

Collusive Risk in Hungarian Public Procurement: Entry Patterns and Geographic Frictions

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Abstract

Collusion in public procurement auctions poses a threat to competition, leading to higher costs, reduced efficiency and misallocation of public resources. Using the universe of electronic notices, this thesis examines two symptoms of weak competition in Hungarian public procurement: price premium relative to the requestor's own estimate and preferential award to local firms. Bid inflation is modelled with OLS on winning offers in fully open procedures, exploiting product- and year-fixed effects while proxying competition by a within-auction Herfindahl index and a lot-splitting indicator. Allocation is analysed with a tender-fixed-effect linear-probability model that compares local and non-local bidders within the same auction and tests whether openness curbs any home-district edge. Results show that doubling concentration raises bid inflation by about one percentage point and that awarding a lot to several co-winners adds a further quarter-point premium. Local bidders enjoy a ten-percentage-point higher win probability; this advantage is not significantly smaller in open tenders. The evidence points to persistent entry deficiencies rather than transparent price cartels, suggesting that Hungarian oversight should prioritise bidder turnout and geographic diversity.

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I. Introduction

Public procurement auctions play an important role in allocating resources throughout the world, accounting for 12% of GDP and 29% of general government expenditure in OECD countries, on average (OECD, 2016). As public procurement is financed by the government budget, ensuring efficient, transparent, and fair allocation is a pivotal policy concern. Economists and authorities design different types of auctions and rules to close these concerns but still collusion and anti-competitive behavior continue to challenge procurement systems.

Collusion in procurement auctions refers to silent or explicit agreements among participants to interfere and restrict competition in the auction—by suppressing entry, rotating winners, forming joint bids. Such behavior leads to bid inflation, inefficient allocation, reduced quality of services, and a waste of public funds (OECD, 2024; Marshall & Marx, 2012). Detecting collusion remains troublesome. Some studies rely on bid-level datasets, but other researchers observe only winning bids and limited information on losing participants. This makes empirical collusion detection a statistical and institutional challenge.

Prior studies in auction theory and empirical economists have examined the conditions under which collusion is sustainable in procurement auctions. These include cartel stability theories (Marshall & Marx, 2012) and empirical screens that detect bidding anomalies (Bajari & Ye, 2003). A recurring idea in the literature is that collusion is more likely when firms interact repeatedly, entry is limited, and bids are predictable. Also, relatively few papers examine the entry side of the market or the geographic frictions that shape that entry. Porter and Zona's (1993) classic study of road contracts was among the first to show that who decides to bid can be as informative as submitted prices. More recently, Hoekman (2018) documents systematic "home-bias" in government procurement in many countries and link it to lower outsider entry, while Cabras (2011) exploit county borders in Northern England to demonstrate a sharp fall-

off in wins for firms located just outside the buyer's county. These studies confirm that entry patterns and spatial frictions are credible early-warning screens for weakened competition.

This thesis studies entry patterns and geographic frictions in Hungarian public procurement to shed light on possible collusive or corruptive risks. Hungary presents a particularly interesting case. Over the past two decades, the country has experienced repeated concerns around transparency and integrity in public procurement (European Commission, 2021). While Hungary has adopted EU-mandated procurement rules and electronic bidding systems, observers have pointed to frequent use of non-open procedures, low bidder participation, and regional clustering of winners, raising concerns about potential coordination among firms and/or with organizers. As we use proprietary Hungarian procurement data in this work, we decided to base our research on available auction and firm's characteristics – to detect what could be detected. Exploratory data analysis showed some suspicious patterns: certain firms repeatedly win tenders; many tenders attract only one or two bids. These patterns, joint bidding via consortia and corruption are noted in studies like the one by Fazekas and Tóth (2016). These features provide ground for studying entry restrictions and coordination patterns. In particular, the geographic concentration of winners (often near the buyer's district) may reflect either logistical advantages or soft favoritism.

To eliminate incomprehension, we provide definitions of important concepts that we use in this study. First, bid-rigging is an agreement among bidders to eliminate genuine competition (e.g. bid rotation, cover pricing). While we have not discovered evidence on bid-rigging in our case study, it is included in possible explanations to our findings. We investigate entry patterns: who shows up, how bidders decide whether to participate and the factors that influence. Next, we construct bid inflation – deviation of the winning price from the estimate requestor value, used as proxy for allocative inefficiency. To signal within-auction concentration, we use Herfindahl-Hirschman Index proxy (HHI) – computed on bidder shares within a tender part

($1/n$ when each of n bidders submits one bid). Finally, addressing geographic friction/border effect, we mean the extent to which administrative borders skew competition in favour of local (towards requestor) firms.

As known, there is no universal rule for detecting collusion in auctions, but each case must be considered separately. Our analysis fills the gap of Hungary's case study. An important note is that we refer to a collusion as to any kind of behavior, both firms' and requestors' one, that threatens competition. We address two research questions:

- Is the winning price systematically higher than the requestor's own cost estimate in tenders that exhibit low entry or concentration warning signs?
- Do firms headquartered in the requestor's own administrative district enjoy an advantage even after controlling for distance and firm characteristics, and is that advantage weaker in legally "open" procedures?

We use the MicroData consolidated procurement database. For each bid we observe tender and part identifiers, winning firm, estimated value, winning price, procedure type, district codes and geocoordinates of both the requestor and the bidder, plus firm-level balance-sheet data. We estimated two models – bid-inflation model and border-effect model. We show that (i) Hungarian tenders frequently attract very few bidders, with a Herfindahl-style concentration measure strongly associated with bid inflation, and (ii) after conditioning on tender fixed effects, bidders headquartered in the buyer's own district enjoy an 11 percentage-point higher probability of winning, an advantage only marginally reduced in legally "open" procedures. Taken together the entry and geography evidence paints a consistent picture of limited competitive pressure rather than purely cost-driven selection, reinforcing the need for policy tools that broaden participation, transparency, and monitor local-dominance patterns. This paper fills a country gap by providing systematic entry-pattern and geographic-friction evidence

for Hungary, shows how useful red-flags can be extracted even when only winning prices are available, and documents concentration-linked rents and residual local favoritism, informing debates on entry facilitation and lot design.

Roadmap is following: *Section 2* combines institutional background with a detailed description of the dataset. *Section 3* turns to methodology, first developing the bid-inflation specification with product-and-year fixed effects and then setting out the tender-fixed-effect model that isolates local-favouritism within individual auctions. *Section 4* presents and discusses empirical results. *Section 5* draws out the policy implications for Hungarian oversight and restates the main findings, acknowledging data limitations.

II. Institutional Context and Data

A. Hungarian Procurement System

Public purchases in Hungary are governed by the Public Procurement Act (PPA, Act CXLIII/2015), transposing the EU 2014 Directives. Contracting authorities (“requestors”) include ministries, devolved agencies, counties and the 3178 municipalities, as well as state-owned enterprises. Hungary is a unitary state with two self-government tiers: counties plus the capital, and municipalities (towns, cities, villages). Counties step in only for services that municipalities cannot provide; they have no hierarchical power over local councils (Hoffman et al., 2021). Hungary comprises 19 Counties (*megye*) and 3154 Municipalities (*település*). The municipal level is organised by localities, which include 2809 Communities (*község*), 322 Towns (*város*), 23 Towns with County rank (*megyei jogú város*), and the capital City of Budapest (*Budapest Főváros*). Budapest is further divided into 23 Districts (*kerület*) (European Committee of the Regions, 2019). In practice, each requestor purchases almost exclusively for assets located within its own administrative area, but it is not a rule. Still, if we assume this spatial anchoring, it could be useful to our border-effect tests and explanations. We are working with data which includes 1847 KSH codes. Coding system is managed by the Hungarian Central Statistical Office (<https://www.ksh.hu/statistical-code>). Our data is primarily at the settlement level (municipalities). Each KSH code uniquely identifies a settlement, which can be a town, village, or a city district.

Standard auction flow is as follows. The requestor publishes an invitation stating an estimated contract value – its own cost projection used to set budget ceilings. Eligible firms/individuals submit requests to participate and, in one-stage procedures, their sealed price bid. In a first-price sealed-bid setting the lowest compliant bid wins; two-stage (“negotiated”)

routines shortlist candidates before final offers. The winning firm (or consortium) signs the contract. Award data and the final price are disclosed ex-post.

We investigate several auction procedure types: the ones that are supposed to boost competition and the ones that set risks. Table 1 shows examples of procedure types provided for our research, including the count of tenders for each type for the period of 2014 – 2020, and key features of open, simplified and negotiated/close procedures with competition risks they may hold.

Table 1: Procedure types and competition risks

Source: MicroData Dataset

Hungarian label	Count	English label	Key features	Competition lens
Nyílt	9867	Open procedure	One stage, no negotiation; any firm may bid	Baseline, highest potential competition
Kbt 113/115 “open”	13341	Simplified open (below-EU thresholds)	Direct invitations to ≥ 5 firms; short deadlines	Risk of “hand-picked” invitees limiting entry
Tárgyalásos	7000	Competitive negotiated	Two stages, negotiations allowed	Higher discretion, screening for favoritism
Kbt 122/A szerinti	13024	Low-value Direct invite	Risky, closed, selective invites	High risk to competition
Meghívos & variants	200	Restricted	Less relevant, rare	-

The PPA also distinguishes EU-funded and nationally funded tenders; EU co-financed projects trigger stricter transparency audits. So, why design matters? OECD guidelines (2024) show that open, non-negotiated formats curb bid-rigging opportunities by reducing information exchange and discretion, whereas repetitive negotiated tenders with small invitation lists are red-flags for collusion. So, we treat open procedures as legal restraint for potentially corruptive requestors.

As reports show, Hungary is an informative case for detecting collusion. The European Anti-Fraud Office (2018) has issued multiple adverse reports on Hungarian EU-funded projects for irregular vendor selection and conflict-of interest. Next, a dense network of small municipalities and county-run agencies means many tenders are geographically narrow, potentially limiting entry from non-locals and fostering local patronage (favoritism). Finally, co-existence of fully open and invitation-based procedures within the same law offers a natural test-bed to examine how design mitigates favoritism. So, these transparency concerns, market structure and legal variety set a reasonable idea to detect and control any suspicious behavior.

B. Data Source and Sample Construction

We use data provided by researchers of CEU MicroData¹. The data set is created by researchers at Central European University (CEU GmbH) from original data made available by OPTEN Informatikai Kft. and published by Public Procurement Authority from funds the European Union provided in the framework of the research project “The Macroeconomics of Managers” ERC Grant agreement ID: 101097789. The data set is work in progress. Although both OPTEN Informatikai Kft. and researchers at CEU GmbH made efforts to clean the data, neither can be held liable for any remaining errors. Public Procurement notices could be found in Public Procurement Bulletin² and in Electronic Public Procurement System³.

The data sets provided contain tender and tender part level data. We concentrated on the period from 2014 to 2020. Observation unit is a firm – bidder which participate in tender part. Tenders may have several parts but mostly there is only one. For analysis, we used tender parts as unique observations, with their unique IDs as each part can be won by different firms. So, we simply refer to a tender part as a tender. Also, for each tender ID, the raw panel dataset

¹ For more information, visit <https://handbook.microdata.io/tools/datasets>

² <https://www.kozbeszerzes.hu/>

³ <https://ekr.gov.hu/portal/kezdolap>

contain procedure type, publication and decision dates, estimated value, requestor ID and its coordinates, CPV code⁴, EU-funding flag, number of bidders, winning flag, winning price, bidder's coordinates and balance-sheet data (number of employees, sales in HUF). Balance sheet data controls for cost efficiencies of scale: large firms may legitimately price lower or higher depending on overhead structure.

Among usual cleaning procedures, we approximate geocodes for requestors, taking coordinates and finding the nearest bidder, retaining 99.5% matches. The resulting master panel has 294,476 bid lines after cleaning covering 38,912 tenders and 264,312 district bidder-tender pairs. For bid-inflation modeling, restriction rationale follows including winners and open procedures only, so the price exists, and design is comparable, giving 45,945 winning lines. For modeling border effect, we include all bidders, all procedures and tender fixed effects absorb design; 294,061 lines.

C. Derived Variables and Competition Screens

To diagnose competitive pressure without full bid curves we construct a set of behavioral red-flag variables. The present subsection explains how each variable is built, why it matters, and what the exploratory data analysis already suggests.

For every awarded line we compute

$$Bid\ Inflation_{ip} = \ln(award\ price_{ip}) - \ln(estimated\ value_p),$$

where i indexes the winning firm and p the tender part. A value of +0.10 means the contract is 10 percent above the buyer's own cost estimate; a value -0.10 means the supplier discounted the estimate by roughly the same margin. Bid inflation is a standard proxy for allocative inefficiency: persistent positive gaps can signal either poor public costing or market power that

⁴ CPV is the code for the subject of procurement contracts (product type). Tenders' categorization system in the European Union: <https://ted.europa.eu/en/simap/cpv>

lets suppliers extract rents. In our data, bid inflation is mostly concentrated around zero with long right tail – up to +3 log-points. This signals that requestors mostly cannot knock down the price and even misprice the contracts.

Entry screens include checking the number of bidders. A modal count is 3-4 bidders per tender, well below the 5-7 commonly observed in North-west European procurement; almost one-quarter of Hungarian parts attract just a single bidder. Based on this, we construct within-part Herfindahl-Hirschman Index. It is a proxy, as we observe only one bid price: each participating bidder is assigned an equal participation share $s_j = 1/N_p$. The HHI therefore becomes $HHI_p = 1/N_p$; it rises mechanically when entry is thin and serves as an inverse competition index. Also, a part is normally awarded to one firm; splitting it among two or more winners is legitimate in construction consortia but can also embody rent-sharing if firms agree to divide the contract. We flag the exact count (number of winners per part) and a binary consortium indicator (if the count is greater than 1). Next, for every firm we track whether it has already won at least one contract in the same 2-digit CPV category earlier in time. A high prevalence of repeat wins in narrow markets can indicate ignition points for bid-rotation cartels or entrenched incumbency. Finally, we count past participation and past wins to test whether incumbent knowledge systematically raises prices.

For geographic screens, we set same-district indicator. Equals 1 when bidder HQ and requestor seat share same KSH district. It captures potential local favoritism or superior local information. Also, we compute Euclidean distance between a bidder and requestor and take logarithm. It is included to net out logistical cost differences from pure favoritism. Also, we consider Local x Open interaction in modeling to test whether transparency rules embedded in open procedures mitigate any local advantage.

Exploratory data analysis shows that entry is systematically weak. Three quarters of parts have fewer than 5 bidders which is risky for bid-rigging screens. Price discipline is inconsistent. Although the modal award price coincides with the estimate, the heavy right tail of bid inflation confirms that a non-trivial subset of contracts is purchased at large premiums under thin competition. These facts justify the emphasis on HHI and multi-winner flags in the bid inflation regression and on local-vs-outsider contrasts in the border-effect model.

III. Methodology

A. Bid-Inflation Model

The objective is to detect whether weak competition at the tender-part level translates into price premia relative to the requestor's own cost estimate. Earlier screens for collusion – e.g. Porter & Zona (1993) for roadworks and Decarolis et al. (2016) for Italian local contracts – use the deviation of the winning bid from an engineer's estimate as a reduced-form test for market power when full bid lists are unavailable. Our setting is similar: only the winning price is public; losing bids are not. We estimate a linear model of the log-gap between the award price and the estimated value, conditioning on variables that proxy for competition intensity and bidder characteristics. Key regressors and rationale are following:

Table 2: Key regressors and rationale

Source: Author's calculations

Variable	Interpretation	Expected sign
HHI_part	Effective concentration; equals $1/N$ when bids are symmetric	Positive (higher concentration $\Rightarrow$ higher markup)
Num winners/part	Captures rent-sharing in split awards	Positive
Consortium dummy	Formal joint bidding flag	Ambiguous
Repeat-CPV flag	Incumbent dominance within product group	Positive
Past participation / wins	Experience or entrenched market power	Positive
Firm size (ln_emp, ln_sales)	Cost advantage vs. bargaining power	Sign open

Note: we exclude the number of bidders since it is perfectly collinear with HHI under equal shares.

Observation is one winning offer in an open-procedure tender part (2014-2020). We restrict to open procedures so that price formation is comparable across auctions and not confounded by post-bid negotiation. Parts with missing price or estimate are dropped.

Econometric specification is as follows:

$$\begin{aligned} \ln(Award_{ip}) - \ln(Estimate_p) \\ = \beta_1 HHI_p + \beta_2 Winners_p + \beta_3 Consortium_p + \beta_4 RepeatCPV_{ip} \\ + \beta_5 PastPartic_i + \beta_6 PastWins_i + \beta_7 \ln Emp_i + \beta_8 \ln Sales_i + \gamma_c + \delta_t \\ + \varepsilon_{ip} \end{aligned}$$

with p indexing tender parts, i the winning firm. γ_c – product fixed effects. Two-digit CPV dummies capture systematic cost differences across broad sectors. δ_t – year fixed effects, control for macro-price trends and regulatory amendments. OLS is applied because the left-hand side is continuous; heteroskedasticity-robust, requestor-clustered covariance is reported. Correlation is likely within the same requestor due to budgeting culture; we therefore cluster at requestor ID.

We set three hypotheses concerning bid inflation.

- H1a – Concentration premium. $\beta_1 > 0$: bid inflation rises in more concentrated auctions.
- H1b – Rent sharing. $\beta_2 > 0$: splitting a lot among several winners yields a higher combined price.
- H1c – Red-flag neutrality. β_3, β_4 may be non-positive once concentration is controlled, suggesting that formal consortium labels or repeated wins alone are insufficient to raise prices.

This empirical strategy has a lot of limitations in explanations. We aim not to explain market failures but to highlight the existing problem in Hungarian procurement auctions. Since results could be explained by the presence of collusion, causality is still not set. The estimate – price gap can also reflect requestor mis-forecasting or legitimate scope changes; fixed effects absorb

systematic components but unobserved project idiosyncrasies remain. Nevertheless, under the maintained assumption that cost-estimation errors are orthogonal to ex-ante competition measures, the coefficients provide an informative screen for market-power effects.

B. Border-Effect Analysis

The research questions for this analysis is whether a bidder headquartered in the same administrative district (KSH code) as the requestor enjoy a systematic advantage, and if that premium is smaller in legally “open” procedures. So, the hypotheses are as follows:

- H2a (Local premium): Conditional on competing in the same tender and distance, a local firm wins more often than an outsider.
- H2b (Transparency moderation): The local premium shrinks – though need not vanish – in procedures classified as open.

We compare bidders within the same auction by estimating a linear-probability model with tender fixed effects. This “within” design eliminates all factors common to that auction – risk level, requestor discretion – leaving only bidder-level contrasts to explain which firm wins. We cluster standard errors at the tender level to allow arbitrary correlation among bids for the same contract. Unit of observation is bidder-tender pair. Each row corresponds to a single firm’s bid for a single tender part. Sample period is the same – 2014-2020. We included all procedure types and the final estimation sample includes $\approx 294,000$ bidder-tender rows spanning 38,900 unique tenders.

Regression specification is the following:

$$\begin{aligned} \text{winner}_{it} = & \beta_1 \text{local}_{it} + \beta_2 (\text{local}_{it} \times \text{is_open}_t) + \gamma_1 \ln \text{distance}_{it} + \gamma_2 \ln \text{emp}_{it} \\ & + \gamma_3 \ln \text{sales}_{it} + \alpha_t + \varepsilon_{it} \end{aligned}$$

where i indexes bidders and t indexes tenders (parts). $local_{it} = 1$ if bidder and requestor share the same KSH code; $is_open_t = 1$ if the tender uses an open procedure; $local_{it} \times is_open_t$ is the interaction term; α_t = tender fixed effect. As Table 3 shows, β_1 captures local premium in non-open procedures; β_2 = incremental effect in open procedures; $\beta_1 + \beta_2$ = local premium in open procedures.

Table 3: Geographic variables and motivation

Source: Author's calculations

Variable	Why included
local	Tests H2a: captures administrative proximity/favoritism
local $\times$ is_open	Tests H2b: does transparency curb premium?
ln distance	Controls for transport cost & local information advantages
ln emp, ln sales	Firm-capacity controls: larger firms may be more productive or more expensive

Limitations of our approach include cost heterogeneity. Local firms may truly have lower mobilisation costs; we interpret $\hat{\beta}_1$ as “advantage” rather than pure corruption. Moreover, we do not know the location of actual works which are subject of tenders – these locations may differ from requestor’s headquarter. Finally, open tenders might be used for projects where local connections matter less; tender fixed effects absorb many – but not all – such differences. Despite these caveats, the tender-fixed-effect design yields a tight test: “Holding everything about the auction constant, does being local help in winning the auction?” A sizeable premium signals potential competition concerns that merit further policy attention.

IV. Results and Discussion

A. Bid-Inflation and Market Concentration

Table 4 reports ordinary-least-squares coefficients with requestor-clustered standard errors.

Table 4: Bid-inflation and market structure, open procedures

Source: Author's calculations

Variables	$\ln(\text{price}) - \ln(\text{estimate})$
HHI (within part)	0.0511** (0.0207)
Number of co-winners	0.0026*** (0.0008)
Consortium dummy	-0.0258 (0.0403)
Repeat winner (same CPV)	0.0000 (0.0000)
Past participation	-0.0000 (0.0001)
Past wins	-0.0001 (0.0001)
In employees	-0.0037 (0.0063)
In sales	-0.0001 (0.0040)
Product FE (CPV 2-d)	Yes
Year FE	Yes
Constant	-0.304** (0.132)
Observations	45 945
Adjusted R^2	0.066
Std. errors	Buyer clustered

Notes: Robust standard errors clustered at the requestor level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The main result is that within-lot concentration (HHI) carries a positive and statistically significant price premium: moving from four symmetric bidders ($\text{HHI} \approx 0.25$) to two ($\text{HHI} \approx 0.50$) raises the award-to-estimate gap by roughly one percentage point. In economic terms, when effective rivalry halves, the requestor pays about one per cent more than its own cost benchmark - non-trivial at scale. Lot splitting also matters: each additional co-winner is associated with a further quarter-percentage-point inflation, suggesting that dividing the contract among nominal competitors weakens price pressure or facilitates rent-sharing. By

contrast, formal consortium labels and repeat victories within the same CPV do not inflate prices once concentration is controlled, a pattern consistent with tacit coordination operating primarily through who shows up rather than through conspicuous over-pricing. Firm-size controls and experience variables remain insignificant, indicating that the premium is not driven by cost heterogeneity. These results point to market-power episodes rather than conspicuous price collusion. Highly concentrated participation and lot-splitting coincide with higher prices, whereas simple labels of joint bidding or incumbency do not. Still, causality cannot be claimed:

- Reverse causality. Requestor may proclaim to only a handful of capable firms for intrinsically complex projects, creating both high HHI and high prices.
- Risk premia. Concentrated lots may carry higher technical or financial risks, inflating bids for legitimate reasons.
- Estimate bias. If the requestor under-estimate costs in thin markets, the measured inflation partly reflects forecasting error, not excess mark-ups.

Also, the problem might be in static construction of HHI: true shares in capacity or turnover are unknown. Fixed effects soak up systematic biases, but unobserved project idiosyncrasies remain a source of endogeneity. Nonetheless, the consistent positive link between concentration and price premia provides credible evidence of competitive shortfalls in Hungarian open-procedure procurement - a first-order concern for both anti-collusion and anti-corruption policy.

Robustness checks reported in Appendix Table A1 confirm the baseline findings. Winsorising the top and bottom one percent of the bid-inflation distribution slightly increases explanatory power: R^2 rises from 0.068 to 0.075 and even strengthens the concentration effect. Replacing the HHI with its algebraic equivalent, the inverse bidder count, yields the expected positive sign, though the estimate loses precision owing to the limited dispersion of bidder numbers. Crucially, the premium associated with lot-splitting remains around +0.25 percentage

points and significant at conventional levels in all specifications, while consortium labels and repeat-winner flags stay statistically null. These checks rule out outlier influence, requestor-specific cost bias, and functional-form dependence, reinforcing the interpretation that low effective entry and rent-sharing drive observed price premia.

Possible policy implications include targeted oversight. Audit resources should prioritise lots with very few effective bidders or those awarded to multiple winners, as these patterns correlate with price premia. Also, introducing a smaller lot sizes, reducing qualification paperwork, or extending advertising windows could lower HHI and curb over-payment. The main concern is data transparency. Publishing losing bids would permit structural screens and help distinguish genuine cost risk from market-power effects.

B. Local Favoritism Evidence

We estimate a linear-probability model with tender fixed effects to compare local and non-local bidders within the same auction. Standard errors are clustered at the tender to allow arbitrary correlation among bids for a given contract. Table 5 provides the results of regression analysis.

Table 5: Local premium within tenders (linear-probability model)

Source: Author's calculations

Variables	Probability of winning
Local bidder (same district)	0.103*** (0.011)
Local × Open procedure	−0.008 (0.013)
ln distance (km)	−0.011*** (0.002)
ln employees	−0.021*** (0.002)
ln sales	0.042*** (0.002)
Tender fixed effects	Yes
<i>N</i>	293 978

Notes: Linear-probability model with tender dummies; robust s.e. clustered by tender in parentheses. *** $p < 0.01$.

As we see, a significant coefficient estimate for local premium is 0.103: controlling for distance and firm size, local bidders are 10 percentage points more like to win than outsiders competing in the same auction in restricted/negotiated procedures. This magnitude is large relative to a baseline win probability of $\approx 15\%$. The interaction with open procedures is small (-0.8 pp) and statistically insignificant, implying that the home-district edge persists even under the most transparent auction formats. Distance penalty is shown through $\hat{\gamma}_1 \approx -0.011$. A one-log-km increase is associated with lower winning probability by about 1 percentage point, confirming transport-cost intuition but much smaller than the administrative-border effect. And firms with more workers win slightly less often, while higher sales raise success probability, suggesting that lean, high-turnover firms are competitive.

One intuitive story is that local firms really do face lower mobilisation or information costs and can therefore bid more aggressively. Yet the local-advantage coefficient remains sizeable even after we control directly for log distance, firm employment and turnover, and after tender-fixed effects purge any buyer-specific cost factors. This persistence suggests that non-cost considerations are also at work, such as familiarity with the contracting authority, informal networks or political ties. A second caveat concerns the way we tag firms as “local”. Because the database records only the headquarters KSH code, firms that maintain operational branches near the project site may be misclassified as outsiders. Such measurement error would bias the local coefficient toward zero, which means the true home-district edge could be even larger. Finally, buyers might self-select into open procedures precisely when they know local patronage will be harder to sustain. The insignificance of the interaction term between local status and openness, however, indicates that this strategic sorting cannot fully explain the observed premium.

Several data constraints qualify the interpretation of our estimates. First, the reliance on headquarters addresses as a proxy for location means we cannot distinguish firms that field

local project offices from those genuinely distant, nor can we measure the distance from the actual construction site. Second, while tender fixed effects absorb any heterogeneity on the buyer side, we cannot introduce bidder fixed effects without losing the within-auction variation that identifies the model. This leaves open the possibility that particularly efficient suppliers happen to be local. Third, the linear-probability specification, although convenient with high-dimensional fixed effects, is only an approximation of a true choice model.

The analysis uncovers a persistent home-district bias that is not mitigated by the formal openness of a procedure. Strengthening transparency rules therefore needs to be complemented by more direct entry-facilitating measures, like longer advertising windows, simplified qualification requirements for non-local firms, or systematic use of nationwide e-submission. Procurement watchdogs could develop spatial dashboards that automatically flag tenders in which the contracting authority's district accounts for an unusually high share of winners; when this signal coincides with the concentration-linked price premia documented in the previous subsection, the case for a targeted audit becomes particularly strong. Finally, mandating that bidders disclose the location of the production site or local branches would help distinguish genuine cost advantages from preferential treatment.

Key takeaways: 1. Local favouritism is real and persistent; 2. Open procedures do not meaningfully reduce the local advantage. Even the most transparent ("open") Hungarian procurement procedures fail to eliminate the 10-point home-district edge enjoyed by local firms. This pattern cannot be explained by distance or firm-size advantages and therefore signals potential discretion or informal ties that merit further audit. That underscores the need for complementary policies that broaden geographic competition in Hungarian public procurement.

V. Conclusion

This thesis out to investigate whether Hungarian public procurement, even under legally open and competitive rules, exhibits patterns consistent with weakened competition (collusion). The Introduction motivated two empirical questions: (i) do shortages of effective entry translate into higher prices (bid inflation) and (ii) do administrative borders confer an advantage on local firms, and is that advantage mitigated by transparent procedure types? Using the MicroData panel (2014–2020) and constructing competition screens from limited public data, we provide consistent evidence that both price and allocation outcomes are shaped by market-structure frictions.

First, the bid-inflation analysis shows that higher within-lot concentration (as proxied by an HHI based on bidder counts) is associated with the raise of the contract price relative to the requestor’s own estimate. A movement from four to two effective bidders increases the price–estimate gap by roughly one percentage point, while awarding a lot to several co-winners adds an additional quarter-point premium per extra winner. By contrast, formal red-flags such as consortium labels or repeated wins within the same CPV market do not raise prices once concentration is held constant; the evidence therefore points to entry restriction and rent-sharing, not necessarily to explicit bid-rigging.

Second, the tender-fixed-effect model reveals a robust border effect: bidders headquartered in the requestor’s KSH district are ten percentage points more likely to win than outsiders competing for the same contract. The premium persists in legally “open” procedures, indicating that transparency provisions alone do not neutralise geographic bias. Physical distance does matter (tripling the distance lowers win probability by about one point) yet the administrative-border advantage is an order of magnitude larger, suggesting that local familiarity or informal networks outweigh pure transport costs.

These findings contribute to the growing body of work on non-price screens for collusion and corruption by (i) documenting concentration-related price premium in a Central European setting where only winning bids are public, and (ii) quantifying a persistent administrative-border advantage within individual auctions. Methodologically, the study shows that even sparse, winner-only data can yield informative competition diagnostics when combined with simple behavioural indicators and high-dimensional fixed effects.

For Hungarian oversight agencies the results imply a two-track strategy. Low-entry tenders and lot-splitting events should trigger automatic risk flags, because these situations are statistically associated with higher prices. In parallel, spatial dashboards that monitor the share of contracts going to the requestor's own district can help auditors prioritise investigations into potential local patronage. More broadly, facilitating entry through longer advertising periods, streamlined qualification for out-of-district firms, or enforced use of nationwide e-submission, appears more promising than yet another layer of transparency requirements that do not erode the local premium.

Our conclusions remain descriptive rather than causal. The price–estimate gap could partly reflect project complexity or buyer mis-forecasting; headquarters locations may misclassify firms that maintain regional branches; bidder fixed effects are absent; and linear-probability estimates could be complemented by nonlinear choice models. Nevertheless, multiple robustness checks confirm the qualitative patterns.

In sum, the thesis returns to its starting point: although Hungary has adopted the formal trappings of competitive procurement, market outcomes betray a persistent lack of effective rivalry. Concentrated entry raises prices and administrative borders shape allocation, reminding policymakers that competition policy cannot rely on transparency rules alone; it must actively nurture entry and scrutinise geographic patterns if it wishes to secure value for public money.

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Appendix

Table A1: Robustness checks: bid-inflation regression

Source: Author's calculations

Variables	Baseline	Winsorised ^a	Inverse bidders
HHI (within part)	0.051**	0.062***	—
Number of co-winners	0.0026***	0.0025***	0.0027**
Inverse bidders (1/N)	—	—	0.037
Consortium dummy	−0.026	0.011	−0.036
Repeat winner (same CPV)	0.0000	0.0000*	0.0000
Past participation	−0.0000	−0.0000	−0.0000
Past wins	−0.0001	−0.0001	−0.0001
Firm controls	Yes	Yes	Yes
Product FE (CPV 2-d)	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Constant	−0.304**	−0.254***	−0.298***
Observations	45,503	45,503	45,503
Adjusted R^2	0.068	0.075	0.068
Std. errors	Clust. buyer	same	same

^a Outcome winsorised at 1st and 99th percentiles. Robust standard errors are clustered at the requestor level. Superscripts ***, **, and * denote significance at the 1, 5 and 10 per cent levels respectively.