014), conjoint methods have been used to study e.g. migration (Bansak et al., 2016; Hainmueller and Hopkins, 2015) and public policies (Bechtel et al., 2014; Bechtel and Scheve, 2013; Beetsma et al., 2022); for overviews, see Stantcheva (2023) and Bansak et al. (2019).

evidence on potential bidders' preferences over alternative procurement designs and contexts. The approach complements the standard empirical toolkit in industrial organization and public procurement research where entry is typically analyzed using reduced-form regressions that link tender characteristics to bidder counts (e.g., Lewis-Faupel et al. 2016; Hyytinen et al. 2018; Arve and Desrieux 2025) or using structural models that infer production costs and entry costs from observed bidding and entry data (e.g., Li and Zheng 2009, Xu 2013). Method-wise, a study close to ours is Tukiainen et al. (2024) who analyze the preferences of public buyers over various tender outcomes using a conjoint experiment.

The survey consisted of three main parts. In the first part, respondents answered background questions and a screening question to determine the suitability of their firm's products for participating in tenders in Finland.[4] In the second part, to elicit bidder preferences, the respondents were repeatedly asked to choose between pairs of hypothetical tender scenarios, each of which varies randomly across eight attributes. The attributes were bidder experience with similar tenders, project's scale relative to the company's turnover, nature of the procurement organization, secondary objectives related to the product or provider, criteria for selecting the winning bid, time required to invest in preparing and filing the offer, risk of post-award litigation, and expected level of competition. The third part included direct survey questions that used randomized parameter values (for e.g. how clear the tender notice is) and that elicited probabilistic responses to questions related to entry and bidding.

The estimation results inform us of the effect of a given attribute value relative to the reference value of that attribute on the probability of choosing a given tender for entry. The findings indicate systematic preferences across the randomized tender attributes. First, in line with high entry costs (e.g., Li and Zheng 2009), we find that bid-preparation time emerges as the single most influential factor discouraging entry. A project requiring 80 hours of bid preparation is 21 percentage points less likely to be selected than an otherwise identical project requiring only 6 hours. To get a sense of the relative importance of the remaining attributes, we use the time required to prepare a bid as the yardstick for estimate magnitudes.

We also find that bidders prefer best price–quality scoring auctions over lowest-price formats. The estimates imply that switching from the lowest price award criterion to the best price–quality scoring is roughly equivalent to a decrease of 60 hours of bid preparation. This suggests that, conditional on bid-preparation costs (and other attributes), bidders may expect to get higher profits in scoring auctions as accounting also for quality dimension

[4]The public procurement market in Finland is comparatively large, averaging 18.9% of GDP and 33.9% of government spending, compared to, for instance, the OECD average, where these figures are 12.9% and 27.8%, respectively (Organisation for Economic Co-operation and Development (OECD), 2021).

may lessen competition by creating more asymmetries between the bidders (Che 1993; Asker and Cantillon 2008, 2010). In addition, the respondents favor roughly as strongly municipal buyers over cross-border procurement. This result is in line with the very limited cross-border participation in EU tenders (Cernat 2025; Polanec et al. 2025; Jääskeläinen and Tukiainen 2019).

Furthermore, our results indicate that higher expected number of other bidders discourages entry. Very interestingly, not knowing the number of competitors also discourages entry, in the same way as having more competitors (Levin and Smith 1994; Li and Zheng 2009; Murto and Välimäki 2025). In particular, compared to being the only bidder, having six competitors or not knowing the number of rivals is about equally bad and roughly equivalent to an increase of 40 hours of bid preparation. Given that in Finland the median number of competitors is two (Jääskeläinen and Tukiainen 2019), not knowing the number of bidders is as bad as facing unusually high level of competition.

Prior success in tenders increases willingness to participate (Jääskeläinen and Tukiainen 2019; Butler et al. 2020; Iossa et al. 2022), likely reflecting a type of incumbency advantage and how experience reduces entry costs and uncertainty. Finally, we also provide evidence that greater post-award litigation risk, very small and very large projects and employment-related secondary goals reduces participation, but their magnitude is moderate or small.[5]

The results from the direct survey questions with randomized parameters confirm and complement the conjoint findings. For example, we find that the time required to prepare and submit an offer deters the probability of entry a lot. Supporting this, unclear procurement notices also appear to have a large negative effect on participation. A bidder's distance from the contract location reduces participation, but the effect is not as large.

Taken together, our findings align well with prior empirical evidence and the predictions of existing theoretical models. They also reveal systematic preferences over alternative procurement designs and contexts, providing hence novel insights on why potential bidders may choose to enter a particular PP auction, but refrain from bidding in others. Four key policy lessons emerge from these findings. First, the high sensitivity to bid-preparation time underscores the importance of reducing administrative and informational burdens for potential suppliers. In practice, this likely amounts to e.g. simplifying documentation, standardizing procedures, and providing clear tender materials. Besides clear documentation inducing entry by directly reducing entry costs, it can further facilitate entry by reducing uncertainty

[5]We perform a series of heterogeneity analyses and validity checks. For example, we use a split-sample analysis to see if the results vary by firm size, prior experience in PP or industry sector. Moreover, we check respondents' attention using a specific attention question and the time it took for respondents' to complete the conjoint section of the survey. We also conduct standard validity checks for conjoint analysis to make sure there are no carryover effects, or attribute or profile order effects.

over the number of competitors. Second, the preference for scoring (price-quality) auctions suggest that well-designed multidimensional criteria can attract entry by alleviating bidders' concerns of too harsh competitive pressure. Third, the bidders' preference for local (municipal) buyers and the positive effect of past participation on entry suggest that procurement policies aiming to broaden competition should focus on lowering entry barriers for new and out-of-region firms, for example through targeted outreach or supplier-development initiatives. Finally, policy efforts to boost participation may face inherent limits, because greater number of expected bidders will eventually undermine the potential bidders' overall willingness to submit a bid.

The remaining of this paper is as follows. In Section 2, we outline an analytical framework for our analysis and in Section 3, we describe our data collection and the conjoint survey. We report our empirical results in Section 4 and present our conclusions in Section 5.

2 Analytical Framework

Theoretical Background: Early models of entry in auctions focused on the timing of information revelation and participation decisions. Samuelson (1985) examined a setup in which bidders know their private costs before deciding whether to enter, while McAfee and McMillan (1987) and Levin and Smith (1994) modeled entry as part of a two-stage game in which potential bidders first decide whether to pay a fixed entry cost to obtain a private signal, and then compete in a first-price auction. These models typically assume that bidders are symmetric ex ante and that entrants know the number of actual bidders when submitting bids. Maskin and Riley (2000) allowed bidders to be asymmetric ex ante, whereas Li and Zheng (2009) relaxed the assumption that bidders know the number of entrants at the bidding stage and introduced heterogeneity in entry costs.

Models of selective entry, such as those considered in Gentry and Li (2014) and Gentry et al. (2017), extend the standard two-stage entry framework by allowing (ex ante) heterogeneous firms to endogenously self-select into participation (see also Athey et al. 2011). This selection is based on the private characteristics of firms, such as their efficiency (low-cost). In these selective-entry models, the entry decision depends not only on entry costs and expected competition but also on firm-specific attributes that affect expected profitability.

In line with the sequential nature of entry and bidding that characterizes most (empirical) auction entry frameworks, we postulate that when considering in which type of tender a potential bidder would like to participate, it chooses the auction design and context in which its expected net value of entry is greater. Anticipating our conjoint setting, we model bidders' choices as the outcome of a discrete decision problem in which each potential bidder

$i \in \{1, \ldots, N\}$ evaluates alternative hypothetical tender opportunities $k \in \{1, 2\}$ in choice task $t \in \{1, \ldots, T\}$. These indices mirror the structure of the conjoint setting, because each choice task t represents a tender scenario in which a potential bidder faces two mutually exclusive bidding opportunities, k, that differ in their design and context.

The bidder's expected net value of participation is given by

$$V_{ikt} \equiv \Pr(\text{Win}_{ikt})\, \mathbb{E}[\pi_{ikt} \mid \text{Win}_{ikt}] - F_{ikt}, \tag{1}$$

where $\Pr(\text{Win}_{ikt})$ is the bidder's perceived probability of winning, $\mathbb{E}[\pi_{ikt} \mid \text{Win}_{ikt}]$ is the expected profit conditional on winning, and F_{ikt} is the participation cost associated with preparing and submitting a bid.

The bidder compares these expected net values across tender scenarios and chooses the one with the higher expected return. Formally, bidder i chooses in each choice task t tender k that maximizes her profits (utility) $U_{ikt} \equiv V_{ikt} + \varepsilon_{ikt}$, where ε_{ikt} captures unobserved factors affecting preferences over auction designs and contexts. We can view ε_{ikt} to be a part of the participation cost F_{ikt}, or alternatively interpret it to mirror bounded rationality in decision-making. The preferred choice is

$$k^*_{it} = argmax_{k \in \{1,2\}}\, U_{ikt} \tag{2}$$

which implies that $k^*_{it} = 1$ when $U_{i1t} > U_{i2t}$. We therefore have $\Pr\left[(V_{i1t} - V_{i2t}) > (\varepsilon_{i2t} - \varepsilon_{i1t})\right]$, showing that the probability of choosing tender 1 over tender 2 depends on the relative expected profitability $(V_{i1t} - V_{i2t})$ of these two tender alternatives.

To connect this to choices, we let $Y_{ikt} = 1$ if bidder i prefers tender k in task t and $Y_{ikt} = 0$ otherwise and assume that the error term is i.i.d. Type I Extreme Value. This results in the standard logit choice probability $\Pr(Y_{i1t} = 1) = \exp(V_{i1t})/(\exp(V_{i1t}) + \exp(V_{i2t}))$ $= \Lambda\left(V_{i1t} - V_{i2t}\right)$, where $\Lambda(\cdot)$ is the logistic CDF. This formulation embeds the bidder's entry decision within the general random-utility framework of discrete choice models. It provides a *possible* behavioral foundation for our empirical conjoint specification. However, we do *not* impose the structure implied by it into our empirical analysis.

Empirical Implementation: In our empirical work, we employ a general nonparametric approach, originally proposed by Hainmueller et al. (2014). In this approach, each tender k is described by a vector of experimentally randomized attributes (e.g., project scale, buyer type, award criterion, or expected competition level). These randomized tender attributes serve as determinants of the unobservable expected net value of entry, V_{ikt}. Based on these attributes, each bidder forms expectations about the profitability of entering a given tender.

The nonparametric approach of Hainmueller et al. (2014) identifies attribute effects di-

rectly from the experimental variation in tender profiles, without assuming any particular behavioral model or error distribution. The target estimand is the average causal effect of each attribute on the probability of choosing a profile (tender), obtained by integrating over the joint distribution of other attributes. Under independent randomization, this Average Marginal Component Effect (AMCE) can be estimated by a simple difference in means or, equivalently, by OLS regression of the choice indicator on attribute dummies.

We estimate AMCEs using the regression specification

$$Y_{ikt} = \alpha + \sum_{a} \sum_{l \neq l_0} \beta_{al} z_{iktal} + \varepsilon_{ikt}, \tag{3}$$

where Y_{ikt} indicates whether respondent i selected profile $k \in \{1, 2\}$ in task t, α is a constant, and z_{iktal} are binary indicators that fully describe each profile through the randomly assigned level l of attribute a (one baseline level l_0 per attribute omitted). Under independent (or conditionally independent) randomization of attribute levels, the coefficients β_{al} nonparametrically identify the AMCEs of each attribute level relative to its baseline. The coefficients capture the marginal effect of a one-unit (i.e., level-to-level) change in each attribute on the probability that a tender is preferred, conditional on all other attributes.

In a fully randomized conjoint design, the AMCE of an attribute equals the difference in the population probability that a profile is chosen when the attribute takes one value rather than another (Hainmueller et al., 2014). Standard OLS estimation of equation (3) yields unbiased sample analogues of the AMCEs, because randomization guarantees orthogonality between the attribute variables and the error term. Besides assigning the attribute levels randomly to each tender, the identification of AMCEs relies on two other assumptions (Hainmueller et al. 2014). First, there should be no carryover effects for the potential outcomes, meaning that treatments in a respondent's other tasks do not influence their responses in the current task. Second, there should be no profile-order effects, which requires that the order in which profiles are presented within a choice task should not affect responses.

Relative to certain other survey-based methods, conjoint experiments have a number of strengths. First, they have high statistical power (Stantcheva 2023), which helps to quantify also smaller effects. Second, they predict real-world behavior (Hainmueller et al. 2015), supporting their external validity. Third, the conjoint method mitigates strategic or socially desirable responding, as multiple dimensions are evaluated simultaneously (Hainmueller et al. 2014; Horiuchi et al. 2022).

To see how specification (3) is connected to the discrete choice model in our context (see Appendix A for details), let $\tilde{z}_{ital} = \frac{1}{2}(z_{i1tal} - z_{i2tal})$ and $u_{it} = \frac{1}{2}(\varepsilon_{i1t} - \varepsilon_{i2t})$. Moreover, let $\tilde{z}_{it}$ denote a vector with representative element $\tilde{z}_{ital}$ and form a conformable coefficient vector

β with representative element β_{al}. Using this notation we can write

$$Y_{it} \;=\; \tilde{\alpha} \;+\; \tilde{z}'_{it}\beta \;+\; u_{it} \tag{4}$$

where $Y_{it} = 1$ if tender 1 was chosen in task choice t and $Y_{it} = 0$ otherwise. This formulation represents regression (3) as a standard linear probability model (LPM).

To see that this LPM can be viewed as a first-order approximation to the conditional logit specification derived from a random-utility maximization framework, consider the case in which the difference between the attractiveness of the two tenders is fixed at point, e.g. $V_{i1t} - V_{i2t} = a$. Around such a point, the logit choice probability can be approximated as $\Pr(Y_{ikt} = 1) \approx \tau_0 + \tau_1(V_{i1t} - V_{i2t})$, where $\tau_0 = \Lambda(a) - a\Lambda(a)(1-\Lambda(a)$ and $\tau_1 = \Lambda(a)(1-\Lambda(a)$. Locally, the logit probability is approximately linear in the utility difference. Because $\tilde{z}_{it}$ encodes the differences in attribute levels between the two alternatives, its inner product with β gives the deterministic component of the utility difference $(V_{i1t} - V_{i2t})$. This shows that in our context, the LPM in equation (4) implied by the AMCE framework nests a first-order approximation of the structural logit model (see Wooldridge 2010; Hainmueller et al. 2014).

The AMCE framework is, however, more general than the conditional logit specification. It provides unbiased causal estimates without imposing parametric assumptions on the underlying utility function. The conditional logit model provides a possible behavioral interpretation of our empirical conjoint specification. It serves as a parametric counterpart which shows that it is possible to interpret the AMCEs as scaled preference parameters within a random-utility structure.

3 Survey Design and Conjoint Experiments

3.1 Construction and Representativeness of the Sample

Construction of the Sample: To study the preferences of bidders over different PP auction designs and contexts, we conducted a large-scale survey in collaboration with the FCCA. The survey was administered between May and December 2023. Its target population consisted of Finnish firms that either had participated or could potentially participate in PP tenders; potential participation depends e.g. on the firm producing goods or services that are suitable for procurements.

The data collection consisted of several steps. We started by compiling a representative sample of firms operating in Finland for which contact details were available. In the first

phase of the survey, we reached representatives of these firms by phone and, provided that the firm seemed to qualify to participate in the survey (e.g., it seemed to produce goods suitable for PP) and the representative was willing to do so, we subsequently sent them an email invitation with a unique web-link to access the survey platform. In the second phase, we did not contact the potential respondents by phone, but instead sent out emails. These emails included an invitation to participate in the survey and a web-link to access the survey platform.

In total, we contacted 1739 representatives of the firms by phone and sent out 7668 emails.[6] We received a total of 748 survey responses, of which 450 are classified as "Complete". This means that the respondent answered all sections of the survey. Another 69 responses are categorized as "Disqualified". These are respondents who answered to a pre-screening question that their firm does not produce goods or services suitable for PP and the survey subsequently ended. Additionally, 229 responses are "Partial," where respondents began the survey but did not complete all sections, leaving us with answers to only some questions. The respondents are owner-managers of the firms.[7]

During the final step of our data collection, we linked the respondent's firm identifier to the data available from the firm registry of Statistics Finland. The variables that we could retrieve for this study are the number of employees, revenue, and industry classification of the respondent's firm. These firm-level data are used to assess the representativeness of the sample and to run split-sample analysis with respect to company size and industry.

Representativeness of the Sample: Because our target population consists of firms that either had participated or could potentially participate in PP tenders, it is neither equal to the entire population of firms in Finland nor the population of firms that have already participated in PP tenders.

While defining clear criteria for the target population is difficult, we have assessed the representativeness of the sample in two ways. First, we evaluated how it compares to the population of Finnish firms based on the number of employees, revenue, and industry. Figures A1-A4 in Appendix A shows the distribution of firms in the overall population and in our sample with respect to these dimensions. This comparison shows that while the survey sample is fairly representative of the firm population, small firms (1–4 employees) are underrepresented. This is a feature and not a bug, because many of the smallest firms are not

[6]Participation in the survey was voluntary. The median completion time of the whole survey was 23.3 minutes, while it took 3.8 minutes for the median respondent to complete the conjoint section of the survey.

[7]Based on the available job titles of the survey respondents for the Complete sample ($n = 450$), a clear majority (380) of the respondents were CEOs and 9 were entrepreneurs (business operators). Especially in smaller firms, many of these CEOs are likely to be owner-managers. The job titles were unavailable for 61 respondents. In the Partial sample ($n = 229$), 186 were CEOs, 5 were entrepreneurs (business operators), and the titles were missing for 38 respondents.

interested in or qualified to participate in PPs and thus not part of our target population. Second, we compared the firms of the survey respondents to a large sample of firms who have participated in PP tenders in the recent past.[8] Tables A1-A2 in Appendix A present the results of this comparison. We find for instance that out of those firms whose representative fully completed the survey, 74.2% have participated in PP tenders. This is consistent with the aim that the sample should also include respondents that have never participated in PP tenders.[9]

In sum, the firms in our survey sample have characteristics that we expect the firms in our target population to have. While the comparison is imperfect, it seems that our sample is a mixture of firms that had participated and could potentially participate in PP tenders.

3.2 Survey Structure

The survey consisted of three main sections (see Appendix B). The first section includes background questions designed to gauge the respondent's experience with participation in PP tenders and included a screening question about whether the respondent's firm produce products, services or construction works that they have offered or could potentially offer in PP. The second section includes conjoint experiment questions, while the third section contains a set of direct survey questions with randomized parameters, to be explained in more detail below.[10]

3.3 Conjoint Experiment

Set-up: In the conjoint experiment, the respondents were asked to evaluate multiple hypothetical PP scenarios (see Appendix B for the text introducing the conjoint section). Each decision scenario mirrors a situation where the respondent is deciding whether their firm should participate in a tender after reviewing the tender announcement. Each tender was described in terms of several attributes that we randomized. When designing the experiment, our main goal was generate scenarios that reflect situations that the respondents tend to encounter in their daily work and that would produce responses that are as commensurable as possible, despite the heterogeneity of the respondents' firms, and differences in the

[8]For this, we used the so-called Cloudia database which covers a significant portion of PP tenders in Finland. Cloudia is a web-based procurement system that enables the contracting authority to manage the entire procurement process from the request for tenders to the procurement contract.

[9]It is important to note that some of the remaining 25.8% may have also participated, as the Cloudia database, while extensive, does not capture all procurement tenders.

[10]The survey also include a fourth section that targeted a small sub-sample of all respondents and that included questions on litigation in PP.

types of goods or services being procured, and the respondents' job roles.

The respondents faced eight repeated choices, each involving a decision between two hypothetical tenders (also referred to as cards or profiles). In total, the respondents ended up evaluating 16 tender scenarios. Respondents were asked to choose their preferred tender in each choice task. This paired, forced-choice conjoint experiment is well-suited for policy design, as it reveals trade-offs. In our context, it allows adopting a buyer's perspective, because the civil servants representing public buyers, such as a municipality, typically do not have the option of not organizing the procurement. Therefore, the civil servants can only choose what kind of procurement auction to organize. This means that they are interested in learning which kinds of procurement designs and contexts are preferred by potential bidders.

Choice of Attributes and Their Levels: Each hypothetical tender had eight attribute dimensions. Table 1 lists the chosen attributes and describes their potential realizations (levels). The attributes include experience with similar tenders, the project's scale relative to the company's turnover, the nature of the procurement organization, secondary objectives related to the product or provider, criteria for selecting the winning bid, time spent preparing and submitting the offer, litigation risk, and the expected level of competition.

From a theoretical point of view, each of the eight attributes is a potential determinant of a bidder's expected net value if she enters a certain kind of PP auction, i.e., $V_{ikt} = \Pr(\text{Win}_{ikt})\,\mathbb{E}[\pi_{ikt} \mid \text{Win}_{ikt}] - F_{ikt}$. To illustrate, it is plausible that the expected gross value, $\Pr(\text{Win}_{ikt})\,\mathbb{E}[\pi_{ikt} \mid \text{Win}_{ikt}]$, depends on selection criteria for winner (lowest price vs. scoring) and anticipated competition. Moreover, time needed to prepare and submit an offer is a likely determinant of the entry cost, F_{ikt}. While these mappings are intuitive, we do *not* intend to argue that these attributes, or any of the other attributes, can unambiguously be linked to a specific component of the bidders' expected net value. Rather, it seems likely that many of them can be determinants of entry costs and also influence the expected gross value.[11]

When choosing how to describe the attributes and which values they could take, we opted to define the attributes and their levels in a broad, general manner. A key reason for this is that we wanted to accommodate the heterogeneity of the respondents and their firms. For instance, the respondents have varying backgrounds and their firms come from various industries, implying that the respondents may hold differing views on the tender characteristics. In total, we have 10,368 possible combinations of attribute realizations. All

[11]Except for the bidder's experience with similar tenders, the attributes are characteristics of the tender. We included an attribute for the experience, because it is known that prior success in tenders increases willingness to participate (e.g., Butler et al. 2020; Iossa et al. 2022). It therefore provides as with a check that the conjoint experiment produces results that are in line with the previous literature. Prior experience may also reduce participation costs and is therefore a determinant of entry.

attribute levels were presented with equal probabilities and none of the specific combinations of attribute levels was excluded from the choice set in advance.[12]

[12]Because of the independent cross-randomization of the various attribute levels, their realizations could produce tenders that appear unusual. If respondents identify unrealistic combinations of the attributes, it could introduce bias (Kessler et al. 2019). After thorough consideration, we could not identify an attribute combination that would clearly be implausible in our survey context. Some of the combinations may, however, be less likely to appear in practice than others.

Table 1: Tender attributes and possible realizations

Conjoint Experiments	
Attribute	**Possible Attribute Realizations**
Bidder experience with the same buyer	No previous experience
	Previous loss
	Previous win
Type of the procurement organization	A municipality or other local-level organization
	An organization from another country or the EU
	State organization
	Joint procurement unit
Selection criteria for winner	Lowest price
	Best price-quality score
Anticipated competition	Our company is the only bidder
	A bid is submitted by another bidder
	Six other bidders leave the bid
	The number of other bidders cannot be estimated
Project size in relation to the company's turnover	10 %
	30%
	60%
Secondary objective	Nothing
	Innovation goal
	Employment target
	Environmental goal
Time needed to prepare and submit an offer	6 hours
	20 hours
	80 hours
Estimated litigation risk	0 %
	2 %
	8 %

Notes: This table shows the attributes and their potential realizations (levels) used in the conjoint experiments.

Besides randomizing the attribute levels for each of the eight attributes, we randomized the order in which the attributes are presented to minimize any primacy or recency effects. However, the attribute order remained consistent for each respondent to simplify the decision-making process.

4 Empirical Analysis

Our baseline sample consists the 450 Complete answers which nevertheless may include missing replies to certain questions. We use these 450 Complete answers and 43 Partial answers, totaling to 493 answers, in the conjoint regressions, because all the partial responses included valid replies to the conjoint questions.

4.1 Descriptive Statistics

Table 2 shows descriptive statistics for selected background questions. Over the three years prior to the survey, the median firm had participated in four PP tenders. The mean is much higher, indicating that some firms are very frequent participants in PP tenders. The median firm had won two PP tenders. The median responding individual had been involved in five PP tenders during his/her current or previous employment spells.

While not shown in the table, 22.2% of the respondents reported that their firm had not participated in PP tenders over the past three years. Reassuringly, this is close the share of firms whose representatives gave complete responses and which we do *not* find from a database that includes the bidders who have participated in PP tenders in the recent past.[13]

Some of the firms in the sample have been potential bidders, because the median firm had considered participating in three PP tenders over the course of the three preceding years but to which it ultimately did not leave an offer.

[13]For years 2017-2023, this share is 25.8%, and for 2020-2023, it is 32.4%; see the first two rows in Tables A1-A2 in Appendix A.

Table 2: Descriptive statistics for the background questions of the survey

Question	Mean	St. Dev	Median	Obs.
In how many public procurement tenders has your firm participated as a bidder during the last three years in total?	18.8	63.5	4.0	450
How many of those tenders have your firm won?	7.8	27.0	2.0	347
How many of those tenders have taken place during the last 12 months?	6.6	20.9	2.0	348
How many public procurement tenders have you personally been involved in some way, such as an offer drafter or otherwise, during your current and any previous employment?	45.3	131.6	5.0	445
In how many public procurement tenders has your firm tentatively considered participating as a bidder during the past three years, but to which it ultimately did not leave an offer?	13.8	50.0	3.0	449

Notes: This table contains summary statistics for selected background questions.

4.2 Conjoint Results

Conjoint Regressions: Our baseline conjoint estimates come from regression equation (3), where the outcome variable Y_{ikt} is a binary indicator equal to one if respondent i selected tender profile k in choice task t and where the regressors are binary indicators z_{iktal} that describe each tender profile through the randomly assigned levels l of each attribute a.[14] In our experiment, each respondent completed eight paired-choice tasks, yielding $t = 1, \ldots, 16$ tender profiles in total. We pool these data across the tasks for estimation ($N = 493 \times 16 = 7888$). The coefficients of interest, β_{al}, estimate the AMCEs (Hainmueller et al. 2014) and capture the relative importance of each attribute. The effects are interpreted conditional on the levels of all other attributes and relative to the omitted baseline level. By including multiple attributes simultaneously, this regression specification enables consistent and comparable estimation of trade-offs across design dimensions within a unified causal framework.

[14] One level per attribute is omitted to serve as the reference category.

The standard errors are clustered at the respondent level to account for within-bidder correlation in the error term. This accounts for the correlation within each choice task (since choosing a profile means that the other profile cannot be chosen) and for the potential correlation in attribute valuation across the repeated choices of each respondent.

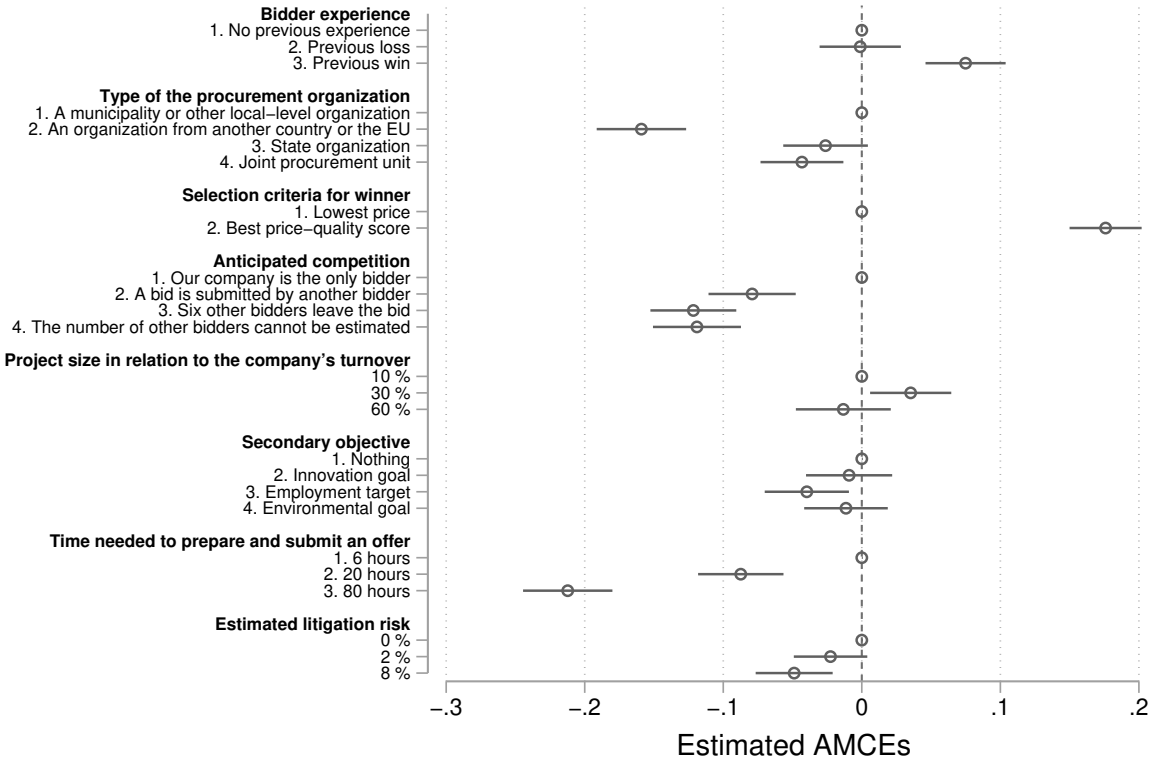
Main Results: Figure 1 presents our main results, showing estimates for each attribute realization in the experiment. As can be seen, there are several statistically significant AMCEs, indicating systematic preferences across the randomized tender attributes.

Echoing the prior evidence on high entry costs (e.g., Li and Zheng 2009), we find that in our conjoint experiment, bid-preparation time emerges as the single most influential factor discouraging entry. When the time required to prepare a bid increases, the probability of participation in a PP auction decreases, holding all other tender attributes constant. Focusing on the contrast between 6 and 80 hours, the AMCE of -0.21 implies that, when the respondents must choose between the two hypothetical tenders, a project requiring 80 hours of bid preparation is 21 percentage points less likely to be selected than an otherwise identical project requiring only 6 hours.

To get a sense of the relative importance of the remaining attributes, we use the time required to prepare a bid as the yardstick.[15] In terms of this yardstick, bidders prefer strongly the best price–quality scoring auctions over lowest-price formats. The estimated AMCEs imply that switching from the lowest price award criterion to the best price–quality scoring is roughly equivalent to a decrease of 61 hours of bid preparation (95% CI [47, 75]). One theoretical explanation for this large effect could be that, conditional on the bid-preparation costs (and other attributes), bidders may expect to get higher profits in scoring auctions as accounting for quality dimension may lessen competition by creating more asymmetries between the bidders (Che 1993; Asker and Cantillon 2008, 2010). The respondents favor roughly as strongly municipal buyers over cross-border procurement, corresponding a decrease of bid preparation by 55 hours (95% CI [41, 69]). This finding explains, in part, why cross-border participation in EU tenders is limited (Cernat 2025; Polanec et al. 2025; Jääskeläinen and Tukiainen 2019). It suggests that PP markets tend to be local and that the additional requirements for participation and compliance in the non-local tenders hinder participation.

[15] We use as the yardstick the estimated AMCE of -0.21, which captures the effect of increasing the required preparation time from six to eighty hours. This yardstick assumes a degree of linearity in how strongly bidders dislike bid preparation. Whereas it does not affect relative comparison of the attributes, it implies that the level of implied hours might differ if a different yardstick value was used.

Figure 1: Main Results



Notes: The figure shows estimated coefficients (AMCE) for tender attributes on the likelihood of choosing a particular tender. Horizontal lines represent 95% confidence intervals with standard errors clustered at the respondent level, while points without these lines indicate the reference categories for each attribute effect. Number of observations = 7888.

Considering the relative importance of expected competition and prior experience in PP, we find that they both matter. First, higher expected numbers of other bidders strongly discourages entry. This is intuitive, because anticipating fiercer competition lowers the probability of winning and the expected profits conditional on winning, making it less likely that entry costs can be recovered. Interestingly, not knowing the number of competitors also discourage entry, in the same way as having six competitors. In particular, compared to having no competition, having six competitors or not knowing the number of rivals is nearly equivalent to a decrease of 41-42 hours of bid preparation (95% CI [29, 54]). These empirical findings inform the theoretical literature where varying assumptions have been made about whether or not potential entrants know the number of actual bidders when submitting bids (Levin and Smith 1994; Li and Zheng 2009; Murto and Välimäki 2025).[16]

In contrast to the negative effect of expected competition, prior success in tenders in-

[16]For example, Murto and Välimäki (2025) consider affiliated common value auctions where the potential bidders do not know the realized number of bidders at the time of choosing their bids, finding that participation and bidding decisions are often non-monotonic.

creases willingness to participate (Jääskeläinen and Tukiainen 2019; Butler et al. 2020; Iossa et al. 2022), likely reflecting a sort of incumbency advantage and how experience reduces entry costs and uncertainty. Winning public contracts may also produce other benefits, such reducing liquidity constraints, that encourage participation (di Giovanni et al. 2022). Compared to no previous experience, having won a PP tender previously is roughly equivalent to a decrease of 26 hours of bid preparation (95% CI [15, 37]).

The remaining of the statistically significant AMCEs in Figure 1 suggests less prominent relative effects. Holding other things constant, litigation risk reduces participation, but the effect is moderate. Increasing the risk of post-award litigation from 0% to 8% is roughly equivalent to an increase of 17 hours of bid preparation (95% CI [7, 26]). The litigation risk is partly endogenous to the winner's subsequent behavior (Coviello et al. 2018), but this finding implies nevertheless that if either the contracting authority or one of the (expected) rivals are prone to litigate, entry is discouraged. While not extremely strong, this bidder preference may in part explain why the fear of post-award litigation is common on the buyer side (Finnish Ministry of Justice 2009; EC 2018; Tukiainen et al. 2024). Setting employment-related secondary goals slightly reduces participation. In terms of our yardstick, its magnitude is around 14 hours of bid preparation (95% CI [3, 24]). Finally we also find that mid-sized projects, i.e., when the project size is about a third of the firm's turnover, encourage participation. The enhanced participation incentive attributable to a mid-sized project corresponds roughly to a decrease of 12 hours of bid preparation (95% CI [12, 23]). This result is in line with the view that very small projects are not attractive to potential bidders because they do not warrant paying fixed production costs when executing the contract, whereas very large projects relative to the firm size are not attractive because of possible capacity constraints (Chaturvedi 2015; Iyengar and Kumar 2008).

Taken together, these findings provide new evidence on the relative importance of the diverse set of factors that bidders weigh when deciding whether to participate in a PP auction. Our conjoint analysis disentangled their separate roles and also links the estimated AMCEs to the bidders' preference parameters, i.e., the difference in the expected net profitability across the tender scenarios ($V_{i1t} - V_{i2t}$), within the auction-theoretic (random-utility) structure.

Heterogeneity Analysis: We analyze the possible heterogeneity in the conjoint responses based on firm size (measured by the number of employees), experience in PP (determined by whether the firm has previously submitted an offer) and industry sector (whether the firm operates in the service sector). We report the results from these heterogeneity analyses using marginal means (instead of AMCEs), in order to account for potential differences in omitted categories across subgroups (see Leeper et al. 2020).

The results are presented in Figures A5-A7 in Appendix A. Overall, the findings appear

similar across the different sub-samples. For example, the industry in which firms operate or their prior experience with PP auctions has very little impact on the results. We find some evidence that the significance of the attribute capturing the project's size in relation to the firm's turnover varies with the firm size, but otherwise, the results seem stable.

Robustness and Validity Checks: We consider two sets of robustness and validity checks. First, we assess the reliability of the conjoint responses by dividing the sample into two parts based on the respondents' attention, as assessed using their response to an attention question in the survey, and on the time taken to complete the conjoint section of the survey (see Figures A8-A9 in Appendix A). Second, we conduct standard validity tests commonly used in conjoint analyses. We check for i) carryover effects to ensure that previous choices do not influence subsequent ones and for ii) potential attribute and profile order effects, which may arise if attributes positioned at the top of the choice task receive disproportionate attention (see Figures A10-A13 for carryover effects, Figure A14 for profile order effect and Figures A15-A18 for attribute order effects in Appendix A).

Taken together, these checks suggest that our conjoint findings are not driven by sloppy responses by inattentive respondents, nor by carryover effects or attribute and profile order effects.

4.3 Survey Questions with Randomized Parameters

To complement the conjoint analysis, we analyze three direct survey questions, $q \in \{q_1, q_2, q_3\}$, with randomized parameters. When replying, the respondents were asked to give the probability that they would enter the PP auction in question (for eliciting probabilistic beliefs, see e.g., Manski 2004; Manski and Molinari 2010). We use these questions to examine how the clarity of the procurement notice (q_1), the geographical distance from the purchasing unit (q_2), and the required working time to prepare and submit the offer influence the probability to participate in a tender (q_3).

To analyze these data, we regress the elicited probabilities, $\hat{Pr}_{iq}$, in question q on the corresponding randomized tender attribute (with and without control variables). This amounts to estimating linear regression models of form $\hat{Pr}_{iq} = \gamma_q' d_{iq} + \epsilon_{iq}$, where γ_q is a parameter vector and d_{iq} is a vector of binary indicators, capturing the treatment group of respondent i in question q. Theoretically, these regressions allow us to assess how bidders weight the profitability of PP participation, $U_{ikq} = V_{ikq} + \varepsilon_{ikq}$, against an (implicit) outside option, say $U_{i0q} = V_{i0q} + \varepsilon_{i0q}$. This utility comparison leads to a discrete choice model that gives the probability that respondent i enters the PP auction in question q. As before, we can think of a first-order approximation of the discrete choice between participating and opting out. It

generates a linear model where the deterministic part mirrors the utility difference, $V_{ikq} - V_{i0q}$. This approximation provides a theory-based interpretation of the regressions that link the elicited probabilistic participation responses to the randomized tender characteristics.

Table 3 Panels A-C present the results of regressions studying how the randomized level of clarity of the procurement notice, geographical distance and time required to prepare and submit an offer affect the likelihood of submitting an offer. In each panel, Column 1 includes no controls, Column 2 shows the results from a specification that includes as controls dummy variables for the number of employees and industry of the respondent's firm. and Column 3 further adds controls for the respondents' prior experience in PP tenders. The variables capturing prior experience are a dummy variable set to one if the respondent reports that the firm had not participated in PP procurements earlier, the number of procurements to which the firm participated, as reported by the respondent, the number of wins that the firm has won, as reported by the respondent, and the number of procurements in which the firm considered participating but eventually decided to opt out.

Table 3 Panel A shows the results when the randomized variable is the clarity of the procurement announcement (q_1). The results show a large effect of around 46 percentage points lower probability of submitting a bid to a procurement where notice leaves room for interpretation about the object of purchase as opposed to when the tender notice is clear. The effects are much smaller in Table 3 Panel B, which focuses on the (randomized) distance to the contracting authority (q_2). Distance of 100 km results in about 12 percentage points lower probability of submitting a bid than when the distance is 10 km. Finally, Table 3 Panel C shows the results from a regression where the randomized variable is time required for preparing and submitting the offer (q_3). Supporting the conjoint results, the estimated effect is large. Bid preparation of 80 hours results in about 38 percentage points lower probability of submitting a bid than when the time is 10 hours.

Table 3: The effect of Clarity of the Procurement Notice, Distance and Preparation Time on Entry

	(1)	(2)	(3)
Panel A: Clarity of the Procurement Notice			
Unclear Proc. Notice	-46.30***	-46.21***	-45.66***
	(2.56)	(2.58)	(2.56)
Control group mean	81.92	81.92	81.98
R-squared	0.421	0.435	0.469
Panel B: Distance			
Distance 50 km	-9.04**	-8.20**	-6.83*
	(3.64)	(3.65)	(3.60)
Distance 100 km	-12.64***	-11.59***	-10.88***
	(3.81)	(3.81)	(3.76)
Control group mean	77.99	77.99	77.75
R-squared	0.026	0.098	0.150
Panel C: Time Needed			
Time: 20 hours	-13.42***	-14.28***	-13.95***
	(3.42)	(3.43)	(3.33)
Time: 80 hours	-38.05***	-38.50***	-37.67***
	(3.47)	(3.50)	(3.34)
Control group mean	74.78	74.78	74.67
R-squared	0.226	0.249	0.334
Experience Controls	no	no	yes
FE: Employees	no	yes	yes
FE: Industry	no	yes	yes
Obs.	434	434	431

Notes: Table shows OLS estimates for the effect of randomized attribute values of three different direct questions on the probability of submitting a bid. Panel A estimates the effect of an ambiguous procurement notice vesus a clear one. Panel B estimates the effects of increased distance to the contract (50km or 100km versus reference group of 10km). Panel C estimates the effects of time needed to prepare and submit a bid (20 or 80 hours versus reference group of 10 hours). Each panel displays three specifications: no controls (1), a model with firm size and industry fixed effects (2), and a model that additionally controls for the firm's prior procurement experience (3). The experience controls are: a binary indicator for no prior participation, the total number of bids submitted, the number of contracts won, and the number of procurements considered but ultimately not pursued. Robust standard errors are in parentheses. * denotes 10% statistical significance level, ** 5% level and * 1%.

In sum, the direct survey questions allow us to assess how bidders weight the benefits of PP participation against the option of staying out (an implicit outside option). The elicited participation probabilities in the randomized scenarios provide evidence that complement and support the conjoint findings, pointing to the importance of bid preparation costs.

5 Conclusions

Our findings reveal systematic bidder preferences over alternative procurement designs and contexts. Taken together, they provide several new insights on why potential bidders may refrain from participating in a particular PP auction, but are willing to submit a bid in others.

We show that requiring a lot of time and effort to prepare a bid is a significant barrier to participation in PP. This finding emerges both from our conjoint analysis and from the analysis of direct survey questions with randomized parameters. It aligns with the available empirical evidence and is consistent with the theoretical models that emphasizes the importance of entry costs and selective entry (e.g., Samuelson 1985; Levin and Smith 1994; McAfee and McMillan 1987; Li and Zheng 2009; Gentry et al. 2017). A key policy lesson emerging from this is that buyers should focus on making bidding less costly. In practice, this means clear and transparent description of the product to be purchased and the tender process, as well as avoiding too many requirements, forms and documents to be produced. Clear description of the product could also reduce uncertainty over the amount of competition, which would induce more entry. In line with these possibilities, we find that posting unclear calls for tenders reduces the willingness of potential bidders to submit a bid.

Our findings also suggest several other policy implications. First, using scoring instead of the lowest-price criterion may facilitate entry as long as its use does not add too much complexity and bid preparation costs. Second, hurdles that reduce participation in cross-border PP call for special policy attention. Third, the relationship between project size and a firm's turnover suggests that both very large and very small projects tend to be less attractive. This finding emphasizes the importance of appropriately dividing the procurement purchases into suitable parts. Fourth, tenders with secondary objectives may reduce firms' willingness to participate, but the effect seems to be relatively small, at least as long as the additional requirements do not add complexity or too much exclusivity to the tender process.

Finally, our results confirm the theoretical prediction that higher anticipated competition discourages participation, suggesting an upper bound on the effectiveness of measures that aim at increasing participation. This suggests that the policy efforts to increase entry ought to be directed, i.e., they should focus on PP contexts where increasing competition matters

the most such as tenders with very low amount of bidders.

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A Appendix: Supplementary material

A.1 Equivalence of the stacked and differenced regressions

Write the stacked equations for the two profiles in task t:

$$Y_{i1t} = \alpha + \sum_a \sum_{l \neq l_0} \beta_{al} z_{i1tal} + \varepsilon_{i1t}, \tag{5}$$

$$Y_{i2t} = \alpha + \sum_a \sum_{l \neq l_0} \beta_{al} z_{i2tal} + \varepsilon_{i2t}. \tag{6}$$

Subtracting (6) from (5) gives:

$$Y_{i1t} - Y_{i2t} = \sum_a \sum_{l \neq l_0} \beta_{al} (z_{i1tal} - z_{i2tal}) + (\varepsilon_{i1t} - \varepsilon_{i2t}). \tag{7}$$

Because the task involves a forced binary choice, $Y_{i2t} = 1 - Y_{i1t}$, so that

$$Y_{i1t} - Y_{i2t} = 2Y_{i1t} - 1. \tag{8}$$

Substituting (8) into (7) and dividing by 2 gives

$$Y_{i1t} = \tfrac{1}{2} + \sum_a \sum_{l \neq l_0} \beta_{al} \tfrac{1}{2} (z_{i1tal} - z_{i2tal}) + \tfrac{1}{2} (\varepsilon_{i1t} - \varepsilon_{i2t}). \tag{9}$$

Now, let us define

$$\tilde{z}_{ital} = \tfrac{1}{2}(z_{i1tal} - z_{i2tal}), \quad u_{it} = \tfrac{1}{2}(\varepsilon_{i1t} - \varepsilon_{i2t}),$$

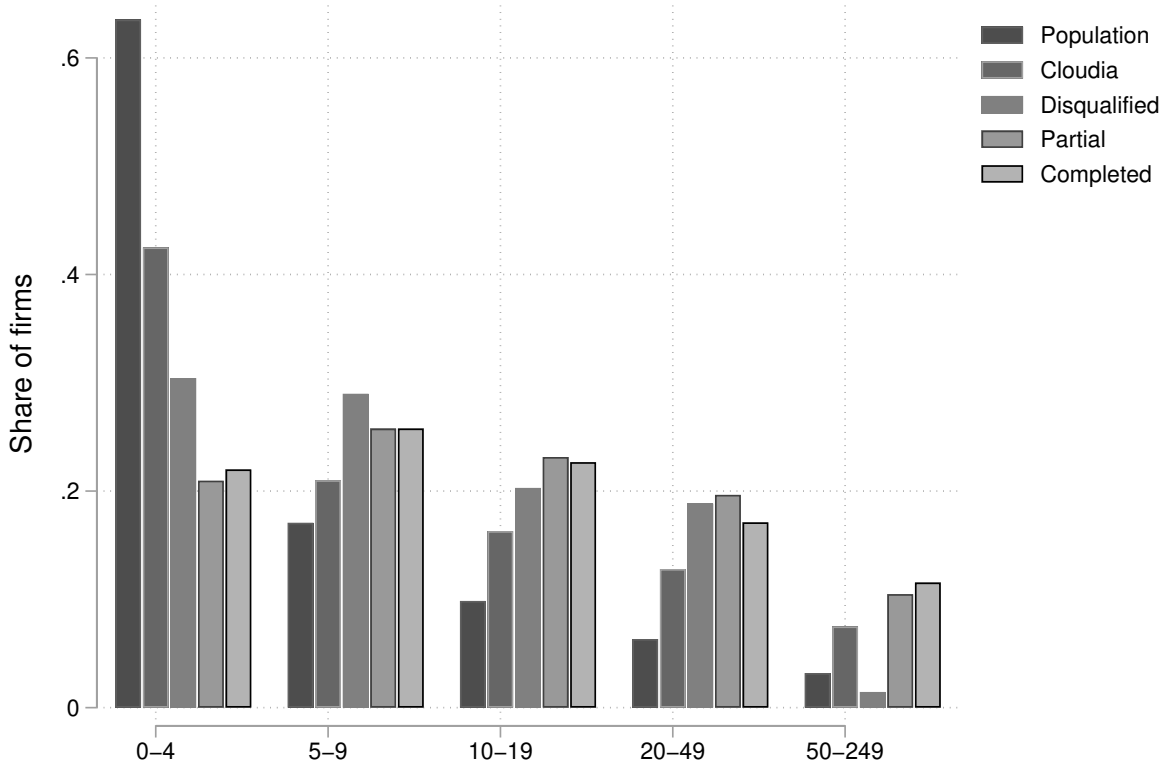
as well as $\tilde{\alpha} = \frac{1}{2}$ and $Y_{it} \equiv Y_{i1t}$. Then (9) can be rewritten as

$$Y_{it} = \tilde{\alpha} + \sum_a \sum_{l \neq l_0} \beta_{al} \tilde{z}_{ital} + u_{it}, \tag{10}$$

where $Y_{it} = 1$ if tender 1 was chosen in task choice t and $Y_{it} = 0$ otherwise. This is identical to the regression in (4) after we replace the double sum in (10) with the Euclidean inner product. From this we can see that OLS on (3) and OLS on (4) yield the same slope coefficients $\{\beta_{al}\}$.

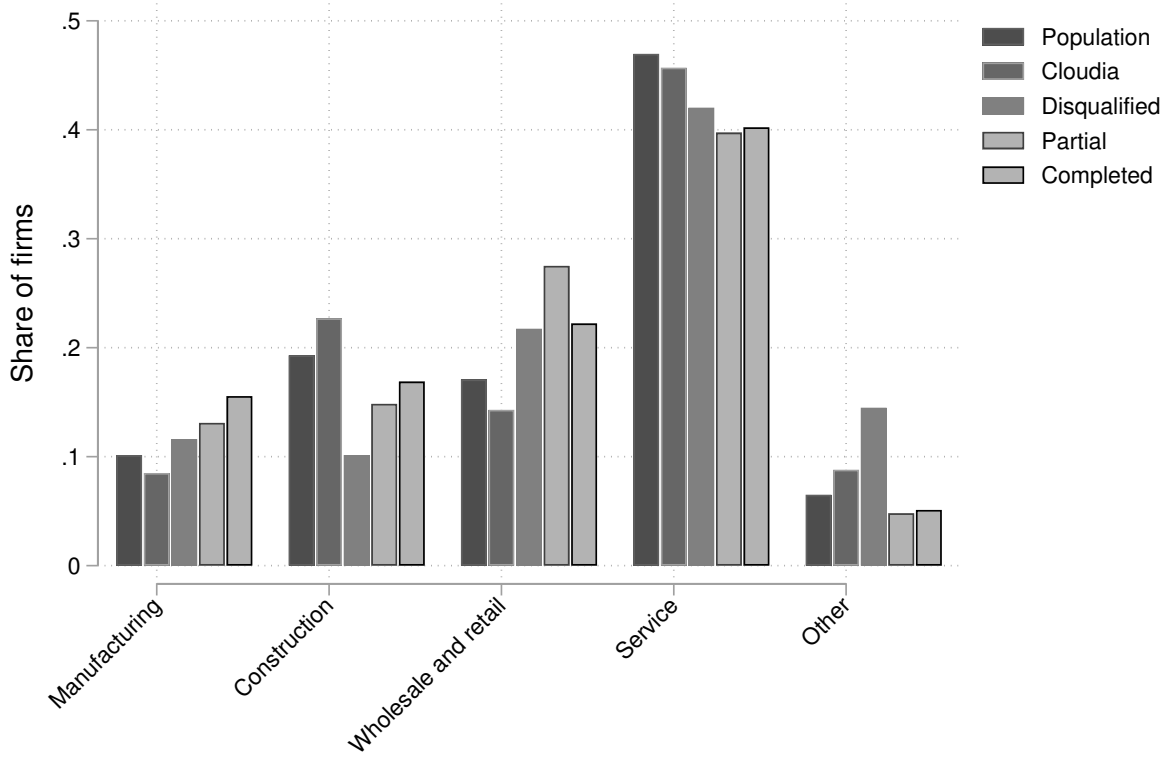
A.2 Representativeness of the Sample

Figure A1: Respondents by the number of employees



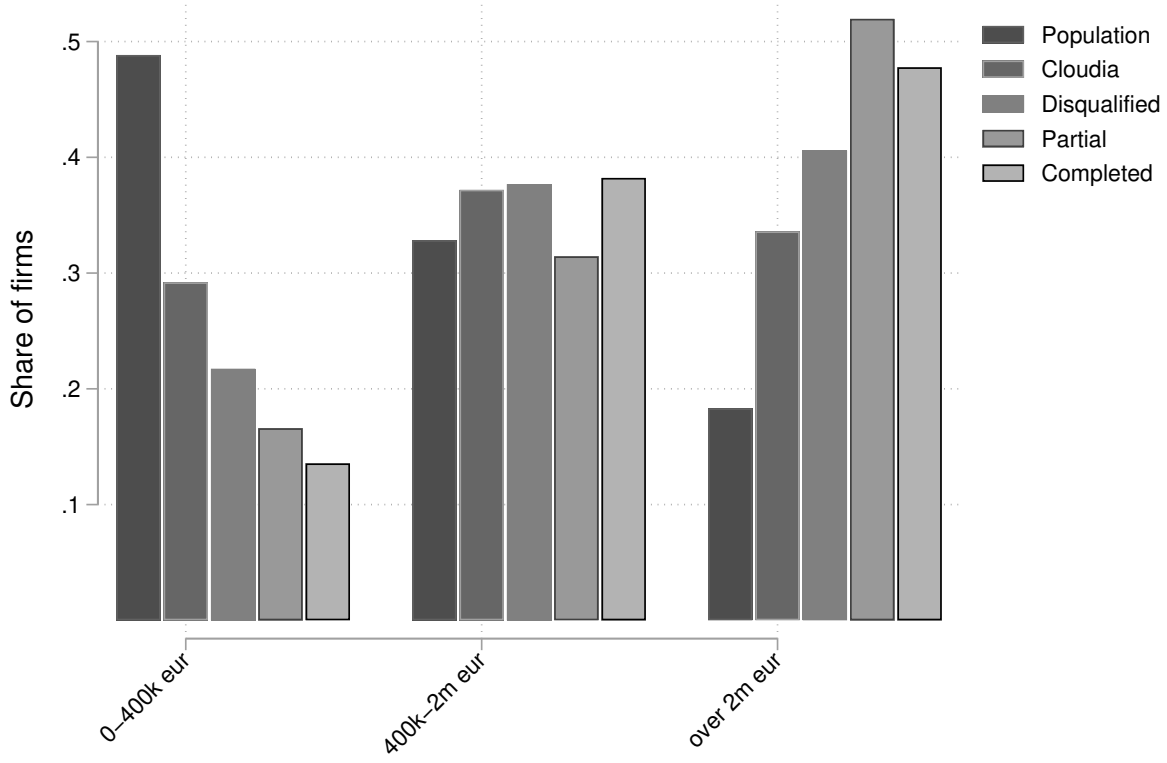
Notes: The figure shows the proportion of firms in a given category for the number of employees. The 'Population' category contains all firms listed in the Finnish firm registry. 'Cloudia' contains the firms in the Cloudia database. 'Disqualified' refers to survey respondents whose businesses do not produce goods suitable for public procurement. 'Partial' denotes respondents who started but did not complete the survey, while 'Completed' represents those who fully answered the survey.

Figure A2: Respondents by industry



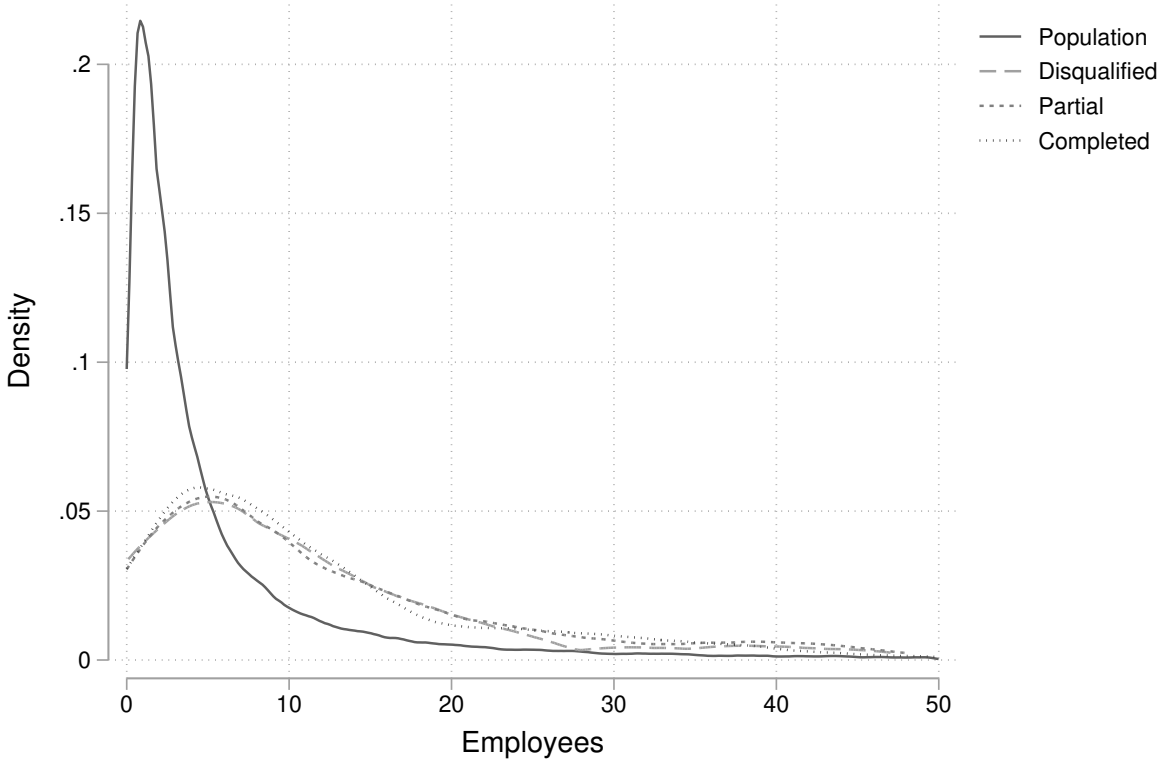
Notes: The figure shows the proportion of firms in a given industry. The 'Population' category contains all firms listed in the Finnish firm registry. 'Cloudia' contains the firms in the Cloudia database. 'Disqualified' refers to survey respondents whose businesses do not produce goods suitable for public procurement. 'Partial' denotes respondents who started but did not complete the survey, while 'Completed' represents those who fully answered the survey.

Figure A3: Respondents by firm revenue



Notes: The figure shows the proportion of firms in a given revenue category. The 'Population' category contains all firms listed in the Finnish firm registry. 'Cloudia' contains the firms in the Cloudia database. 'Disqualified' refers to survey respondents whose businesses do not produce goods suitable for public procurement. 'Partial' denotes respondents who started but did not complete the survey, while 'Completed' represents those who fully answered the survey.

Figure A4: Density of Respondents by the number of employees



Notes: The figure shows the estimated density of firms in a given category for the number of employees. The 'Population' category contains all firms listed in the Finnish firm registry. 'Disqualified' refers to survey respondents whose businesses do not produce goods suitable for public procurement. 'Partial' denotes respondents who started but did not complete the survey, while 'Completed' represents those who fully answered the survey.

Table A1: Prior participation in procurement tenders based on the Cloudia database

		2017-2023		2020-2023		2022-2023	
Bids submitted	**Category**	**N**	**Share**	**N**	**Share**	**N**	**Share**
No	Complete	116	0.258	146	0.324	193	0.429
Yes	Complete	334	0.742	304	0.676	257	0.571
No	Disqualified	55	0.797	58	0.841	61	0.884
Yes	Disqualified	14	0.203	11	0.159	8	0.116
No	Partial	76	0.332	89	0.389	118	0.515
Yes	Partial	153	0.668	140	0.611	111	0.485
No	Population	66310	0.723	70104	0.764	77103	0.840
Yes	Population	25464	0.277	21666	0.236	14666	0.160

Notes: This table presents the number of firms that participated in procurement tenders, as recorded in the Cloudia database. A firm is considered to have participated if it has submitted at least one bid. The table includes separate columns indicating whether a firm participated during the periods 2017–2023, 2020–2023, and 2022–2023. The 'Population' category contains all firms listed in the Finnish firm registry. 'Disqualified' refers to survey respondents whose businesses do not produce goods suitable for public procurement. 'Partial' denotes respondents who started but did not complete the survey, while 'Completed' represents those who fully answered the survey. The shares are calculated relative to each specific category.

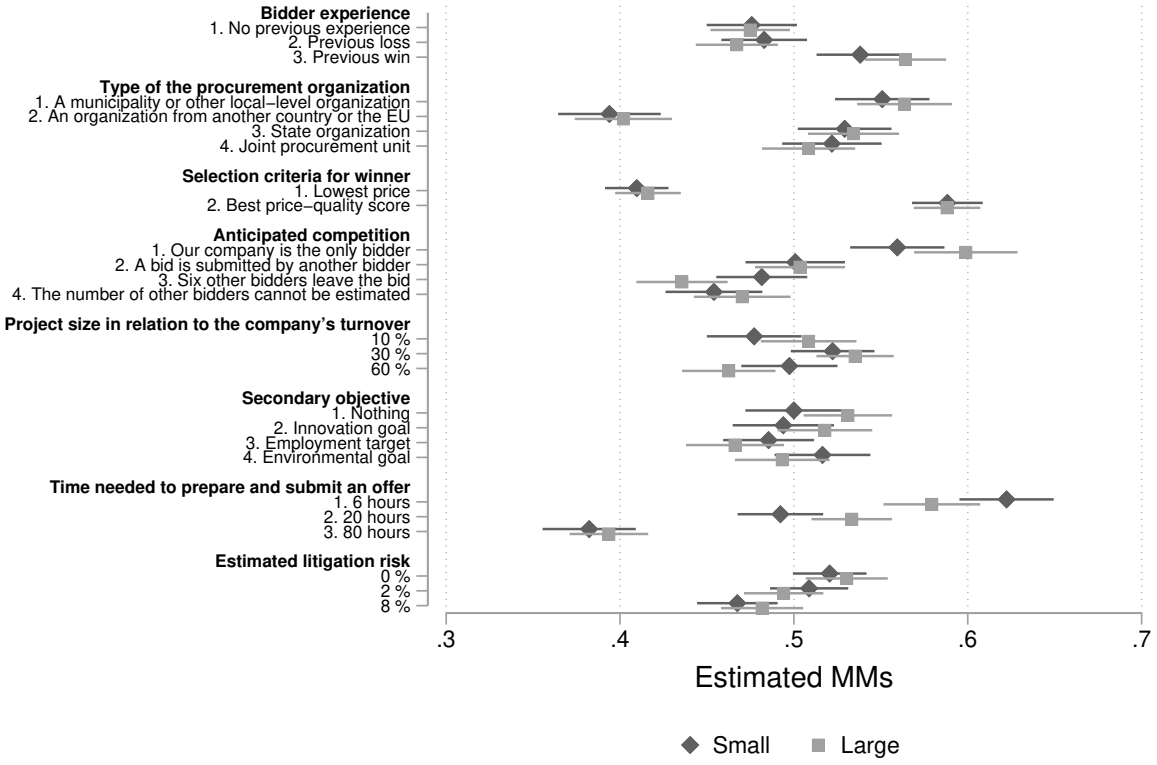
Table A2: Distribution of the number of procurement tenders in the Cloudia database

		2017-2023		2020-2023		2022-2023	
Bids	**Status**	**N**	**Share**	**N**	**Share**	**N**	**Share**
0	Complete	116	0.258	146	0.324	193	0.429
1	Complete	30	0.067	28	0.062	40	0.089
2-5	Complete	54	0.120	57	0.127	71	0.158
6-20	Complete	86	0.191	84	0.187	81	0.180
21+	Complete	164	0.364	135	0.300	65	0.144
0	Disqualified	55	0.797	58	0.841	61	0.884
1	Disqualified	5	0.072	4	0.058	6	0.087
2-5	Disqualified	5	0.072	5	0.072	0	0.000
6-20	Disqualified	3	0.043	1	0.014	2	0.029
21+	Disqualified	1	0.014	1	0.014	0	0.000
0	Partial	76	0.332	89	0.389	118	0.515
1	Partial	17	0.074	16	0.070	20	0.087
2-5	Partial	36	0.157	40	0.175	28	0.122
6-20	Partial	27	0.118	26	0.114	32	0.140
21+	Partial	73	0.319	58	0.253	31	0.135
0	Population	66310	0.723	70104	0.764	77103	0.840
1	Population	4977	0.054	4644	0.051	4190	0.046
2-5	Population	7535	0.082	6871	0.075	5188	0.057
6-20	Population	6384	0.070	5362	0.058	3446	0.038
21+	Population	6568	0.072	4789	0.052	1842	0.020

Notes: This table presents the distribution of firms based on the number of bids submitted in procurement tenders, as recorded in the Cloudia database. It includes separate columns showing the number of tenders a firm participated in during the periods 2017–2023, 2020–2023, and 2022–2023. The 'Population' category includes all firms listed in the Finnish firm registry. 'Disqualified' refers to survey respondents whose businesses do not produce goods suitable for public procurement. 'Partial' denotes respondents who started but did not complete the survey, while 'Completed' represents those who fully answered the survey. Shares are calculated relative to each specific status group.

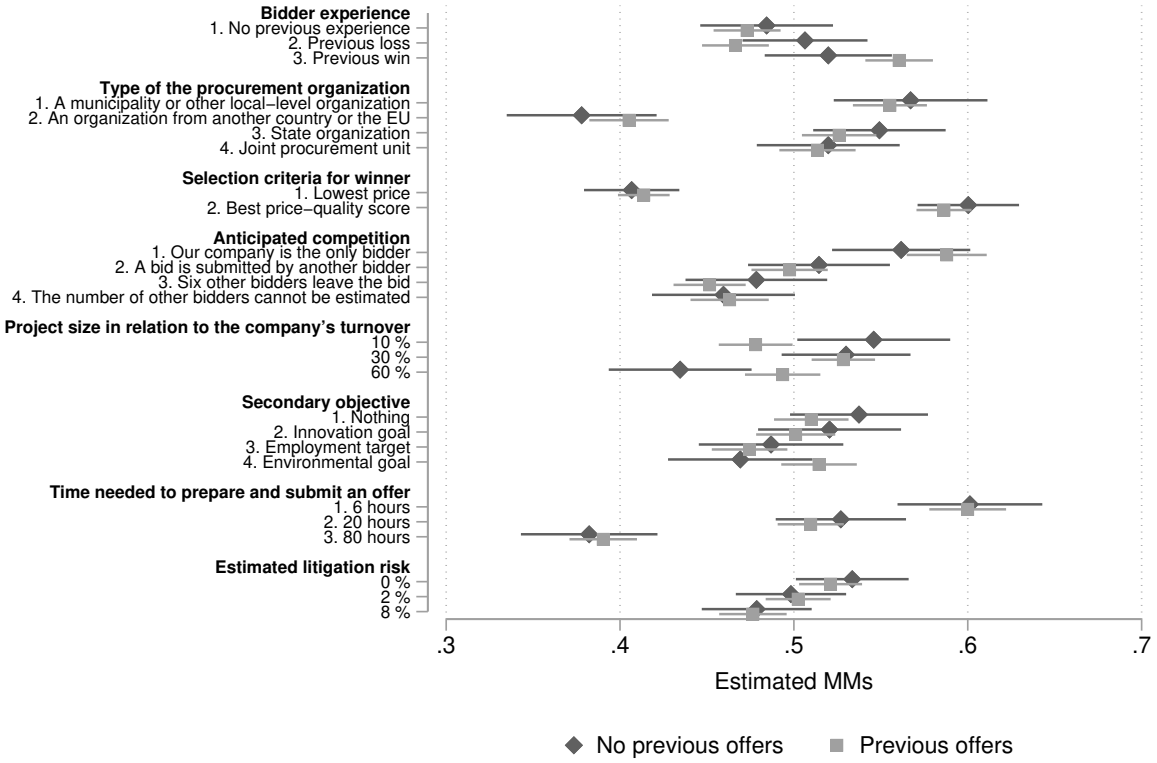
A.3 Heterogeneity Analysis: Marginal Means

Figure A5: Respondents by number of employees



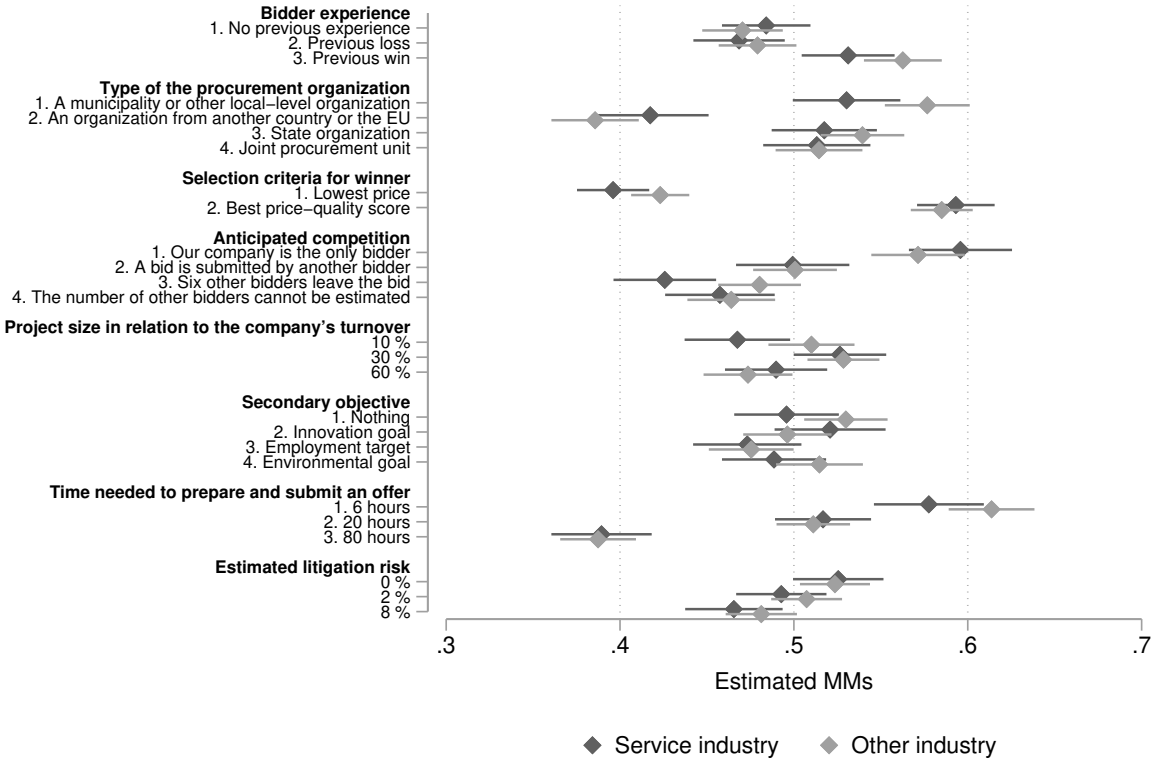
Notes: The figure shows the estimated marginal means for the conjoint attributes, with the dependent variable being the respondent's binary choice for the tender. The subsamples are chosen based on the median number of employees 9.7. Details of the estimation are outlined in Equation 3. Horizontal lines represent 95% cluster-robust confidence intervals for each attribute effect.

Figure A6: Respondents by experience



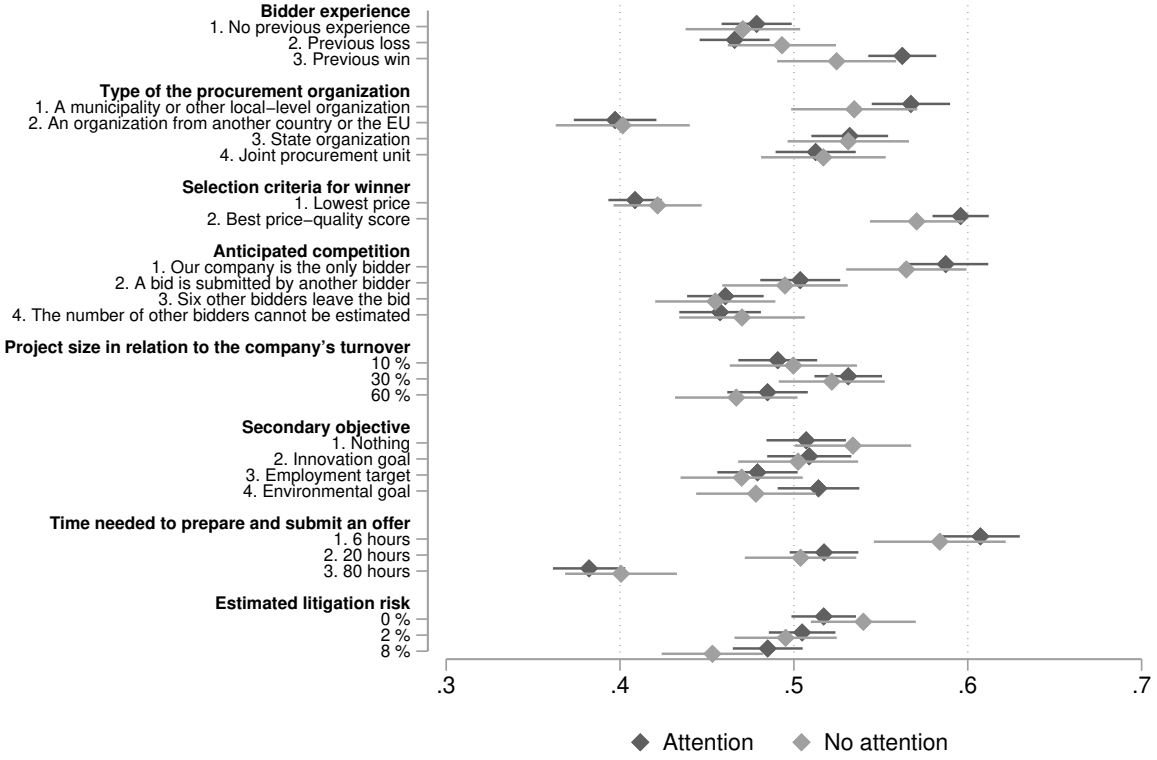
Notes: The figure shows the estimated marginal means for the conjoint attributes, with the dependent variable being the respondent's binary choice for the tender. The subsamples are chosen based on whether the respondent's firm had participated in zero tenders or not. Details of the estimation are outlined in Equation 3. Horizontal lines represent 95% cluster-robust confidence intervals for each attribute effect.

Figure A7: Respondents by industry



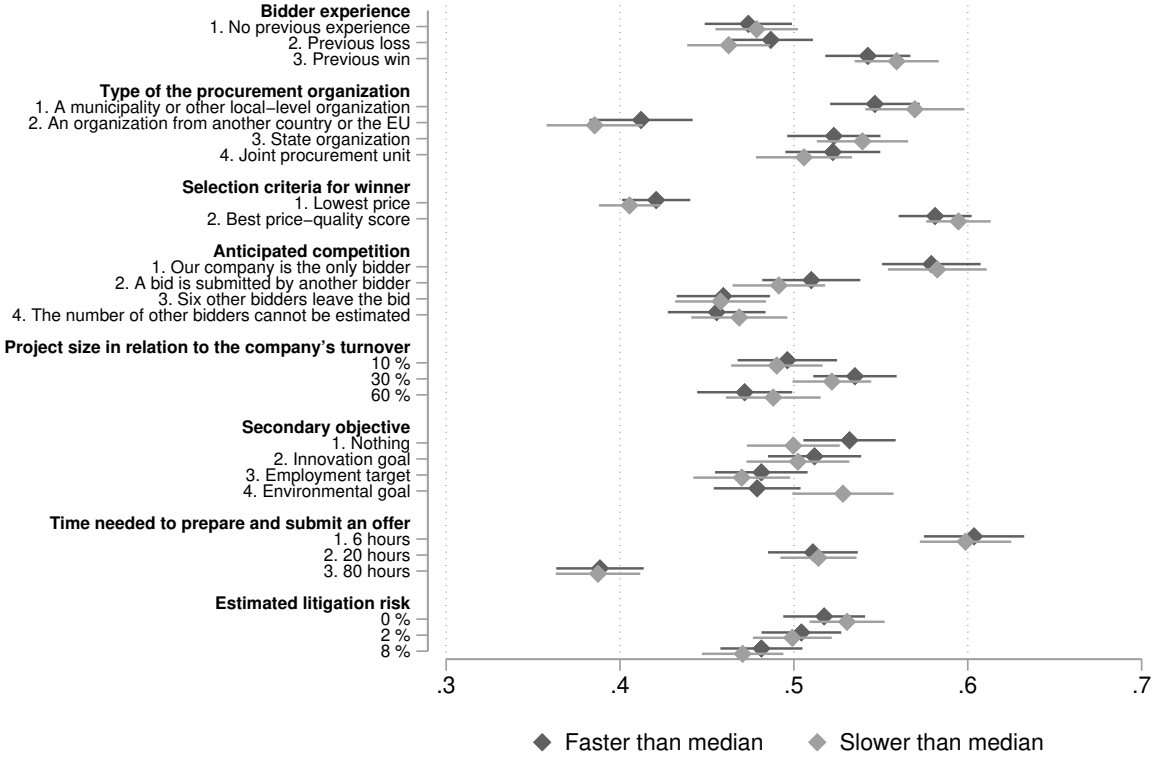
Notes: The figure shows the estimated marginal means for the conjoint attributes, with the dependent variable being the respondent's binary choice for the tender. The subsamples are chosen based on whether the respondent's firm operates within a service industry or not. Details of the estimation are outlined in Equation 3. Horizontal lines represent 95% cluster-robust confidence intervals for each attribute effect.

Figure A8: Respondents by attention



Notes: The figure shows the estimated marginal means for the conjoint attributes, with the dependent variable being the respondent's binary choice for the tender. The subsamples are chosen based on the respondent's answer to Question 11 in the survey, as presented in the Appendix. Details of the estimation are outlined in Equation 3. Horizontal lines represent 95% cluster-robust confidence intervals for each attribute effect.

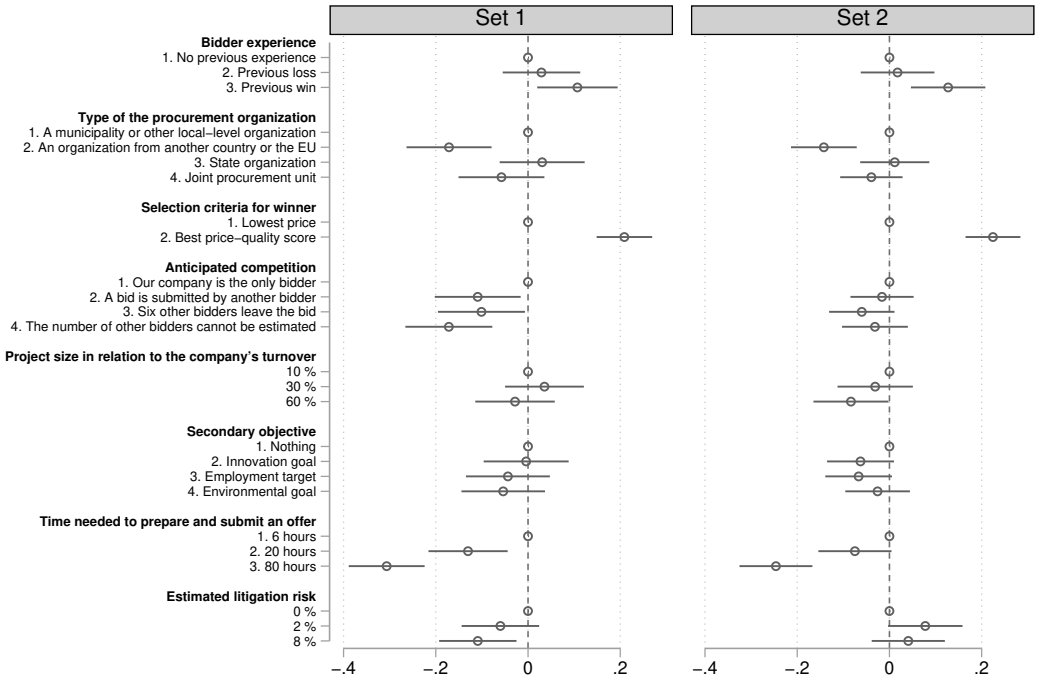
Figure A9: Respondents by time used for the conjoint section



Notes: The figure shows the estimated marginal means for the conjoint attributes, with the dependent variable being the respondent's binary choice for the tender. The subsamples are chosen based on whether the respondent used more or less time than the median in the conjoint section. Details of the estimation are outlined in Equation 3. Horizontal lines represent 95% cluster-robust confidence intervals for each attribute effect.

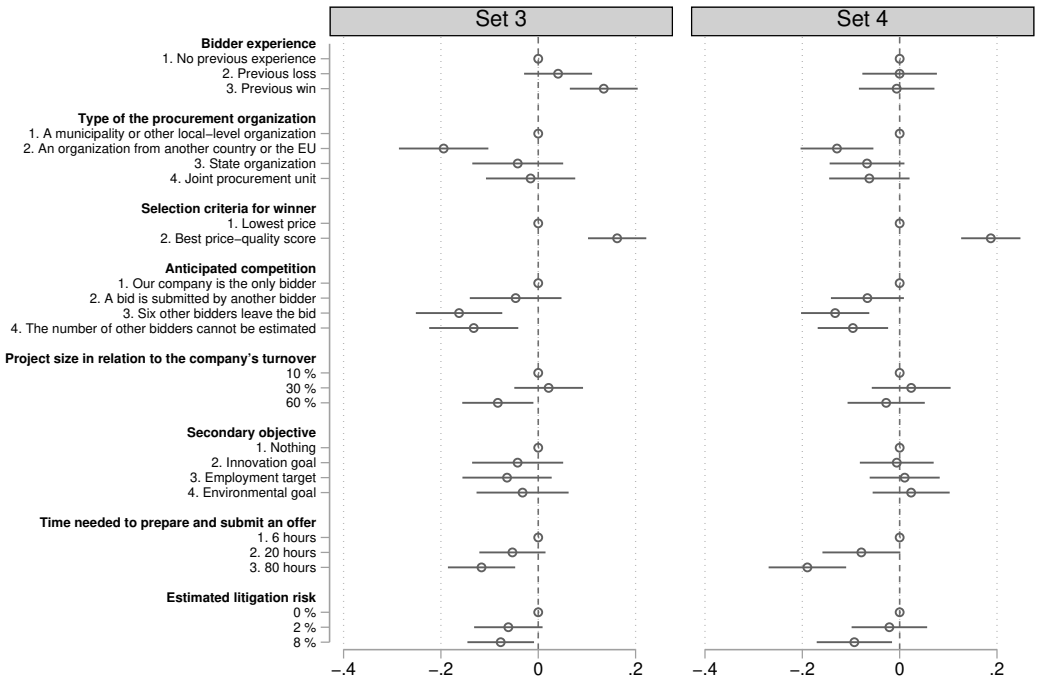
A.4 Carry Over Effects: Effect of the Set Number

Figure A10: Estimates for sets 1 and 2



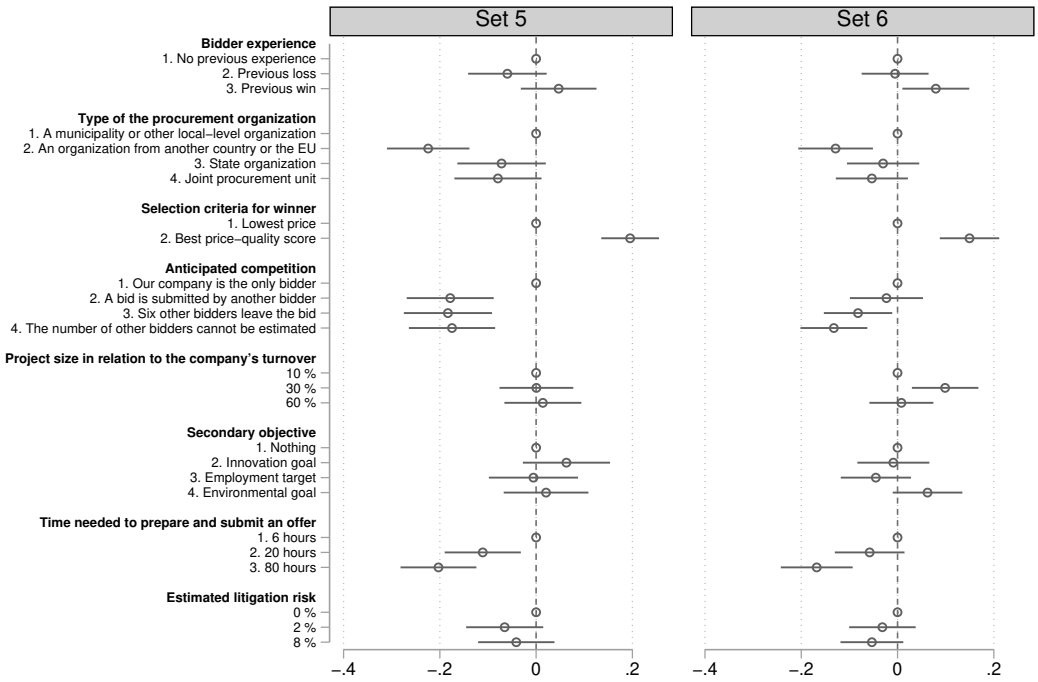
Notes: The figure shows the estimated coefficients for tender profile sets 1 and 2, with the dependent variable being the respondent's binary choice for the tender. Horizontal lines represent 95% cluster-robust confidence intervals, while points without these lines indicate the reference categories for each attribute effect.

Figure A11: Estimates for sets 3 and 4



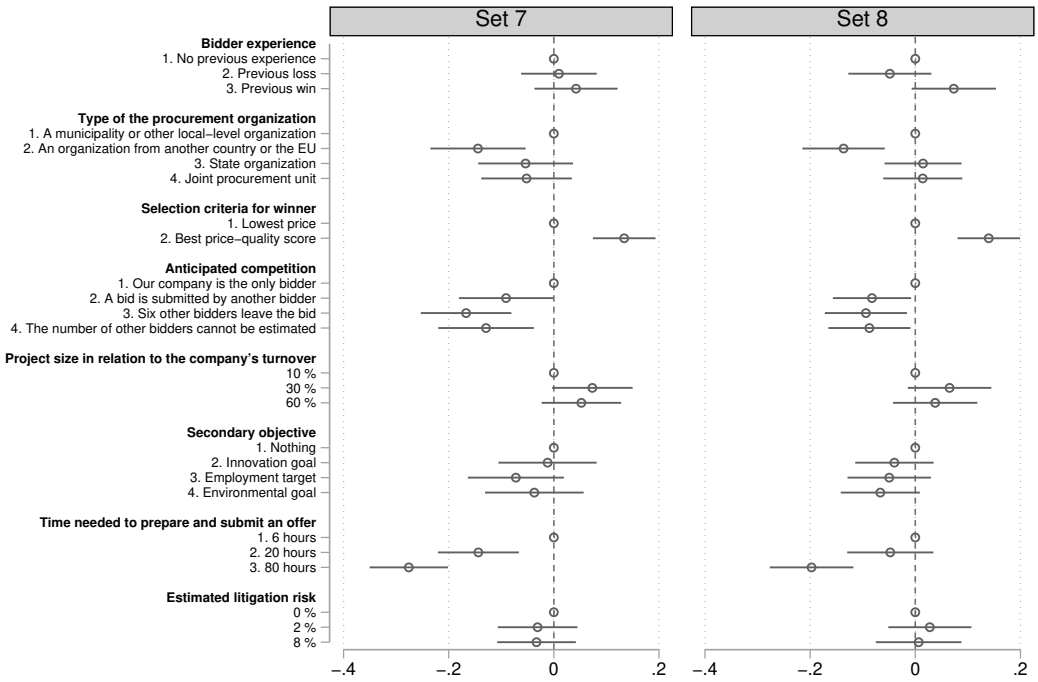
Notes: The figure shows the estimated coefficients for tender profile sets 3 and 4, with the dependent variable being the respondent's binary choice for the tender. Horizontal lines represent 95% cluster-robust confidence intervals, while points without these lines indicate the reference categories for each attribute effect.

Figure A12: Estimates for sets 5 and 6



Notes: The figure shows the estimated coefficients for tender profile sets 5 and 6, with the dependent variable being the respondent's binary choice for the tender. Horizontal lines represent 95% cluster-robust confidence intervals, while points without these lines indicate the reference categories for each attribute effect.

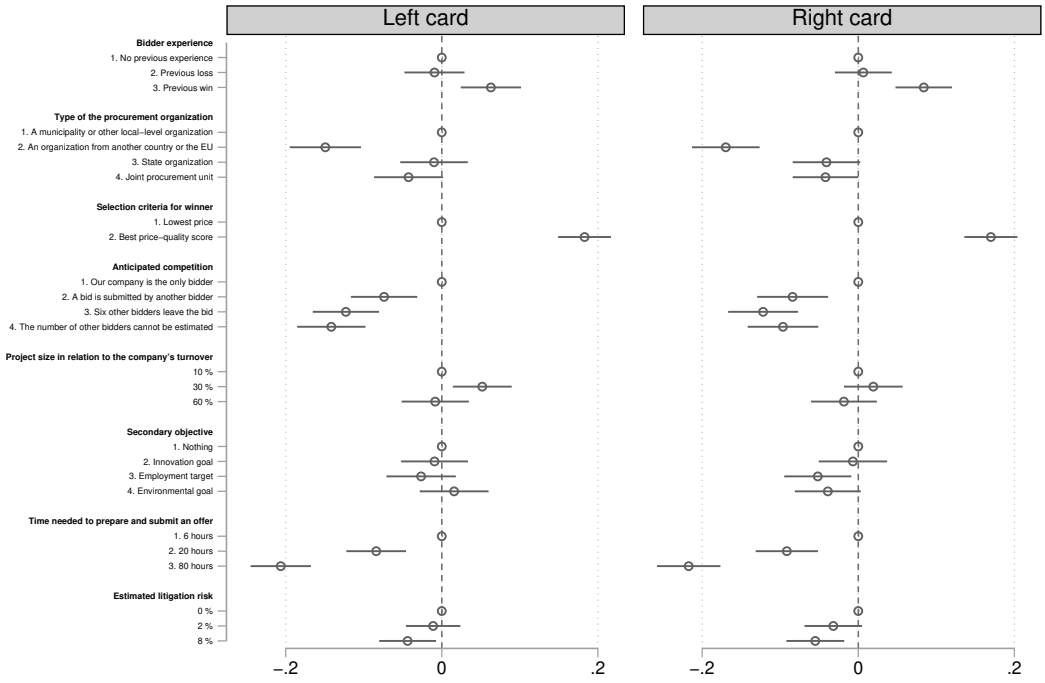
Figure A13: Estimates for sets 7 and 8



Notes: The figure shows the estimated coefficients for tender profile sets 7 and 8, with the dependent variable being the respondent's binary choice for the tender. Horizontal lines represent 95% cluster-robust confidence intervals, while points without these lines indicate the reference categories for each attribute effect.

A.5 Profile Order Effects: Left vs. Right Card

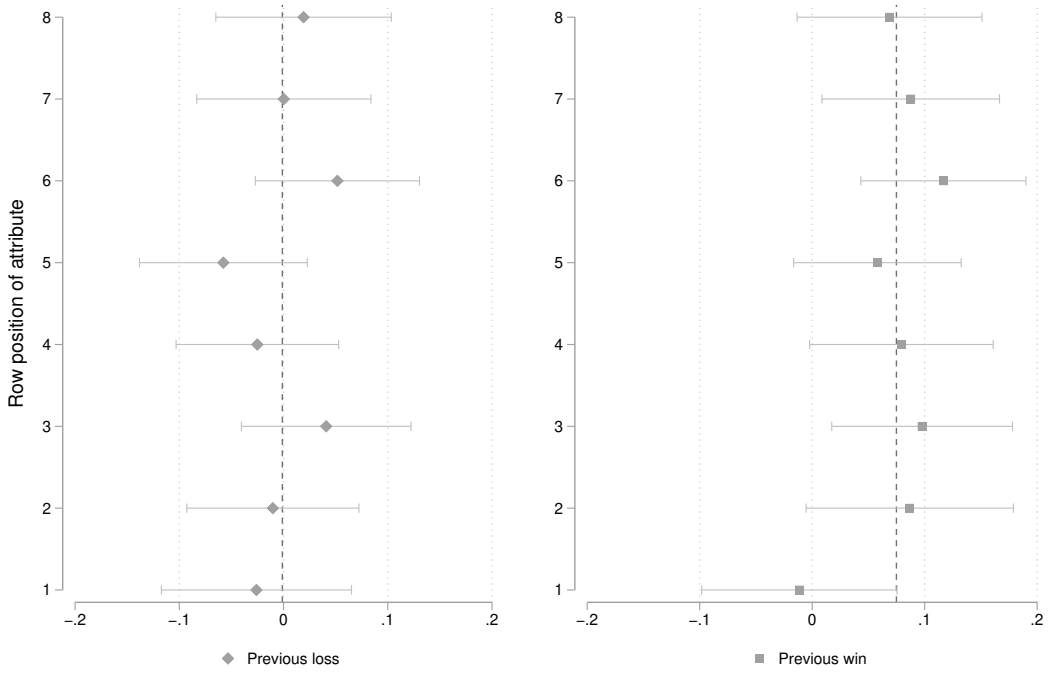
Figure A14: Estimates for the left and right tender profile



Notes: The figure shows the estimated coefficients for tender profiles positioned on the left versus the right side of the screen, with the dependent variable being the respondent's binary choice for the tender. Horizontal lines represent 95% cluster-robust confidence intervals, while points without these lines indicate the reference categories for each attribute effect.

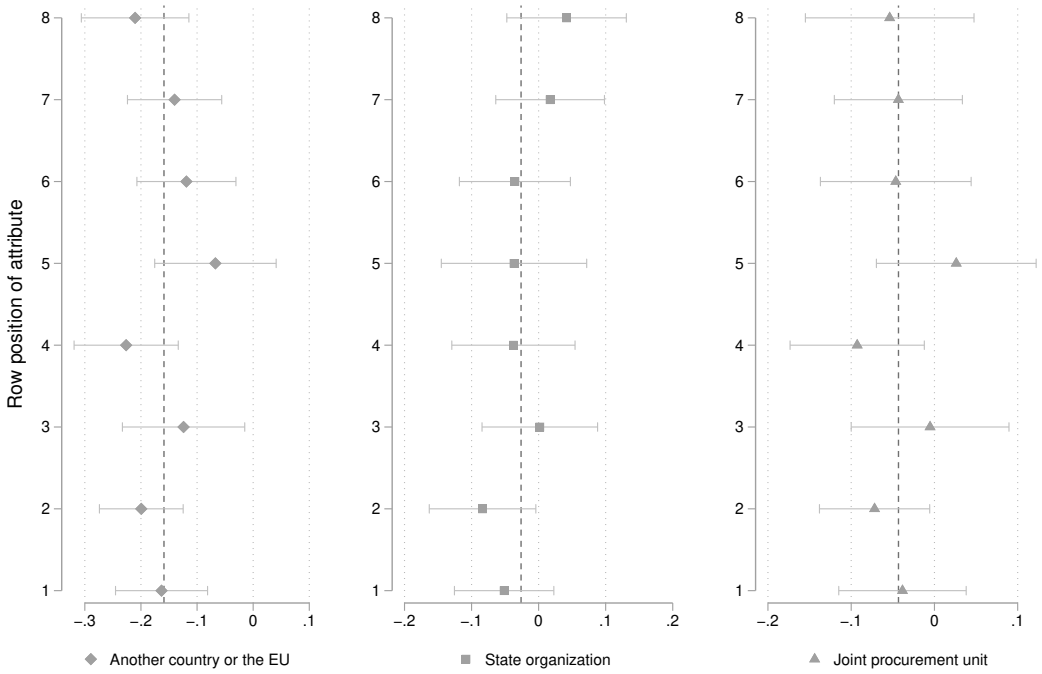
A.6 Attribute Order Effects

Figure A15: Attribute order effect: bidder experience



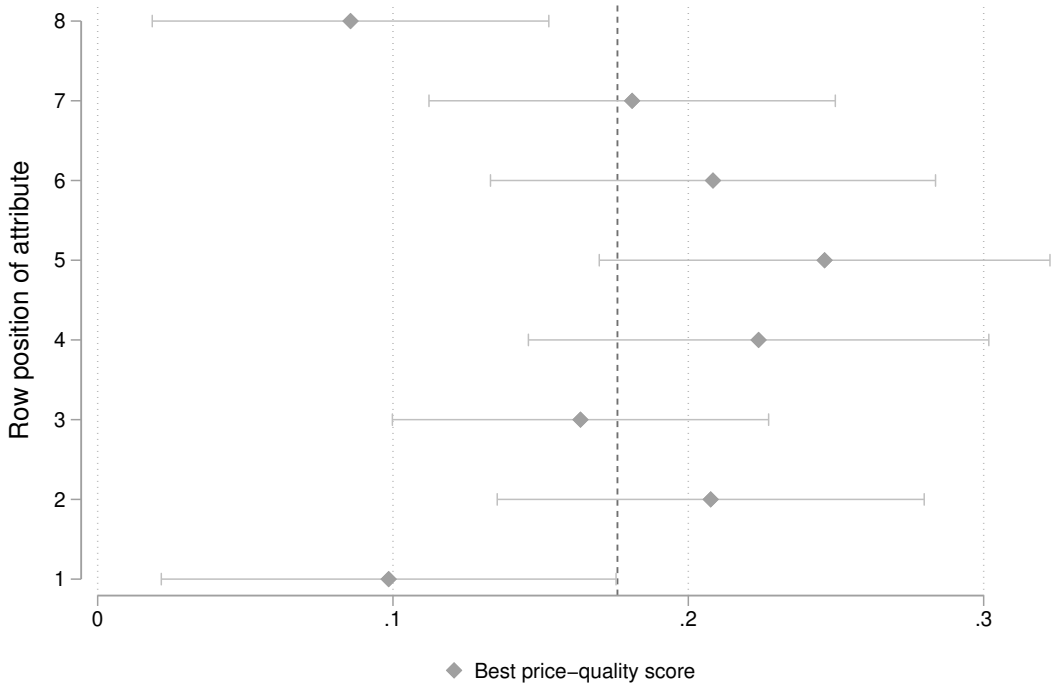
Notes: The figure shows how the estimated coefficients for attribute "bidder experience" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. The estimates are obtained by including an interaction between this attribute and row position, while otherwise maintaining the same set of control variables as in the main specification. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A16: Attribute order effect: type of the procurement organization



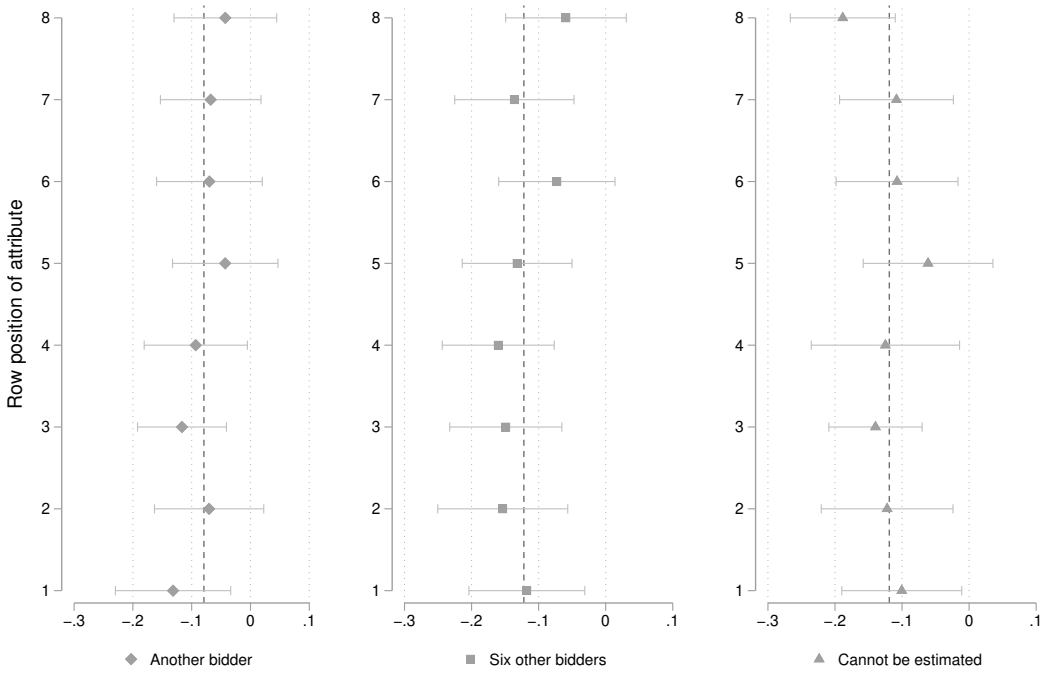
Notes: The figure shows how the estimated coefficients for attribute "type of the procurement organization" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A17: Attribute order effect: selection criteria for winner



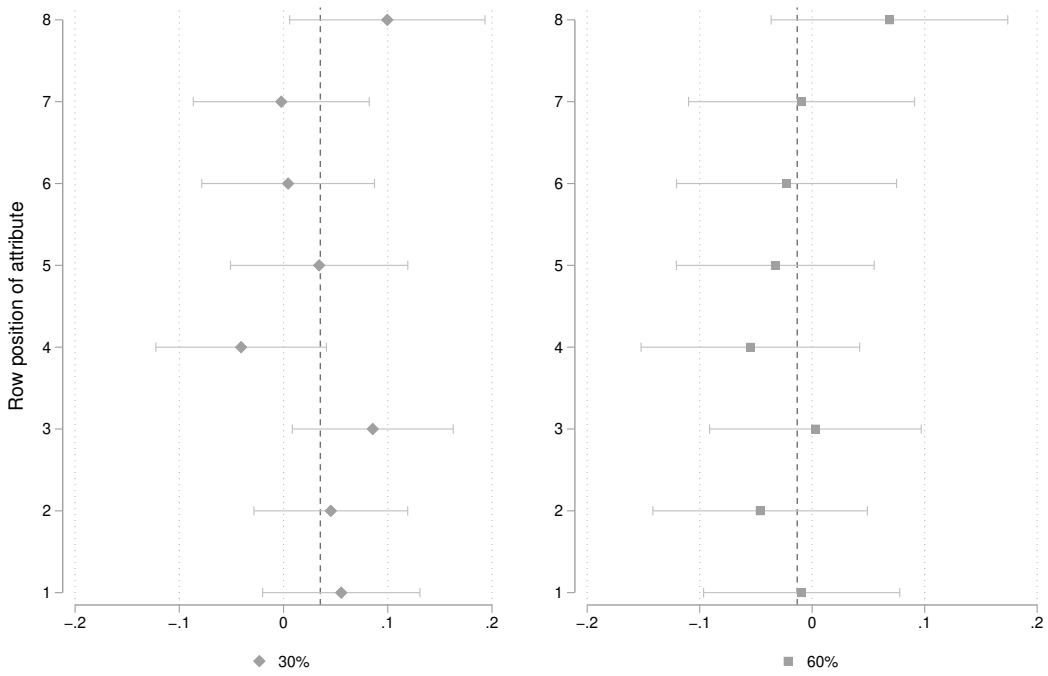
Notes: The figure shows how the estimated coefficients for attribute "selection criteria for winner" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A18: Attribute order effect: anticipated competition



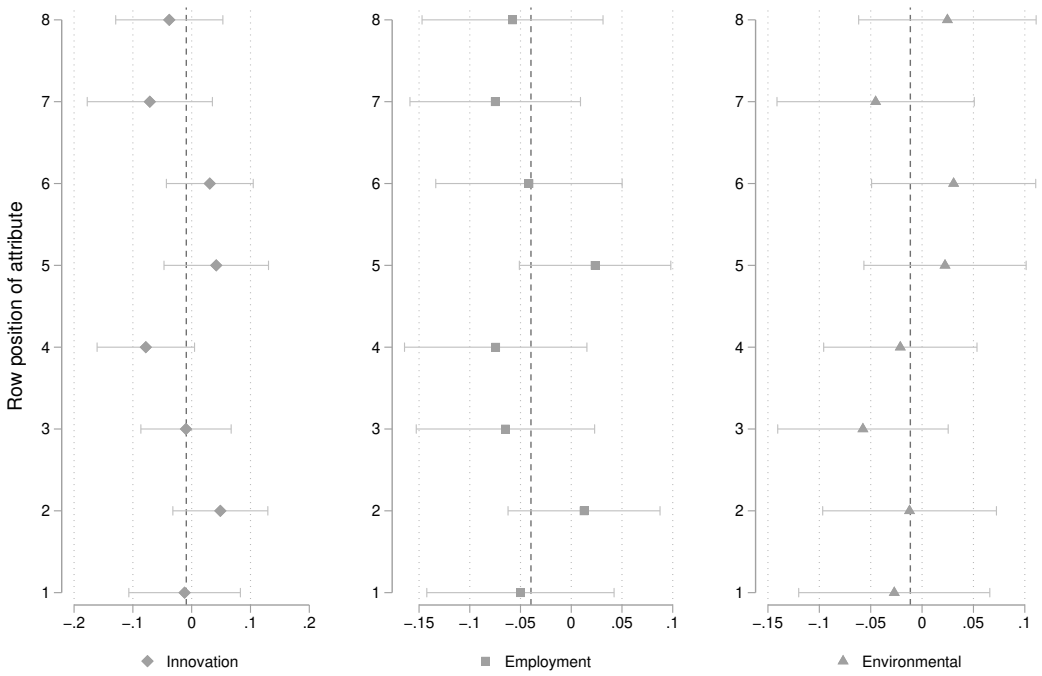
Notes: The figure shows how the estimated coefficients for attribute "anticipated competition" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A19: Attribute order effect: project size in relation to the company's turnover



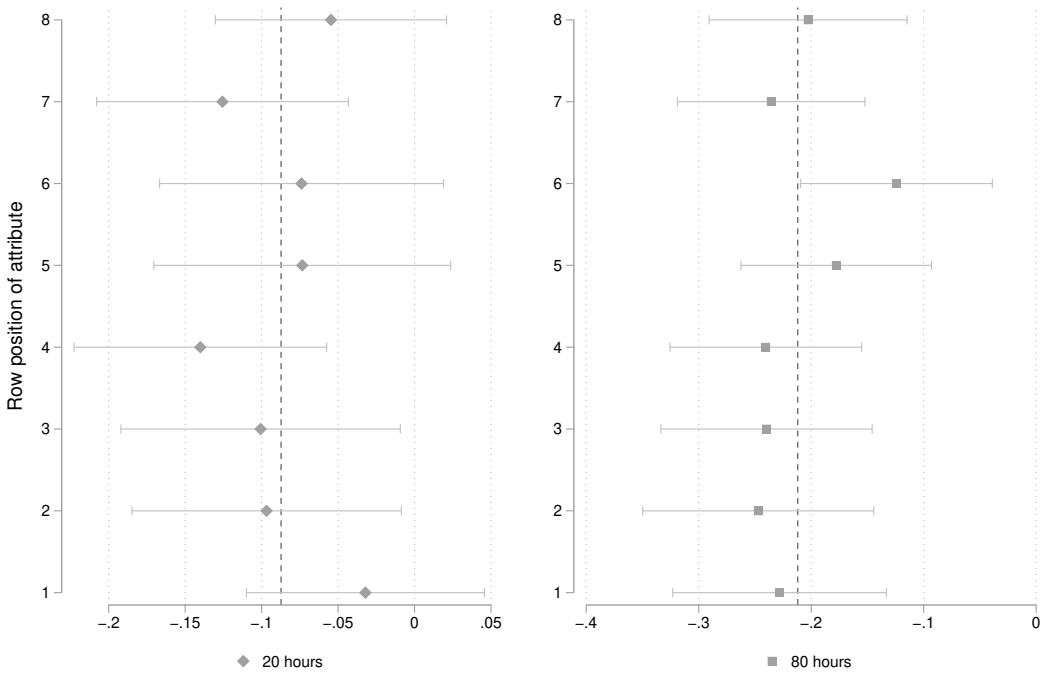
Notes: The figure shows how the estimated coefficients for attribute "project size in relation to the company's turnover" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A20: Attribute order effect: secondary objective



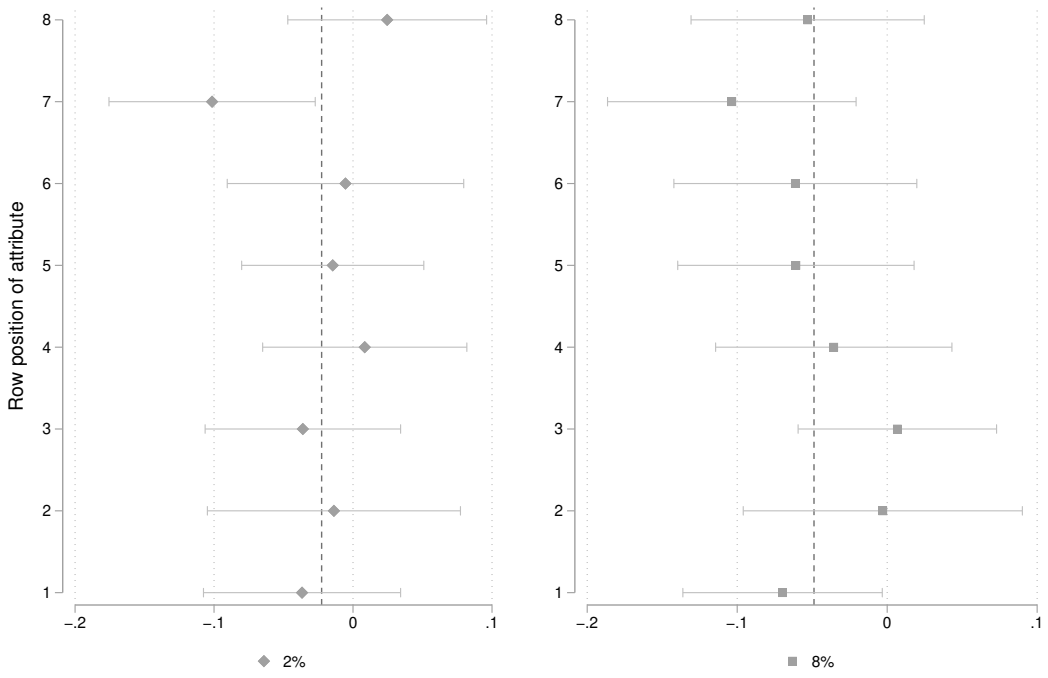
Notes: The figure shows how the estimated coefficients for attribute "secondary objective" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A21: Attribute order effect: time needed to prepare and submit an offer



Notes: The figure shows how the estimated coefficients for attribute "time needed to prepare and submit an offer" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

Figure A22: Attribute order effect: estimated litigation risk



Notes: The figure shows how the estimated coefficients for attribute "estimated litigation risk" change based on the row position in which the attribute was presented. We calculated these estimates by interacting the attribute with row position, while including all other attributes as control variables. Horizontal lines represent 95% cluster-robust confidence intervals. The vertical line presents the corresponding estimate in the main regression.

B Survey details

B.1 Emails to Potential Survey Respondents

B.1.1 Content of the email after a call (Spring/Summer 2023)

Title:

The Finnish Competition and Consumer Authority's survey on participation in public procurement

Email text:

Hello (first name last name),

Thank you for your interest in the Competition and Consumer Agency's survey on participation in public procurement! You can participate in the survey from the following link: (unique link)

If you leave the survey unfinished, you can continue it by opening the survey again

from the same link. If you have any questions about the research, please contact research supervisor (first name, last name), (email address), (phone number)

Thank you for your reply! Regards, (sender name)

B.1.2 Content of the contact email (Fall 2023)

Email text:
Hello,

The Finnish Competition and Consumer Authority conducts research on companies' experiences with public procurement. The information gathered from the answers is valuable, for example, when formulating changes to the Procurement Act that may be planned in the future government program. If your company produces a service or product that could participate in public procurement, your answer is valuable to us, even if you have not yet participated in public procurement. You can also find information about our survey on KKV's website: (website address).

You can participate in the survey from the following link: (link) If the survey is left unfinished, you can continue it from the same link. You can also direct the survey to another respondent in your company, but only one person can answer the survey.

If necessary, we will send a reminder message about answering the survey. However, if you want to remove yourself from the email list of this survey, reply to this message.

If you have any questions about the research, please contact research supervisor (first name, last name), (email address), (phone number) Thank you for your reply!

B.2 Contents of the Survey

Introduction

In this survey, we ask you to assess your knowledge of public procurement and your company's opportunities to participate in them as a bidder. The FCCA is carrying out this survey in cooperation with researchers from the University of Turku, the University of Lapland and Hanken. Your answers will be analyzed completely anonymously and using only statistical methods. Although you may find some of the questions difficult, we still ask that you assess your views as accurately and comprehensively as possible for each question. We ask you to read each question and the instructions carefully before you start answering the questions.
Answer to tick: I understand, and I want to continue answering the survey.

Part I - Background questions

In this section, you will be asked questions regarding your company's and your own previous participation in public procurement. For the sake of clarity, we would like to clarify that public procurement is the procurement of goods, services and construction contracts that the state, municipalities and joint municipal authorities, state-owned enterprises and other procurement units defined in procurement legislation make outside their own organization. They are therefore procurement situations in which a public actor requests tenders from tenderers in order to procure certain goods or services or to carry out a construction contract. Participation in the procurement as a tenderer requires that the tenderer participates in a tender competition or other tender or negotiation procedure used in the procurement.

1. Does your company produce products, services or construction works that you have offered or could potentially offer in public procurement?
   Answer: Yes/No

2. How many public procurement tenders has your company participated in as a bidder in the last three years?
   Answer: Positive integer. If the answer is 0 or greater than 156, the respondent is asked to confirm their response and given the option to correct it.

3. How many public procurement tenders has your company participated in as a bidder in the last three years?
   Answer: Positive integer

4. How many of those tenders have you won (number)?
   Answer: Positive integer

5. How many of those tenders have taken place in the last 12 months (number)?
   Answer: Positive integer

6. How significant a portion of your company's turnover comes from public procurement on average each year?
   Answer options: 0%, 1-25%, 26 - 50%, 51 - 75%, 75 - 100%

7. How many public procurement-related tenders have you represented in some way, such as participating as a tenderer or otherwise, during your current and possible previous employment relationships?
   Answer: Positive integer

8. Public procurement is sometimes set to have various secondary objectives related to how the procurement contributes to environmental issues, supports innovation or strengthens employment development. Sometimes these objectives are called so-called horizontal or strategic objectives of public procurement. Do you know or have you heard of them before this survey? (choose one)
   Answer options: I know what they are and what they mean, I have heard of them before, I have never heard of them

   Clarification to be shown after the answer:

   > The so-called strategic and horizontal objectives related to public procurement refer to additional objectives or obligations set for procurements. They can be divided into the following three categories:
   >
   > - The environmental objectives of the procurement set an objective that takes the environment and nature into account for the product or service to be procured, its production method or the company producing it. As a result, the company winning the procurement may, for example, be obliged to use environmentally friendly technology or recycled raw materials.
   > - The innovation objectives of the procurement require that the product or service to be procured, its production method or the company producing it utilize either product or process innovations in some way. Such an innovation objective may require that the company winning the procurement utilize, for example, new technology or produce new types of products or services.
   > - The social objectives of the procurement set some additional societal requirement or obligation for the procurement. As a result, the company that wins the procurement, for example, may be obliged to improve employment by employing the unemployed.

   Answer to tick: Thank you, I understand.

9. In how many public procurement tenders has your company initially considered participating as a bidder in the last three years, but in which it ultimately did not submit a bid?
   Answer: Positive integer

10. What have been the main reasons for not submitting a tender (you can select multiple)?
Answer options:

    - The procurements use contractual clauses and/or standard terms that are inappropriate and have prevented the submission of a tender
    - Our company manufactures products or services that are described as the subject of the procurement in the procurement notices, but the procurement notice describes or sets requirements related to environmental friendliness, innovation and/or employment that have prevented the submission of a tender.
    - Our company manufactures very similar products or services that are described as the subject of the procurement in the procurement notices, but they still do not meet the minimum quality requirements or other minimum conditions set in the procurement notices.
    - A closer examination revealed that our company does not manufacture the products or services that are described as the subject of the procurement in the procurement notices.
    - Our company manufactures products or services that are described in the procurement notices as the subject of the procurement, but participating in the tender takes too much time and/or causes too many costs.
    - Our company manufactures very similar products or services that are described in the procurement notices as the subject of the procurement, but in our opinion they would not be able to compare in quality with other products.
    - Our company manufactures very similar products or services that are described in the procurement notices as the subject of the procurement, but we are not able to offer our product or service at a competitive, i.e. low enough, price.
    - Other reason, which: (text field)

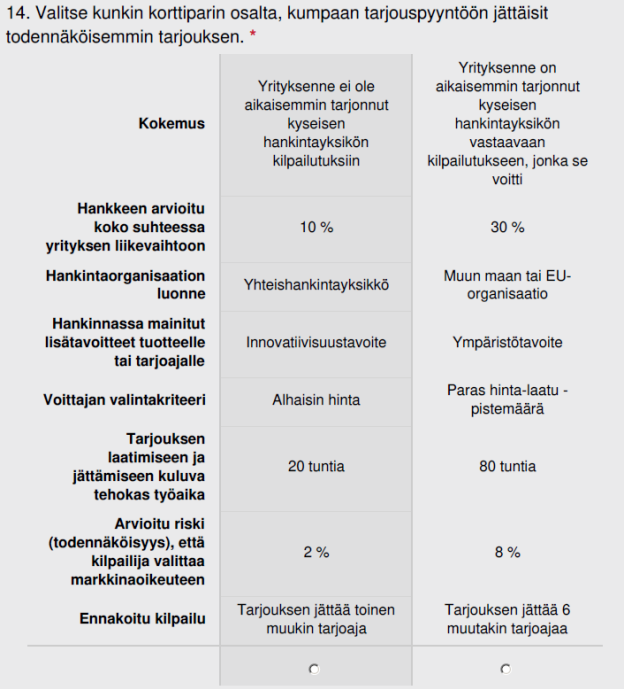
Part II - Conjoint experiment

Next, we will show you descriptions of possible requests for tenders, two at a time. Each pair of cards contains two fictitious public procurement requests that differ in one or more respects. Each fictitious procurement concerns products or services that your company produces. For each pair of cards, choose which request for tender you would be more likely to submit a bid for.

Answer to tick: Thank you, I understand.

Conjoint tender-profiles

Next, the respondent was shown 8 consecutive pairs of hypothetical tender profiles and asked to select their preferred option. An example of a tender profile pair is shown in Figure S1:



14. Valitse kunkin korttiparin osalta, kumpaan tarjouspyyntöön jättäisit todennäköisemmin tarjouksen. *

Kokemus	Yrityksenne ei ole aikaisemmin tarjonnut kyseisen hankintayksikön kilpailutuksiin	Yrityksenne on aikaisemmin tarjonnut kyseisen hankintayksikön vastaavaan kilpailutukseen, jonka se voitti
Hankkeen arvioitu koko suhteessa yrityksen liikevaihtoon	10 %	30 %
Hankintaorganisaation luonne	Yhteishankintayksikkö	Muun maan tai EU-organisaatio
Hankinnassa mainitut lisätavoitteet tuotteelle tai tarjoajalle	Innovatiivisuustavoite	Ympäristötavoite
Voittajan valintakriteeri	Alhaisin hinta	Paras hinta-laatu -pistemäärä
Tarjouksen laatimiseen ja jättämiseen kuluva tehokas työaika	20 tuntia	80 tuntia
Arvioitu riski (todennäköisyys), että kilpailija valittaa markkinaoikeuteen	2 %	8 %
Ennakoitu kilpailu	Tarjouksen jättää toinen muukin tarjoaja	Tarjouksen jättää 6 muutakin tarjoajaa
	○	○

Figure S1: Example of a conjoint scenario (in Finnish)

After each such card (tender comparison), the responded was asked which tender she/he would like to choose. For each of the eight choice tasks (cards), the values of attributes were randomly chosen. The order of the attributes were randomized across the respondents but for a given respondent, their order remained unchanged across the choice tasks.

Part III - Direct survey questions with randomized parameter values

Answer instructions: The following questions ask you to estimate how likely it is that an event or thing will happen, as a percentage. Probability describes the chance that various uncertain options or risks will happen. Expressed as a percentage (%), probability should be a number between zero (0%) and one hundred (100%). On this scale, 0% means that you consider the event to be completely impossible. 100% means that you consider the event to be certain that it will happen. Small percentages, such as 2% or 5%, mean a very unlikely event, and numbers around 20% or closer to it mean a fairly unlikely event. Numbers around

50%, such as 45% or 55%, mean that it is about as likely that something will happen as that it will not happen. Numbers around 80% or close to it indicate a fairly likely event, while higher numbers, such as 95% or 98%, indicate a very likely event.

The next question screens how carefully the respondent answers and completes the survey.

We ask that you continue the survey by selecting the middle of the three options below, even though all of them are correct.

11. Confirmation for progress

    - Small percentages (such as: 1%, 2%, 3%, ..) mean a very unlikely event.
    - Percentages close to 50% (such as: 49%, 48%, ... or 51%, 52%...) mean that it is about as likely that something will happen as that it will not.
    - Large percentages (such as: 99%, 98%, 97%, ...) mean a very probable event.

    Participants were then randomly assigned a secondary objective: Innovation, Employment, Environmental, or Nothing. In cases where an objective other than "Nothing" was assigned, the subsequent two questions were framed with the following text displayed at the top of the screen: "The procurement notice also states that a binding [X] objective has been set for the procurement."

12. How likely do you think, expressed as a percentage, that the company you represent would submit a bid in such a situation? You can choose any number between [0%, 100%].

13. Suppose the company you represent participates in the tender and submits a bid. How likely do you think, expressed as a percentage, that it would win the tender? You can choose any number between [0%, 100%].

14. Suppose your company participates in the tender and submits a bid. In percentage terms, how likely do you think it is that other bidders besides your company would participate in the tender?
    Answer options:

    - There is a x% probability that there would be no other bidders.
    - There is a x% probability that there would be one other bidder
    - There is a x% probability that there would be two other bidders

- There is a $x\%$ probability that there would be three other bidders
- There is a $x\%$ probability that there would be four or more other bidders.

15. Would the aforementioned obligation (secondary objective) imposed on the procurement tender change the company's bid price?
Answer options:

    - I estimate that the price would decrease compared to a situation where the aforementioned obligation would not exist.
    - I estimate that the price would not change compared to a situation where the aforementioned obligation would not exist.
    - I estimate that the price would increase compared to a situation where the aforementioned obligation would not exist.

16. By how many percent do you think the price would decrease compared to a situation where there had been no binding (secondary objective)?

17. By how many percent do you think the price would increase compared to a situation where there had been no binding (secondary objective)?

18. How likely do you think, expressed as a percentage, that the company you represent would submit a bid when x (randomized parameter for the procurement notice). You can choose any number between [0%, 100%]. (x ="procurement notice made it clear what the buyer wants to buy", "the procurement notice leaves room for interpretation as to what the purchaser is requesting to purchase.")

19. How likely do you think, expressed as a percentage, that the company you represent would submit a bid when the distance from the procurement unit is x (randomized distance)? You can choose any number between [0%,100%]. ($x = 10, 50, 100$ kilometers.)

20. How likely is it, expressed as a percentage, that the company you represent would submit a bid when the effective working time required to prepare and submit a bid is x (randomized time)? You can choose any number between [0%, 100%]. ($x = 10, 20, 80$ hours.)

The **Aboa Centre for Economics (ACE)** is a joint initiative of the economics departments of the Turku School of Economics at the University of Turku and the School of Business and Economics at Åbo Akademi University. ACE was founded in 1998. The aim of the Centre is to coordinate research and education related to economics.

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