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MARKET COMPETITION IN PUBLIC PROCUREMENT OF NORTH MACEDONIA (2021–2025): ECONOMIC ANALYSIS OF BIDDERS PER TENDER

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ABSTRACT
This paper examines market competition in North Macedonian public procurement using a novel dataset of all public contracts from 2021–2025. We focus on the number of offers (bids) per tender as a key indicator of competition, following models inspired by Fazekas and Kocsis (2017). The analysis explores how institutional factors, particularly the use of electronic procurement tools and the choice of procedure type, influence bidder participation. We find that the average tender in North Macedonia attracts only 2–3 bids, and over one-third of procedures have a single bidder, raising market competition concerns. Using regression analysis with the number of offers as the dependent variable, we show that fully open procedures and e-procurement usage are associated with modestly higher competition, whereas negotiated or restricted procedures reduce the number of bidders. The paper provides descriptive insights (e.g., variation by contracting institution type and by goods/services/works procurement) and discusses implications for public expenditure effectiveness. Our results underscore the importance of transparent, open, and digitalized tendering processes in increasing competition and improving the efficiency of public spending.

Keywords: *Public procurement, Competition, Number of bids; E-procurement; North Macedonia*

JEL classification: *H57, D44, D73*

1. INTRODUCTION

Public procurement plays a crucial role in public expenditure effectiveness, as competitive tendering can lead to cost savings and better value for money. One fundamental measure of competition in procurement is the number of bids received for a contract. A higher number of bidders tends to drive prices down and reduce the risk of favoritism or corruption, improving efficiency in public spending. Conversely, a lack of competition, often manifested as single-bidder tenders, can result in inflated costs and governance concerns. Recent European Union monitoring highlights this issue: in several countries, more than one-third of public procurement procedures above EU thresholds involve only a single bidder. Such findings have raised alarms about insufficient competition in procurement markets and its impact on public budgets.

North Macedonia, as an EU accession candidate, has undertaken procurement reforms in line with EU directives to enhance competition and transparency. Notably, the country implemented a centralized Electronic System for Public Procurement (ESPP), mandating e-procurement for most tenders in recent years. These efforts aim to lower barriers to entry for suppliers and increase the number of offers per tender, thereby improving outcomes. However, empirical evidence on the effectiveness of these measures remains limited. Yet, available

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findings support the broader economic principle that competitive pressure leads to more favorable prices for the buyer (in this case, the government). Indeed, competition is one of the key metrics in the European Commission's Single Market Scoreboard (2022), which uses the Single Bid Indicator (the share of tenders with only one bid) to flag potential problems in national procurement systems. A high incidence of single-bidder contracts is seen as a red flag for restricted competition and possibly inefficiencies or corruption.

How competitive is the public procurement market in North Macedonia? Which factors significantly affect the number of bids in practice? This paper addresses these questions by analyzing a comprehensive dataset of public contracts in North Macedonia from 2021 to 2025 (latest available data), focusing on bidder participation as a proxy for market competition.

We build on the literature that views robust competition as essential for efficient public procurement and as a deterrent to corrupt or collusive practices. Following Fazekas and Kocsis's (2017) approach of using procurement data to identify "red flags" of restricted access, we use the number of offers received for each procedure as a quantitative indicator of competitiveness. By examining patterns in these data and performing regression analysis, we aim to identify which procedural and institutional factors are associated with higher or lower competition. In particular, we investigate the impact of electronic procurement tools (digital platforms for tender submission) and procedure types (open, negotiated, etc.) on the number of bidders. These factors have been highlighted in prior studies as potentially important levers for policy: for example, using open, advertised tenders and e-procurement is generally expected to increase bidder turnout.

The remainder of the paper is structured as follows. Section 2 provides a literature review of competition in public procurement. Section 3 states the hypothesis guiding this study. Section 4 outlines the methodology and data sources, explaining our scientific approach. In Section 5, we present an overview of the dataset and descriptive insights. Section 6 reports the regression results and interprets the effects of electronic tools and procedure type on the number of bids. Finally, Section 7 concludes with a discussion of findings and implications for improving public expenditure effectiveness through enhanced competition in procurement.

2. LITERATURE REVIEW

This paper analyzes competition in public procurement by the number of valid bids received per tender, a measure widely used in empirical work to capture the intensity of rivalry for contracts. A consistent finding across settings is that more bidders are associated with better procurement outcomes, especially lower awarded prices and improved cost-effectiveness. In Turkish procurement auctions, Onur et al. (2012) show that each additional bidder is linked to a statistically significant reduction in prices, while evidence from Central Europe similarly associates higher bidder turnout with improved cost efficiency in the health sector (Nemec *et al.,* 2020). Using U.S. public procurement data, Bajari *et al.* (2009) show that auctions outperform bilateral negotiations for routine, standardized projects, where broader participation translates into stronger competitive pressure and lower costs relative to negotiated deals. In Italian public works, Decarolis (2014) documents that award and screening rules that increase effective participation materially affect both entry and performance, with mechanisms that foster genuine competition associated with better outcomes. Synthesizing theory and evidence, Spagnolo (2012) argues that institutions that promote entry and sustain reputation, such as open procedures and appropriate lot division, enhance competition and procurement performance.

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Scholars have also connected the design of the tender as a major determinant of competition. Open procedures, which are advertised and allow any qualified firm to bid, generally attract more bidders than restrictive or non-competitive procedures. Ochrana and Pavel (2013), analyzing Czech Republic data, confirmed that the use of open tenders has a positive effect on the level of competition on the supply side. In contrast, limited or negotiated procedures, where fewer firms are invited or allowed to bid, tend to result in fewer offers. This is intuitive: greater openness broadens the pool of potential suppliers, increasing competition. From a policy standpoint, international organizations have long advocated open advertising of contracts to maximize competition (WTO Government Procurement Agreement; EU Procurement Directives 2014/24/EU). Exploiting Italian institutional features, Coviello and Gagliarducci (2017) show that greater buyer discretion, often exercised through negotiated or limited procedures, reduces competitive intensity, consistent with fewer bids. Related evidence from procurement auctions indicates that negotiations are associated with weaker competitive outcomes than auctions when comparable contracts are considered (Bajari *et al.*, 2009). Anderson *et al.* (2011) emphasize that publicly advertised tenders ensure transparency and equal opportunity, thereby encouraging more bidders and yielding better value. Empirical evidence supports this; for example. Nonetheless, there are cases where open procedures might not yield many bids due to market structure (e.g., very specialized contracts). A nuanced finding by Tátrai *et al.* (2024) is that negotiated procedures with communication (dialogue) can sometimes avoid single bids and secure 2–5 bids, although they rarely achieve a high number of offers. In general, however, limiting competition through procedure choice tends to lower bidder turnout.

A closely related channel is publicity and transparency in the call for competition. Leveraging a regression-discontinuity design in Italy, Coviello and Mariniello (2014) find that raising publicity requirements, mandating broader/online publication of tenders, increases the number of participating firms and intensifies price competition. The result is directly relevant to our empirical strategy: instruments that expand the pool of potential suppliers (public calls, clear documentation, broad dissemination) are expected to manifest as higher average bids per tender, ceteris paribus.

The literature also highlights the role of digital procurement tools in lowering participation costs and broadening access. In a two-country program evaluation, Lewis-Faupel *et al.* (2016) show that the introduction of e-procurement changed the composition and geography of winning firms and, importantly for our focus, facilitated wider participation by reducing information and submission frictions. Synthesizing global evidence, Becker *et al.* (2022) report that e-procurement reforms improve procurement performance in part by increasing supplier participation, consistent with a pro-competitive effect on bidder turnout. Complementary work in the public sector digitalization literature similarly links institutional capacity for digital tools to improved competitive conditions (Harrison and Sayogo, 2020). Taken together, these studies motivate testing whether tenders conducted with electronic tools exhibit higher numbers of offers.

Beyond procedure and digitalization, market and contract characteristics shape the intensity of competition. Using EU data, Tátrai et al. (2024) find systematic participation differences across procurement categories, with works tending to attract more bidders than goods and especially services, reflecting technology, asset specificity, and supplier-base depth. EU-wide evidence shows that more concentrated operator networks—captured by lower entropy—are associated with thinner effective competition in tenders (Fountoukidis, Wachs and Kertész, 2023).

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Evidence on market structure is consistent with this pattern: in pharmaceuticals, where concentration can be high, Wouters *et al.* (2019) document competitive constraints that plausibly translate into fewer effective bidders. Methodologically oriented work on detecting collusion further emphasizes that thin participation is both a symptom and a facilitator of anticompetitive behavior, reinforcing the value of bidder-count indicators in diagnostic monitoring (Kumar *et al.*, 2015). In addition, the organizational capacity of contracting authorities matters: across 32 European countries, Cingolani and Fazekas (2017) show that stronger administrative capacity is associated with more competitive procurement processes, consistent with higher participation in open calls.

Finally, several studies speak directly to the auctions-versus-negotiations margin that underpins our empirical contrast. In U.S. public procurement, Bajari *et al.* (2009) provide evidence that auctions induce more competitive bidding and better screening of suppliers than bilateral bargaining for comparable projects. In Italian procurement, Decarolis (2014) documents how auction rules that increase effective participation (e.g., screening and price/quality trade-offs implemented transparently) are associated with improved outcomes. At a broader level, Spagnolo (2012) argues that institutional features that sustain entry and reputation, proxied empirically by more bidders, are central to disciplining prices and raising quality. These findings align with the core hypothesis of this paper that procedural openness and the use of electronic tools should be reflected in higher bidder turnout.

3. HYPOTHESES

Drawing from the above literature, we posit a central hypothesis for this study: Greater openness and digitalization in the procurement process leads to a higher number of bids, indicating increased competition. In particular, we expect that tenders which are conducted through fully open procedures and with electronic procurement tools will attract more offers, on average, than tenders using restrictive procedures or offline methods. To clarify, this overarching hypothesis can be articulated in two related parts:

H1: The use of an electronic procurement system (e-procurement) increases the number of offers per procedure. This is based on the notion that e-procurement lowers entry barriers and transaction costs for bidders, thereby expanding competition. We anticipate a positive association between the binary use of electronic tools and the count of bids received.

H2: Open procedure types (e.g., open tenders) will yield more bids than less competitive procedure types (such as direct negotiations or limited calls). Open advertisements generally increase the number of potential bidders, while negotiated or restricted tenders typically result in fewer participants and offers on average. We specifically expect Open procedures to outperform procedures like negotiated-without-call or direct contracting in terms of the number of bidders.

These hypotheses reflect the thesis theme that enhancing competition (through transparency and accessibility) improves public procurement outcomes. In testing H1 and H2, we implicitly examine whether the reforms in North Macedonia, aligning with EU best practices (like mandatory e-procurement and preference for open tenders), are achieving the desired effect of boosting competition. If the hypotheses are confirmed, this would indicate that enhancing these practices may lead to increased efficiency in public expenditure. Conversely, if we find only marginal or no differences, it may indicate that other bottlenecks (for example, supply market structure or administrative capacity) are limiting competition despite formal openness. The regression analysis in Section 6 will formally evaluate these hypotheses using the data.

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4. METHODOLOGY

In order to test the hypotheses about factors influencing competition in public procurement, we applied both descriptive statistics and econometric modeling techniques. The number of offers (bids) per tender is used as the key dependent variable to measure competition, consistent with literature identifying single-bid tenders as a warning sign of limited competition. We employed ordinary least squares (OLS) regression models with dummy-variable encoding for categorical factors of interest. This approach is mathematically equivalent to an ANOVA for comparing group means, but it provides regression coefficients that quantify the difference in the average number of bids between categories. By using regression, we can directly estimate how much each procurement method or tool impacts the expected number of bidders, while controlling for the baseline category. Both models, the one measuring Electronic Auction Effect and the Procedure Type Effect model, were estimated using a 95% confidence level, with significance evaluated based on p-values and standard errors.

Variables used include public procurement contracts in North Macedonia from 2021 to 2025, with each record containing information about the contracting authority, the procurement procedure type, whether an electronic auction was used, and the number of offers received, among other fields. The dependent variable Y_i is the Number of Offers for tender i , an integer count of valid bids submitted. The key independent variables are: (1) a binary indicator for the use of electronic bidding tools (e-auction), and (2) the category of procurement procedure used (a categorical factor with several levels as defined by public procurement law).

We estimate two OLS regression models to evaluate the impact of these factors on Y_i :

1. Model 1 (Electronic Auction Effect): This model tests whether the use of an electronic auction leads to a higher number of bids. It is specified as:

$$Y_i = \beta_0 + \beta_1 \cdot \text{ElectronicAuction}_i + \epsilon_i \ ,$$

   where $\text{ElectronicAuction}_i$ is a dummy variable indicating if an electronic reverse auction was used for tender i (1 = yes, 0 = no). Here, β_1 captures the average difference in the number of offers between tenders with an e-auction and those without. We expect $\beta_1 > 0$, reflecting the hypothesis that e-auctions (which increase transparency and bidding convenience) encourage more bidders to participate.
2. Model 2 (Procedure Type Effect): This model assesses differences in competition across various procurement procedure types. The procedure type is a categorical variable with the following categories: Open Procedure, Simplified Open Procedure, Low-Value Procurement, Qualification System Notice, Special Services, Negotiated Procedure with Announcement, Negotiated Procedure without Announcement, and Direct Inter-institutional Agreement (Article 24). To include this factor in a regression, we created binary dummy variables for each category except one reference group. We chose “Negotiation without prior announcement” as the baseline (reference) category for comparison, because it is one of the least competitive procedure types (often involving a single invited bidder) and provides a meaningful contrast with more open procedures. The model is specified as:

$$Y_i = \beta_0 + \beta_1 D_{1,i} + \beta_2 D_{2,i} + \cdots + \beta_7 D_{7,i} + \epsilon_i \ ,$$

   where each $D_{k,i}$ is a dummy variable for a specific procedure type category (taking value 1 if tender i is of that type, 0 otherwise). In our encoding:
   – D_1 = 1 if *Low-value procurement* ,

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– D_2 = 1 if *Qualification system notice*,
– D_3 = 1 if *Open procedure*,
– D_4 = 1 if *Simplified open procedure*,
– D_5 = 1 if *Special services* procedure,
– D_6 = 1 if *Negotiated procedure with prior announcement*,
– D_7 = 1 if *Article 24 (inter-institutional)* procedure,

and all D 's are 0 for the baseline *Negotiation without announcement*. The intercept β_0 thus represents the mean number of offers in the baseline procedure (negotiation without call), and each coefficient β_k (for $k = 1..7$) indicates how much the mean number of offers in that category differs from the baseline. For example, β_3 for Open Procedure indicates the average increase in bidders when using an open tender compared to a direct negotiation. We anticipate positive coefficients for the more transparent, competitive procedures (open tenders, etc.), and possibly negative or small differences for certain special or closed procedures, reflecting our hypothesis that *open procedures attract more bidders than restricted negotiations*.

All independent variables are dummy-coded (0/1) and the models include an intercept. For the procedure-type factor we use mutually exclusive dummies with Negotiation without prior notice as the baseline (omitted) category to ensure full rank and avoid perfect multicollinearity. Models are estimated on the full 2021–2025 sample using OLS with HC1 robust standard errors. Because the outcome is a non-negative count but spans a broad range, we treat Number of Offers as approximately continuous to enable an ANOVA-equivalent linear comparison of group means (dummy OLS). Model adequacy is assessed by R^2/Adjusted R^2 and the usual t-tests on coefficients; for completeness, we also report the overall F-statistic for each specification.

By employing this methodological approach, we directly test the effect of e-procurement tools and procedural choices on competition levels. The scientific approach here combines descriptive analysis (to understand basic indicators like average bids per category) with inferential statistics (to determine if observed differences are statistically significant and not due to random variation). This methodology enables us to quantitatively evaluate the hypotheses about competition: whether tenders using electronic auctions yield more bids, and whether open tendering procedures result in greater competition than negotiated or limited procedures. The results of these regression models are presented in Chapter 6, along with interpretation and comparison to expectations and prior research.

5. DATA OVERVIEW AND DESCRIPTIVE INSIGHTS

The dataset covers 101,389 public procurement contracts awarded in North Macedonia over 2021–2025 (the latest available data is from July 31). This represents virtually the entire public sector procurement activity in that period, across all government levels and sectors. The data is publicly available at the electronic system for public procurement (ESJN), and it is promptly updated, in real time, once a new contract is officially signed in the system. The average number of offers per tender in this dataset is 2.66. In other words, a typical tender attracted between two and three bids. However, the distribution is quite skewed. The median number of offers is 2, and about 35.7% of all procedures ended up with only a single bidder (one offer). At the upper extreme, a few tenders received dozens of bids; the maximum recorded was 110 offers for a single call (a rare outlier). Three-quarters of contracts had 4 or fewer bids. These figures raise some concern: more than one-third of single-bid procedures suggests that low

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competition is common, echoing the challenges observed in other countries. While some single-bid cases may be justified (e.g., highly specialized contracts or urgent procurements), a high overall rate can indicate structural issues in the procurement market.

We next examine competition across different contracting institutions. For the purpose of this research we divide the Macedonian public sector as follows: central government ministries (including all central government bodies), local governments (municipalities and all their subunits), health institutions (e.g., hospitals), state-owned enterprises (including publicly traded companies founded by the state), educational institutions (schools, universities), Kindergartens, Courts and Public Prosecution and others (including smaller but specific or independent institutions). Each may face different market conditions and supplier pools. Table 1 summarizes the breakdown of contracts by institution type and the average number of offers.

Table 1: Procurement contracts by institution type (2021–2025) and average number of offers

Type of Contracting Institution	Number of Contracts	Avg. Offers per Contract
Health institutions (e.g., hospitals)	28,696	2.73
State-owned enterprises (utility companies)	20,102	2.32
Educational institutions (schools, etc.)	16,223	2.68
Local government (municipalities)	14,570	2.94
Central government (ministries, agencies)	14,080	2.62
Kindergartens (pre-school institutions)	4,235	2.69
Judicial/Prosecutorial bodies	1,417	3.24
Public funds (health, pension, etc.)	462	2.68
National Bank	612	2.39
Regional development centers	364	3.99
Parliament (Assembly)	264	2.14
Association of Local Gov. (ZELS)	37	2.19
Total / Overall Average	**101,389**	**2.66**

(Source: Assigned contracts data from the electronic system of the Public Procurement Bureau)

From the above table, we see that the majority of contracts, by volume, were conducted by five types of institutions: health institutions (which account for about 28% of all contracts), state-owned enterprises (~20%), educational institutions (~16%), local governments (~14%), and central government bodies (~14%). Together, these constitute roughly 92% of all procurements in the dataset. Smaller categories include kindergartens, courts/prosecutors, various public funds, the National Bank, etc.

There is notable variation in the average number of bids across these institution types. Local governments achieved a slightly higher-than-average competition with about 2.94 offers per tender. Health and education bodies are around the mean (2.7), while state-owned enterprises see somewhat fewer bids (~2.3 on average). The institutions with the highest average bids are the Regional Development Centers (nearly 4 bids on average) and Judicial/Prosecutorial institutions (over 3.2 bids). These two categories are relatively small in count, but the consistently higher competition might reflect the nature of their procurements. On the other end, the Parliament and the association of local governments (ZELS) had among the lowest averages (~2.1 bids). Central government ministries, interestingly, did not have as high competition as municipalities on average (2.62 vs 2.94), which might suggest that tenders by

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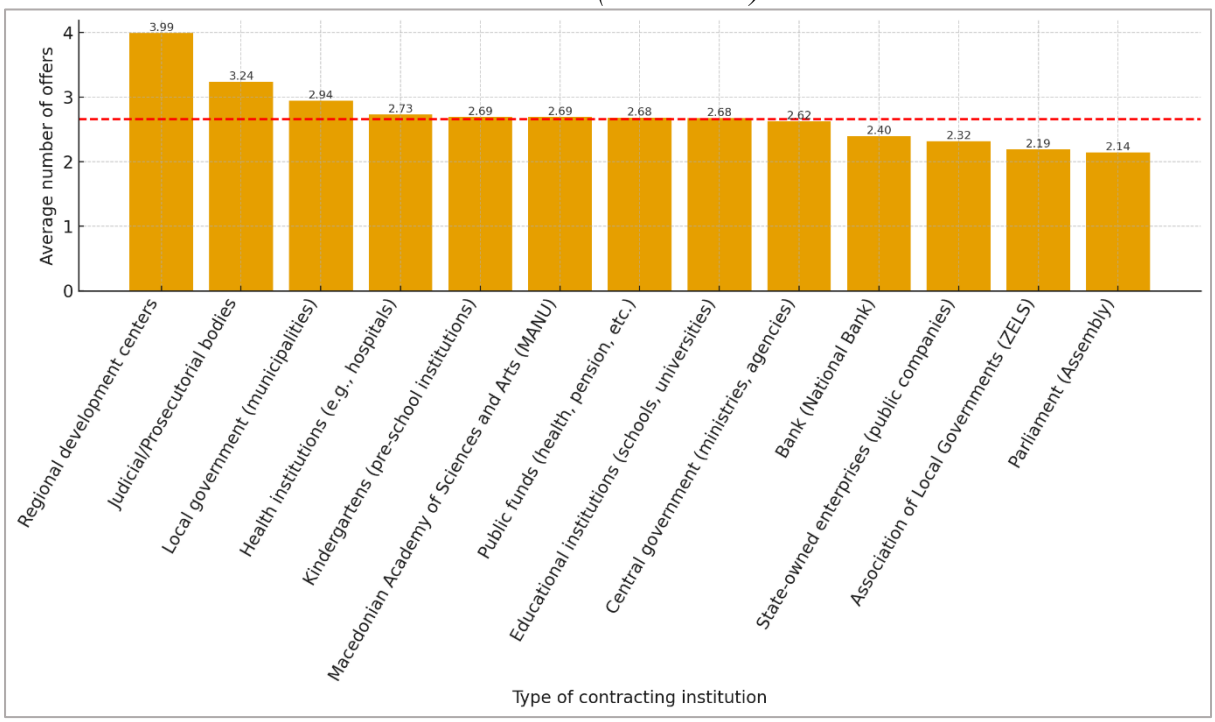
ministries (often large or specialized projects) see moderate competition, whereas municipalities often procure more common works and goods (roads, utilities) which attract more bidders.

Figure 1: Average number of offers per procedure by type of contracting institution in North Macedonia (2021–2025)



(Source: Own calculations based on assigned contracts data from the electronic system of the Public Procurement Bureau)

Another important dimension is the type of procurement by subject matter. The dataset classifies each contract broadly as involving Goods (supplies), Services, or Works (construction). These categories often have different market dynamics. Our data reveals a clear pattern:

- Works contracts tend to have the highest competition, with an average of 3.80 offers per tender.
- Goods contracts average about 2.76 offers.
- Services contracts have the lowest competition, averaging only 2.26 offers.

This ordering "works > goods > services" is consistent with findings in other countries. Works (such as construction projects) usually attract many construction firms, especially for roads, buildings, or maintenance works that numerous contractors can perform. Goods procurements, while also often competitive, can sometimes be limited if the goods are highly specialized or if there are exclusive dealerships (for example, medical equipment or brand-specific supplies). Services procurement often sees fewer bids; this may be due to specialization (e.g., consulting services might have only a few qualified providers) or the intangible nature of services making bidding more complex. Moreover, single-bid tenders are most prevalent in services. Indeed, in our dataset, nearly 47% of service procurements had just one bidder, compared to 31% for goods and only 20% for works. This aligns with the intuition that services are harder to standardize and attract wide competition, whereas work projects are widely contested.

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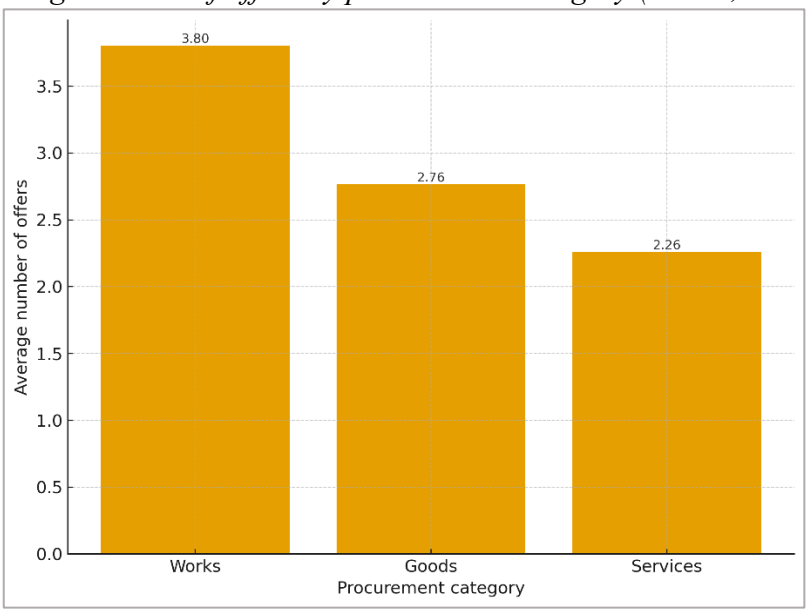
Figure 2: Average number of offers by procurement category (Works, Goods, Services)



(Source: Own calculations based on assigned contracts data from the electronic system of the Public Procurement Bureau)

It is worth noting the extent of e-procurement usage in the dataset. This variable indicates whether the tender was carried out on the electronic procurement platform. Over the 2021–2025 period, the vast majority (98.3%) of contracts were conducted via e-procurement. This reflects the legal mandate in North Macedonia that nearly all public tenders use the online system. The small fraction (1.7%) that did not use e-tools corresponds to specific procedure types, primarily certain negotiated procedures, direct contracting between public entities, or a few special services tenders, which by law or circumstance were handled offline. When comparing outcomes, we find a stark difference: tenders using the electronic system received 2.67 offers on average, whereas those conducted without e-tools received only 1.85 offers on average. This raw difference (nearly one additional bid when using e-procurement) suggests that digital transparency and accessibility do correlate with more competition. However, as noted, this comparison overlaps with procedure type; many of the offline tenders were non-open procedures that inherently limit competition. The regression analysis in the next section will account for procedure types to isolate the effect (if any) of e-procurement itself.

6. EMPIRICAL RESULTS

The econometric analysis was carried out according to the approach outlined in the methodology. In this chapter, we present the findings from the two regression models and interpret the results in the context of public procurement competition. We also include visualizations to illustrate the differences in the number of offers across procedure types and between e-auction vs non-e-auction tenders. All reported coefficients were statistically tested; we highlight which effects are significant and discuss their practical implications.

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6.1. Effect of Electronic Auctions on the Number of Bids

The first regression model examined whether the use of electronic procurement tools (electronic reverse auctions) is associated with a higher number of bidders. The OLS regression results confirm a clear positive effect. The coefficient of the electronic auction dummy is $\beta_1 \approx +0.82$ ($p < 0.001$), meaning that *tenders that employed an e-auction received, on average, about 0.82 more offers* than those without electronic bidding, holding other factors constant. In practical terms, this corresponds to an increase in competition: tenders without e-auctions had about 1.85 offers on average, whereas those with e-auctions had about 2.67 offers on average. This difference is statistically significant ($F(1,10)=289.1$, $p = 0.001$), suggesting that the use of the electronic bidding platform tends to attract more bidders.

Table 2: Regression model A outcomes

Variable	Coefficient	Std. Error	z	P>|z|	[0.025	0.975]	CI_low	CI_high
Const	1.85	0.07	24.84	<0.001	1.70	1.99	1.71	1.99
BinaryElectronicTools	0.82	0.07	10.97	<0.001	0.67	0.97	0.67	0.97

These results reinforce the finding that the use of electronic procurement has a positive effect on bidder turnout. The difference between the two groups is statistically significant, as indicated by the 95% confidence interval not overlapping between the bars. These findings are in line with expectations that an electronic auction can lower entry barriers and increase transparency, thereby motivating more suppliers to participate in the tendering process.

6.2. Differences by Procurement Procedure Type

The second regression model assessed how the choice of procurement procedure influences the level of competition (number of offers), using Negotiation without announcement as the reference category. The overall model was statistically significant ($F(7,101381)=63.30$, $p < 0.001$), indicating that the procedure type has a *significant overall effect* on the number of bids. The regression coefficients for each procedure dummy reveal the direction and magnitude of differences relative to the baseline.

Table 3: Regression model A outcomes

Variable	Coefficient	Std. Error	z	P>|z|	[0.025	0.975]	CI_low	CI_high
Const	1.61	0.13	12.02	<0.001	1.34	1.87	1.34	1.87
d1_small_value	1.02	0.13	7.63	<0.001	0.76	1.28	0.76	1.28
d2_establishment_notice	1.22	0.15	7.99	<0.001	0.92	1.52	0.92	1.51
d3_open	1.09	0.13	8.12	<0.001	0.83	1.35	0.83	1.35
d4_simplified_open	1.11	0.13	8.26	<0.001	0.84	1.37	0.84	1.37
d5_special_services	0.35	0.15	2.32	0.02	0.05	0.65	0.05	0.65
d6_negot_with_notice	0.11	0.22	0.52	0.60	-0.32	0.54	-0.32	0.54
d7_article_24	-0.61	0.13	-4.54	<0.001	-0.87	-0.34	-0.87	-0.34

Table 3 reports OLS coefficients (HC1) for procedure-type dummies with Negotiation without prior notice as the reference category. Each coefficient is the difference in the conditional mean number of offers relative to the baseline. The open and publicly advertised procedures show large, statistically significant positive effects: Open ($\beta = 1.09$, 95% CI [0.83, 1.35], $p < 0.001$), Simplified open ($\beta = 1.11$, [0.84, 1.37], $p < 0.001$), Low-value procurement ($\beta = 1.02$, [0.76, 1.28], $p < 0.001$), and Qualification system notice ($\beta = 1.22$, [0.92, 1.52], $p < 0.001$). Special

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services have a smaller but significant effect (β = 0.35, [0.05, 0.65], p = 0.020). Negotiation with prior notice is not statistically different from the baseline (β = 0.11, [−0.32, 0.55], p = 0.604)—note that this category has very few observations in the data, which limits precision. Article 24 (direct inter-institutional) is significantly lower than the baseline (β = −0.61, [−0.87, −0.34], p < 0.001). Overall, the pattern in Table 3 shows that moving from a non-advertised negotiation to open/advertised procedures increases the expected number of offers by roughly one bidder, whereas Article 24 procedures yield even fewer offers than the already low baseline.

An ANOVA equivalent test confirms that at least some group means differ (the overall F-test is highly significant), and the regression's individual coefficients pinpoint where those differences lie. These results are consistent with theoretical expectations and prior research: using less open and less transparent procedure types is generally associated with deliberately limited competition. Our empirical evidence from the Macedonian data strongly aligns with this notion, as the degree of openness of the procedure correlates with the number of competing bidders.

Although the model R^2 is low (0.003–0.004), this is expected and acceptable in cross-sectional OLS used as a dummy-coded ANOVA to compare group means rather than to predict outcomes (Montgomery *et al.*, 2012; Kutner *et al.*, 2005). In such designs, most variation typically lies within groups, so the between-group share that R^2 captures can be small even when mean differences are real and policy-relevant (Stock and Watson, 2015). For inference, what matters are the joint F-test for the procedure dummies and the individual coefficients with confidence intervals; a small R^2 does not invalidate or bias the estimated average effects in cross-sections (Wooldridge, 2015; Angrist and Pischke, 2009). In our case, the joint test is highly significant (p < 0.001), and the procedure-type coefficients are precisely estimated, so the conclusions about how openness relates to bidder turnout remain valid despite the modest R^2.

Table 4. Models fit statistics

Model	N	R-squared	Adj. R-squared	F-stat (overall)	Prob > F
(a) BinaryElectronicTools	101389	0.003	0.003	120.29	<0.001
(b) Procedure dummies	101389	0.004	0.005	10521.08	0

Overall, the empirical results robustly support the hypotheses: tenders conducted with electronic auctions attract significantly more bidders, and more open procurement procedures yield significantly more competition than restrictive procedures.

7. CONCLUSION AND DISCUSSION

This study set out to examine the competitive dynamics of public procurement in North Macedonia, focusing on how procedural factors influence the number of bidders. Our findings clearly demonstrate that greater transparency and openness in procurement lead to higher competition, whereas restrictive practices correspond with limited bidder turnout. Both of the core working hypotheses are confirmed by the analysis.

First, the use of electronic procurement tools (e-auctions) was found to significantly increase the number of offers. This suggests that implementing e-auctions is an effective way to boost competition in public tenders. By lowering participation costs and increasing transparency, e-auctions encourage more firms to bid. This result is consistent with practical expectations and sends a clear message to policymakers and contracting authorities: investing in and mandating

e-procurement tools can have a tangible positive impact on competition for government contracts. More bidders not only improve the chances of getting better prices and value for money but also reduce the likelihood of collusion or cozy arrangements. An increase from ~1.8 to ~2.7 bidders (when using e-auctions) might seem modest in absolute terms, but it can make the difference between a single-bid contract and a truly competitive tender.

The choice of procurement procedure greatly impacts competition. Open tenders and widely advertised processes attract significantly more bidders on average, open tenders receive about 2.7 bids compared to 1.6 for direct negotiations. Even simplified and low-value open procedures see high participation, highlighting the benefits of transparency across all contract sizes. In contrast, limited or unadvertised methods, like non-public negotiations or special agreements, usually lead to single or very few bids. The data from North Macedonia confirms that transparency and openness are crucial for competitive procurement, and simply announcing a negotiated tender does not boost participation unless the process itself is genuinely open. These findings suggest that policy reforms should prioritize open, competitive procedures over negotiated ones whenever feasible.

In conclusion, this research underscores the critical importance of competitive procurement processes. The empirical evidence supports strong recommendations for public procurement policy in North Macedonia (and similarly placed countries): namely, to maximize the use of open tender procedures and electronic auctions, and to minimize the use of non-transparent negotiated deals. If certain negotiated or direct-award procedures are legally allowed (for instance, in emergencies or for specialized cases), they should remain the exception rather than the norm. Each percentage point reduction in single-bid tenders is a step toward a more competitive and fair procurement system. The benefits are two-fold: economic efficiency (more bidders increase the chance of a better price) and integrity (reducing single-bid situations diminishes the opportunity for corrupt arrangements).

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