THE IMPACTS OF LEADERSHIP CHANGE ON PROCUREMENT OUTCOMES

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Submitted to
Central European University
Department of Economics and Business

In partial fulfilment of the requirements for the degree of Master of Arts in Economics

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Vienna, Austria
2024

Abstract

I analyse the impacts of owner and manager arrivals and departures of bidder firms on procurement outcomes. I conduct an empirical analysis on Hungarian procurement data, on how the fluctuations of owners and managers with tender requestor specific experience affect the winning probability of a bidder firm. Owner and manager experience is defined as requestor specific participation or winning experience. I find that owners with winning experience increase the probability of winning by 8.8-10.8 percentage points, and managers with winning experience increase the probability of winning by 8.7-10.5 percentage points compared to the absence of owners and managers with winning experience. If a firm that had owners with winning experience in the previous tender loses these owners, its winning probability decreases by 2 percentage points. The same type of loss of managers decreases winning probability by 1.9 percentage points. My further investigation of variation in the fractions of knowledgeable owners and managers finds no statistically significant evidence. The non-significant results also contradict my hypothesis. They suggest that a higher proportion of experienced owners and managers leaving the firm does not necessarily decrease winning probabilities. Conversely, the arrival of experienced owners and managers does not significantly improve winning probabilities.

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I. Introduction

There are many forms of how an owner or a manager can help their firm succeed. One way to measure how successful a firm is, is by looking at its capability to win public tenders. It is certainly an important factor on the firm level, as tender revenue can make up significant shares of total revenue in a firm's life. Procurements are also important from a GDP point of view, as in 2017, public purchases made up 13.3% of the European Union's GDP ("Public procurement - European Commission"). The owner or the manager of a firm can contribute to winning tenders with professional experience, capital, or social capital. The impacts of some of these factors on firm productivity are well documented. However, the effect of fluctuations in owner and manager experience on procurement outcomes has not been widely researched yet. Arrival and departure of knowledgeable or experienced owners and managers might have a significant impact on a firm's winning chances of procurements. In this thesis, I attempt to discover the impact of knowledge loss and gain on procurement outcomes. The contribution of my study stands in combining the topics of procurements and managerial/ownership knowledge changes.

In recent decades, substantial effort has been dedicated to discover what role of management structure has in a firm's performance. Garicano (2000) develops an influential theoretical model of employee hierarchy within firms. In his model, workers at the bottom of the hierarchy deal with the most common day-to-day problems. The higher up the hierarchy one goes, the rarer the problems she has to solve. Acquiring new information and the communication of information between layers of hierarchy is costly. If the cost of getting new knowledge is low, lower-level workers have bigger autonomy in decision making and less layers of hierarchy needed. while lower communication costs yield to more hierarchical layers and less worker autonomy. Caliendo and Rossi-Hansberg (2012) augment this model of hierarchy with strong micro foundations and apply it to international trade. They find that

organization hierarchy adaptation increases gains of exporting relative to standard models. Bloom et al. (2014) test the implications of Garicano's hierarchy model about information and communication technology on survey data. They find that the decrease of information costs gives more autonomy to workers, and makes the management hierarchy more centralized, while communication cost decrease works in the opposite way. It has also been shown in Bloom et al. (2013) and Bloom and Van Reenen (2010) that adopting managerial best practices increase firm performance.

Firm performance can not only improve by adopting better management practices and hierarchical structure, but also by worker fluctuations. Stoyanov and Zubanov (2012) conclude that firms that hire workers from more productive competitors tend to have increased productivity after the new workers arrive. Maliranta, Mohnen, and Rouvinen (2009) find that hiring former R&D workers at a non-R&D firm improves firm productivity, as these former workers bring ready-to-use new knowledge with them.Balsvik (2011) finds similar results in the context of workers moving from multinational companies to non-multinationals. The importance of market specific knowledge of managers when entering a new market is also documented by Mion, Opromolla, and Sforza (2022) and Mion and Opromolla (2014) Not only managers can influence firm performance. Empirical evidence from Maliranta and Nurmi (2019) and Colombo and Grilli (2005) show that owner attributes and past experience can be related to firm productivity or growth.

Finally, one cannot talk about procurement outcomes without mentioning the research in the field of political economy. Mironov (2015) connects outside of firm corrupt manager behaviour with an increased firm performance. Cingano and Pinotti (2013), find that political connections increase revenue rather than productivity, Amore and Bennedsen (2013) find that the public sector plays an important role in transferring rents to politically connected firms. The

impact of political connections on public contract allocation has also been analysed by Goldman, Rocholl, and So (2013).

The main takeaway from the summarized papers is that managerial structure and past experience can have a significant influence on firm performance. Expanding the literature on management's role in firm performance, I analyse Hungarian procurement data from 2011 to 2021, and measure how managerial and ownership experience influences firms' chances to win tenders. The procurement dataset is augmented by yearly firm balance data.

I divide owner and manager (or collectively *leader* in my terminology) changes into two categories: departures and arrivals. My hypothesis is that for a firm, losing owner or managerial experience decreases the probability of winning, and acquiring this kind of experience increases the probability. Procurement data gives an easy way to measure firm performance: a bidder firm either wins the tender or it does not. I define both firm and manager/owner knowledge two ways. The first one is whether the firm or leader participated in another tender of the same requestor in the past. The second type of experience is whether the firm or owner/manager has won a past tender by the same requestor.

I introduce two econometric models. I use fixed effects models with the dependent variable of winning the bid tender. I include two key independent variables in my first model: a dummy variable indicating presence of experienced owners/managers and another dummy variable that indicates the presence of owners/managers at the previous tender of the same requestor. In the second model I define two ratio variables to measure the magnitude of change in the number of knowledgeable leaders.

My results are ambiguous. I find that owners with winning experience increase the probability of winning by 8.8-10.8 percentage points while this effect is 11-15 percentage points for managers. I also find that winning probability decreases by 2 percentage points upon losing experienced owners, and by 3 percentage points upon losing experienced managers. The

contradiction comes from the second part of my results. Although these results are non-significant, I find that the larger fraction of knowledgeable leaders leave the bidder firm, the better the firm's winning chances and vice versa for acquiring new, knowledgeable leaders.

The rest of the paper is as follows. In Section II, I briefly introduce the data and data sources. In Section III, I introduce the econometric approach, in Section IV I present results and discuss them. Finally, Section V concludes.

II. Data

I use the datasets of CEU MicroData[1]. It is a research group at Central European University within the Economics Department. The datasets include Kozbeszerzes-LTS, Merleg-LTS and Cegjegyzek-LTS. All of these datasets are scraped from various websites and they are pre-cleaned to some extent. The datasets I describe next are provided to me in a hashed format, making it impossible to me to directly identify the real requestor, bidder firm, owner or manager entities.

Kozbeszerzes-LTS contains procurement data from 1997 to 2023, and it is scraped from the website of Public Procurement Authority of Hungary. It contains tender and tender part level data. Each observation is a bidder firm participating at a tender part published by a requestor. A tender may have several parts, as large investments have different segments that require different kinds of firms to deliver. In my analysis, I used the tender part level version. That is, I treated tender parts as separate observations, since tender parts can be won or lost separately. Because of that, from now on, unless I directly distinguish them, I refer to tender parts as tenders. The dataset also contains the unique identifier of bidders, requestors, separate IDs for tenders and tender parts, the value of the tender, the settlements of the bidder and the requestor, the CPV codes[2] of the tender, the binary outcome of a bidder's participation in a given tender (win or lose), the type of the procurement (open, restricted etc.) and several tender related dates, such as decision date and publication date. The former date marks the event when a decision on the tender is awarded or the contract is signed. Publication date is when the outcome is published. I use decision date as a "time tracking" variable, to mark the date of tenders taking place.

[1] For further details, see: https://handbook.microdata.io/tools/datasets

[2] CPV coding is a categorization system of tenders in the European Union. For detailed dictionary, see: https://ted.europa.eu/en/simap/cpv

Merleg-LTS is scraped from OPTEN's website[3] and contains yearly financial and other information such as sales data, export data, wage cost, net profit, number of employees and owner country of origin from 2011 to 2021. This dataset can be joined to the procurement data by the unique firm identifier.

Cegjegyzek-LTS is also scraped from OPTEN. This database contains the owner and manager data that I need to track leadership changes within firms. For each firm, identified by the unique firm ID, a list of owners and managers are given, and the date interval while they were present at a given firm. By joining this dataset to the tender data, I can precisely measure, which owners and managers were present at a given firm during the time of a given tender.

Using the described data, I obtain two joined datasets with tenders, bidder firm owners/managers and firm variables with 632,438 and 657,812 observations for owner and manager datasets respectively. Since tender data spans from 1997, I can obtain the past history between requestors and firms and leaders, beyond the time span of the firm financial dat. On the other hand, by joining the datasets I cannot analyse tenders before 2011. The last year in the joined datasets is 2021.

[3] See https://www.opten.hu/

III. Empirical strategy and possible shortcomings

A. Empirical strategy

To analyse fluctuations in knowledgeable leaders, I define leadership change as either of the following two events taking place: leader(s) leave the bidder firm or leader(s) arrive to the firm. If the leader leaves the bidder firm after the latest tender with a given requestor, but before the current tender with the same requestor, I consider this leader to be "left" at the time of the current tender. If the leader arrives after the latest tender but before the current tender, I consider this leader to be "arrived".

Other key variables are the ones related to leaders' knowledge present at the bidder firm, at the time of a tender. I define leader knowledge two ways: prior participation experience with the requestor of the current tender, or prior winning experience with the requestor. Based on these experience variables, I define two kinds of leader knowledge variables, separately for owners and managers. The first one is a dummy variable that equals to 1 if any of the owners/managers of the bidder firm has experience, 0 otherwise. Obtaining the lagged version of this variable allows for the measurement of fluctuations in the firm's overall leadership knowledge since the last tender with the same requestor. If the lagged knowledge dummy is 1 but the current knowledge dummy is 0, it indicates that all owners/managers with experience with the given requestor have left since the last tender, leaving only new or remaining unexperienced owners/managers behind. On the other hand, if the lagged knowledge dummy is 0 and the current knowledge dummy is 1, it implies that either at least one owner/manager from the previous tender remains, thereby retaining experience, or a new leader with experience from another firm has joined. This differentiation helps in understanding the dynamics of leadership changes and their impact on the firm's performance.

The second approach of knowledge or experience variables calculates a ratio of experience lost or gained by having experienced leaders that arrived/left. At a given tender part, lost experience ratio is calculated by:

$$\frac{number\ of\ left\ leaders\ with\ experience}{number\ of\ left\ leaders\ with\ experience + number\ of\ present\ leaders\ with\ experience}$$

Similarly, the gained experience ratio is calculated by:

$$\frac{number\ of\ arrived\ leaders\ with\ experience}{number\ of\ present\ leaders\ with\ experience}$$

There is a difference in the calculation of lost and gained experience because unlike arrived leaders, left leaders are not considered to be present at the bidder firm for a given tender part. These ratios are also calculated separately for owners and managers.

A possible issue arises when the denominator of these fractions is 0. For the lost experience ratio, it happens when no owner/manager with experience leaves the firm, and the current owners/managers have no experience with the requestor. For gained experience ratio, the denominator is 0 if no experienced owner/manager comes to the firm, and other owners/managers are unexperienced. It could be argued that in these cases, there is no change in the amount of knowledge possessed by the leaders, so I set the value of the ratios to 0 in these cases. Also, as I discuss it later, I will only use a subsample of my whole sample to analyse the relationship between the variation in experience ratios and winning probabilities, which makes this setting to zero irrelevant.

To estimate the effect of knowledge fluctuations of leaders on procurement outcomes, I construct the following models:

$$win_{rft} = \beta_0 + \beta_1 last\ tender\ experience_{rft} + \beta_2 current\ tender\ experience_{rft} + \beta_3 last\ tender\ experience_{rft} \times current\ tender\ experience_{rft} + \beta_4 X_{rf} + FE_t + \epsilon_{rft} \quad (1)$$

and

$$win_{rft} = \beta_0 + \beta_1 experience\ lost\ ratio_{rft} + \beta_2 experience\ gained\ ratio_{rft} + \beta_3 X_{rf} + FE_t + \epsilon_{rft} \quad (2)$$

A unit of observation for these equations is firm f bidding (or *participating* at) for requestor r's tender part t. The dependent variable is whether firm f wins the tender or not. In equation (1), *last tender experience* and *current tender experience* are defined above. In equation (2), I include both lost and gained ratios to control for movements at the firm of both directions. In the context of the regression equation, *experience lost ratio* means the ratio of leaders left that had experience with requestor r and the total number of leaders that had experience with requestor r before leaders left at firm f. Variable *experience gained ratio* marks the ratio of new, arrived leaders with experience with requestor r and the total number of leaders with experience with requestor r present at firm f. *X* contains tender variables and yearly firm variables like sales, wage bill, export, number of employees, wins so far with the requestor, bidder firm's geographic distance to requestor, domestic/foreign ownership dummies and state/not state ownership dummies and *FE* incorporates tender[4] fixed effects. By including tender fixed effects, time, requestor and industry fixed effects are also included, as these are all fixed on the tender level.

[4] Here I do not use "tender" in the tender part sense, but as the whole, original "composite" tender.

According to the first part of my hypothesis, if the departure of an experienced owner/manager yields to a smaller level of overall leadership experience, winning chances will drop. In terms of coefficients, it means that in equation (1) $\beta_1 < \beta_1 + \beta_2 + \beta_3$. This inequality means that compared to the case when there are experienced leaders both during the last tender and the current tender, winning chances are lower when knowledge is lost due to leader departure. That is *current tender experience* is 0 and *last tender experience* is 1 It makes sense to compare these two cases rather than to just simply look at the sign of β_1, as this would compare winning experience in the past to no experience whatsoever in the last and current tender. It is reasonable to assume that any experience at any point is better than no experience at all regarding winning probabilities. This leads to the rephrased hypothesis that the bidder's probability of winning would have been higher if the leaders with prior experience had remained, assuming all other variables remain constant. The second half of my hypothesis states that the arrival of knowledge improves the bidder firm's winning chances. As a side result, $\beta_2 > 0$ should also hold, because it translates into "more knowledge since the last tender yields to better winning chances". It is important to note, that in the described setup, *current tender knowledge* equals to 1, if the last tender was won by the bidder firm, and at least one of the owners/managers stayed at the firm until the current tender. Consequently, this case not exclusively include the scenario when a new, experienced owner/managers come to the firm, but also the scenario when incumbent owners/managers acquire new knowledge. The focus on the arrival/departure dummies comes from an ex post perspective regarding the last tender. At the time of the current tender, the previous tender has already concluded, making it impossible to retroactively alter the presence or absence of experienced leaders. This approach acknowledges the reality that decisions and changes in leadership have already been made, and their effects on the current tender are now being evaluated. For equation (2), my hypothesis states that $\beta_1 < 0$ and $\beta_2 > 0$. That is, the bigger fraction of experienced leaders leaves the firm,

the lower the winning probability is, and the bigger the fraction of new experienced leaders, the higher the winning probability.

In order to estimate the impact of fluctuations in leadership experience, I estimate the regression models on a subset of my full sample. This subset only contains tenders where the firm itself has bid at the requestor's tender in the past. This way I can focus on the changes in leadership knowledge instead of firm level knowledge, as 38% of observations are first bidder-requestor interactions. It is also practical because when a firm is participating at a requestor's tender for the first time, my definitions of leader departure and arrival become meaningless, as there are no previous tenders to compare to. For robustness check, I also run the same regression changing the condition from past firm level participation experience to past firm level win experience. For equation (2), I further restrict my sample, as I later discuss it in Section IV. Leaders that arrived and left as well within the same tender part were counted as neither arrived nor left, because practically they did not interact with the requestor, as she came after the last tender but left before the current one.

B. Potential shortcomings

The proposed identification strategy is valid only if leadership changes are exogenous. Specifically, there should be no systematic relationship between firm attributes and leadership changes. For instance, one might argue that firms performing well in tenders could experience more frequent ownership changes, as they see potential profit opportunities in these firms. Consequently, the fluctuation of owners at firms that are performing better in the first place would be more likely. This would mean that even though owner knowledge might still matter, my results are biased. However, the opposite could be argued as well: ownership fluctuations happen, because owners want to "get rid of" their ownership of a poorly performing firm. One could similarly argue about management fluctuations as well. If leadership changes occur more frequently at better-performing firms, my coefficients would be biased upwards, and

downwards in the opposite scenario. The danger of endogeneity is present, as I cannot exploit a natural experiment like the one used in Mion, Opromolla, and Sforza (2022). However, by measuring both leadership departures and arrivals, my hypothesis predicts opposite signed impacts on winning probability. If the endogeneity problem exists and I still find significant effects, it suggests that at least one part of the hypothesis is correct. This is because any of the described endogeneity cases would work against one of the hypothesized effects. Specifically, a downward bias would underestimate the positive effect of acquiring knowledge, while an upward bias would underestimate the negative effect of losing knowledge. Therefore, despite potential endogeneity issues, my results can still be valuable by demonstrating the impact of leadership experience on winning probabilities. To dig a bit deeper on this issue, I collapse the tender data to a firm-year pair level and check the summary statistics of firm observables by a leadership change dummy[5]. Summary statistics can be found in The means of observables for firms that experienced no leadership changes within a given year do not significantly differ from those firms that experienced leadership fluctuations. . The means of observables for firms that experienced no leadership changes within a given year do not significantly differ from those firms that experienced leadership fluctuations. These results certainly do not disprove the presence of the endogeneity problem, but it is certainly ensuring that there is no systematic difference in firm observables at first glance.

[5] This dummy indicates whether there were any leadership changes in the given year at the firm or not. Leader arrivals and departure are both counted as leadership change.

Table 1. Summary statistics of yearly firm observables

VARIABLE	Owner dataset Leadership change		Manager dataset Leadership change	
	0	1	0	1
Log net profit in 1000 HUF	9.39 (2.1)	9.27 (2.14)	9.26 (1.98)	9.35 (2.19)
Log sales in 1000 HUF	12.48 (1.81)	12.35 (1.95)	12.33 (1.65)	12.44 (2.01)
Employment	51.35 (529.3)	48.04 (475.07)	24.52 (93.04)	56.43 (524.81)
Log wage bill in 1000 HUF	10.3 (1.89)	9.83 (1.95)	9.82 (1.68)	9.95 (2.02)
State government owned dummy	0.01 (0.1)	0.01 (0.1)	0.004 (0.06)	0.01 (0.11)
Foreign owned dummy	0.07 (0.25)	0.06 (0.25)	0.05 (0.22)	0.07 (0.26)
Domestic not state-owned dummy	0.91 (0.29)	0.92 (0.27)	0.93 (0.25)	0.9 (0.3)
Nr. of tender parts won	1.65 (3.72)	2.1 (6.34)	1.54 (3.02)	2.24 (7.04)
Export	794,219 (1.49e+07)	733,010 (2.66e+07)	207,113 (2.74e+07	921,356 (2.74e+07)
Nr. of observations	10,408	74,171	10,546	84,601

Notes: Summary statistics of yearly firm observables. Means (at the top of the cells) and standard errors in parentheses (bottom of the cells). The log of export could not be taken, because that would eliminate firms that do not export (export = 0).

Another problematic part of my empirical approach is that variation in my experience variables might not be sufficient. Table 2 shows the number of observations of dummy interactions conditioning on past firm participation. For participation-based leader experience, it is evident that there are few observations for both the baseline case of no experience in the previous and current tender and the leader departure cases. The rare occurrence of the 0-0 scenario is hardly surprising, as once a firm participates in a requestor's tender, there will probably remain some leaders with participation experience unless all leaders are replaced. This also explains the higher occurrence of the [*current tender experience* = 1 and *last tender*

experience = 0] scenario. However, there no such "by definition" type of argument can be made about the low number of observations where there is last tender experience without current tender experience. The likely reason is the actual rarity of all leaders with participation experience leaving the firm. This is supported by the fact that the [*current tender experience* = 1 *and last tender experience* = 1] scenario is the most common, implying that once a firm gains experience, at least one experienced leader remains with the firm. The same is true to winning-based experience dummy distributions, however, the balance of *current tender experience* is much better conditioning on leaders not having winning experience in the last tender with the requestor. This is because certainly not all bids by firms result in a win. Distributional problems are even more severe on the restricted subsample of equation (2), which I discuss in detail in Section IV.

Table 2. Distribution of current and last tender experience dummies

			Owners		**Managers**	
			Last tender experience		Last tender experience	
Participation leader experience			0	1	0	1
	Current tender experience	0	4,261	7,908	4,375	6,196
		1	87,286	268,934	86,015	293,160
Winning leader experience						
	Current tender experience	0	74,464	7,225	74,524	5,987
		1	58,158	228,542	56,933	252,299

IV. Results and discussion

Running Poisson fixed effects regression on the equations of Section III using Stata's *ppmlhdfe* package, the following tables are produced. When interpreting the results of the Poisson regressions, my baseline value is always the intercept coefficient. I also run OLS on equation (1), the results can be found in the Appendix

Table 3. Dummy experience regression results 1

	Owners		**Managers**	
VARIABLES	(1) Participation experience	(2) Winning experience	(3) Participation experience	(4) Winning experience
current tender experience	-0.0226	**0.6997*** **	-0.3131*	**0.6956*** **
	(0.0735)	(0.0382)	(0.1686)	(0.0401)
last tender experience	0.1255	**0.6938*** **	-0.1741	**0.7354*** **
	(0.1192)	(0.1177)	(0.1771)	(0.1856)
current tender experience × *last tender experience*	0.1359	**-0.5745*** **	0.4689***	**-0.6164*** **
	(0.1190)	(0.1161)	(0.1786)	(0.1884)
Constant	-1.6800***	-2.1079***	-1.4769***	-2.1313***
	(0.2015)	(0.1958)	(0.2306)	(0.1697)
Observations	225,632	225,632	248,196	248,196
Pseudo R^2	0.169	0.176	0.166	0.172

Notes: Results of Poisson pseudo-likelihood regressions. Columns (1)-(2) show owner experience dummy coefficients, columns (3)-(4) show manager experience dummy coefficients. Standard errors are clustered at the tender level, and in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. 11 years in total: 2011-2021. Regressions are run on subsamples of the joined datasets, conditioning on past firm participation at an earlier tender of the requestor of the current tender. Main coefficients of interest are highlighted with bold.

According to Table 3, fluctuations in participation experience do not yield to consistently significant results neither for owner nor manager experience at the 5% level. Variations in winning experience however have a significant impact on winning chances for both leadership types on the 1% level. Calculating the probabilities corresponding to

coefficients[6], the results can be interpreted as follows. If, during the previous tender, at least one owner had prior winning experience with the requestor but no such experienced owners are present at the current tender, the bidder firm's chances of winning the current tender part increase by approximately 8.9 percentage points compared to scenarios where there are no experienced owners in both the previous and current tenders (baseline case). This situation arises only if all owners with winning experience have left the firm after the previous tender, and the firm did not win that previous tender. The latter condition is crucial because if the last tender had been won, the remaining owners would have gained winning experience, which they would carry into the current tender. Therefore, this scenario is the equivalent of the firm losing all its owners with winning experience. In the opposite situation, where experienced owners are present at the current tender but were absent from previous tenders, the winning probability increases by 8.8 percentage points. Unlike the previous scenario, this case does not exclusively indicate the arrival of new, experienced owners. If the bidder won the previous tender with the current requestor and at least one owner remains with the bidder firm until the current tender, the firm retains experience. Alternatively, if the bidder did not win the previous tender, new owners with winning experience from other firms could have joined the bidder. Regardless of the specific circumstances, the coefficient captures the impact of having owners with winning experience at the current tender, compared to scenarios where there were no experienced owners in either the previous or current tender. Furthermore, if the bidder firm had at least one experienced owner at the previous tender and the same holds for the current tender, the winning probability increases by approximately 10.8 percentage points relative to the scenario where there is no owner experience at all. This means that compared to this scenario, losing experienced owners decrease winning probability by 2 percentage points. The same decrease holds for not having experienced owners in the past. However, as discussed in Section III, it

[6] It is done by applying the formula: $\frac{Odds}{1+Odds}$, where $Odds = e^{\sum \beta_i X_i}$

makes more sense to compare losing experience to the “full experience” case, and comparing gaining experience to the “no experience at all” case.

For managers, I get similar results. Having experienced managers at the current tender increases winning probability by 8.7 percentage points, while having experienced managers in the past increases winning probability by 9.3 percentage points, all compared to not having experienced managers at the previous and current tender. If there are experienced managers present at both the previous and current tender, winning probability increases by 10.5 percentage points. Losing experienced managers decreases winning probability by 1.9 percentage points relative to having experienced managers both at the previous and current tender.

If I further restrict the sample to include only those observations where the bidder firm has participated in previous tenders with the current requestor, but did not win any tender parts in the previous tender, I can isolate the impact of the arrival of experienced owners/managers. It is important to note that under these conditions, the isolated effect primarily reflects the influence of either the arrival of experienced owners/managers to the firm, or an incumbent owner/manager acquiring winning experience with the requestor at another firm. I treat these two scenarios as equivalent because, in both cases, the experience is acquired from outside the firm. Applying the described conditions yields to the result that acquiring new owner winning experience from outside the firm increases winning probability by 8 percentage points, and new manager winning experience increases winning probability by 5 percentage points. These results are significant at the 5% level. The detailed regression table can be found in the Appendix.

To check whether the results of Table 3 hold or change with different restrictions of the sample, I rerun the regression on equation (1), but instead of conditioning of past firm level participation experience, I condition on past firm level win experience. The results of this

regression can be found in Table 4. All coefficients of interest are non-significant at the 5% level. The likely reason for this is that the issue about the dummy variation explained in Section III becomes more severe when restricting the sample on past firm wins. The dummy distribution table when conditioning on past firm win can be found in the Appendix.

Table 4. Dummy experience regression results 2

	Owners		**Managers**	
VARIABLES	(1) Participation experience	(2) Winning experience	(3) Participation experience	(4) Winning experience
current tender experience	-0.0800	0.0457	-0.3104	-0.0173
	(0.0910)	(0.0712)	(0.2344)	(0.1733)
last tender experience	-0.0247	0.1318	-0.3975*	-0.1623
	(0.1431)	(0.1326)	(0.2379)	(0.1813)
current tender experience	0.0827	-0.0393	0.4464*	0.2414
× *last tender experience*	(0.1442)	(0.1339)	(0.2447)	(0.1846)
Constant	-1.1986***	-1.3292***	-1.1463***	-1.4348***
	(0.2248)	(0.2199)	(0.2908)	(0.2361)
Observations	184,063	184,063	203,795	203,795
Pseudo R^2	0.181	0.181	0.176	0.176

Notes: Results of Poisson pseudo-likelihood regressions. Columns (1)-(2) show owner experience dummy coefficients, columns (3)-(4) show manager experience dummy coefficients. Standard errors are clustered at the tender level, and in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. 11 years in total: 2011-2021. Regressions are run on subsamples of the joined datasets, conditioning on past firm win at an earlier tender of the requestor of the current tender.

The presented results have three main implications. The first one is that firms that do not have winning experience can increase their winning chances by "recruiting" a manager or owner that has a requestor specific winning "knowhow". This result is consistent with the literature about the role of manager and owner experience (Mion, Opromolla, and Sforza (2022), Mion and Opromolla (2014), Maliranta and Nurmi (2019) and Colombo and Grilli (2005)).

The second implication is that losing the experienced owners and managers after a tender yields to slightly worse winning probabilities at the next tender with the same requestor. This and the first implication are the two sides of the same coin. Fluctuation in the experienced leaders have a significant impact on winning probability, depending on the direction of the fluctuation.

The third implication of my results so far is that having leaders with winning experience at any point increases the winning probability at the current tender, compared to having experience either only at the last tender or at the current one. The distinction between firm level winning experience and individual leader level experience is not clear however. It is possible that once the leader acquires the knowledge about how to win at a requestor's tender, the information spreads within the firm, and the experience of the leaders is collectivised. Unfortunately, firm winning experience is highly correlated with leader experience dummies, so I cannot control for it in my regressions. Restricting the sample to tenders where the bidder firm has past winning experience yielded to non-significant coefficients.

My results so far demonstrate the impacts of edge cases: leadership experience either exists within the firm due to at least one of the leaders, or not. However, the degree of experience gained or lost may significantly influence winning probabilities. For instance, in a company with five experienced managers, the departure of four managers could also affect the firm's winning chances, not just when all five leave. Since the results in Table 3 imply that only winning experience impacts winning chances significantly, I investigate the impact of lost and gained experience ratios (defined in Section III) on winning probability To test this, I run Poisson regressions on equation (2). In order to focus on tenders where any owner/manager fluctuation took place at the bidder firm, the regression is done on the subsample of tenders where either owners/managers left or arrived to the firm or both. Results are presented in Table 5.

Table 5. Regressions with experience ratios

VARIABLES	(1) Owners	(2) Managers
winning experience lost ratio	0.1951	0.3359*
	(0.1821)	(0.1931)
winning experience gained ratio	-0.2106	-0.4439***
	(0.2126)	(0.1635)
Constant	-0.9616	-1.5509***
	(1.3217)	(0.5521)
Observations	16,774	34,736
Pseudo R^2	0.239	0.207

Notes: Results of Poisson pseudo-likelihood regressions. Columns (1)-(2) show owner winning experience lost and gained ratio coefficients, columns (3)-(4) show manager winning experience lost and gained ratio coefficients. Standard errors are clustered at the tender level, and in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. 11 years in total: 2011-2021. Regressions are run on a subsample of the joined datasets, conditioning on 1) past firm participation at an earlier tender of the requestor of the current tender and 2) leaders either left or arrived to the bidder firm or both.

The results of Table 5 are surprising. Although for owners, neither of the experience ratio coefficients are significant at the 5% (or 10%) level, their signs are exactly the opposite as expected, implying that the bigger fraction of experienced owners the bidder firm loses, the better the winning chances and vice versa for gaining experience. For managers, both coefficients of the ratio variables are significant at the 10% level, and also have opposite signs compared to my expectations. They imply that if a firm loses 100% of its knowledgeable managers, it is 8.4 percentage point more likely that it is going to win the tender compared to the baseline. If all experience came with new managers, the winning probability decreases by 7.6 percentage points. These results contradict my previous findings as they implied that acquiring experience increased winning probability compared to not having any experienced leaders. Similarly losing all knowledge decreased winning probability in the previous model. There are several reasons why experience ratios contradict my previous findings.

If I stick to my hypothesis that the greater fraction of experienced leaders a firm loses/gains, the lower/greater the winning probability is, one obvious reason of the

contradictory results can be that the experience ratios do not sufficiently represent the knowledge function of the firm. Many relevant papers build on the model of Garicano (2000), as summarised in Section I. For instance, in Bloom et al. (2014), structural components of acquiring knowledge (e.g.: access to computers) and communication facilities (e.g.: intranet within firm) within the firm have significant roles. In my empirical model, there is no difference between the types of experiences. If a leader had at least one winning or participation interaction (depending on the model setup) with a given requestor, she is considered to be experienced. The implicit assumption of my model is that every leader has the same channels of taking advantage of her experience. The data I analyse does not include any observables about the information technology a firm has. My relatively simple approach of simply using ratios based on the number of different kinds of fluctuating leaders might be too simplistic. For example, if an experienced manager leaves a firm with three experienced managers including her, the firm loses 33% of its experienced leaders. On the other hand, two experienced managers remain. According to my hypothesis, this scenario decreases winning probability less if there had been four experienced managers to begin with. Equation (1) may better reflect reality, as it suggests that the presence of any experienced leaders, rather than the proportion of experienced leaders leaving or arriving, is what matters.

Another potential underlying reason behind my contradictory results is that controlling for tender parts only where leaders arrived or left significantly reduces the number of observations. These subsamples are only 7% and 14% of the owner and manager datasets respectively. Figure 1 and Figure 2 show the distributions of the winning experience ratios for owners and managers respectively. By the charts, it is obvious that most of the time, leader departure and especially leader arrival does not change the overall experience present at the firm. The non-significance of the coefficients however makes this part of the analysis inconclusive.

Figure 1. Owner winning experience ratio distributions

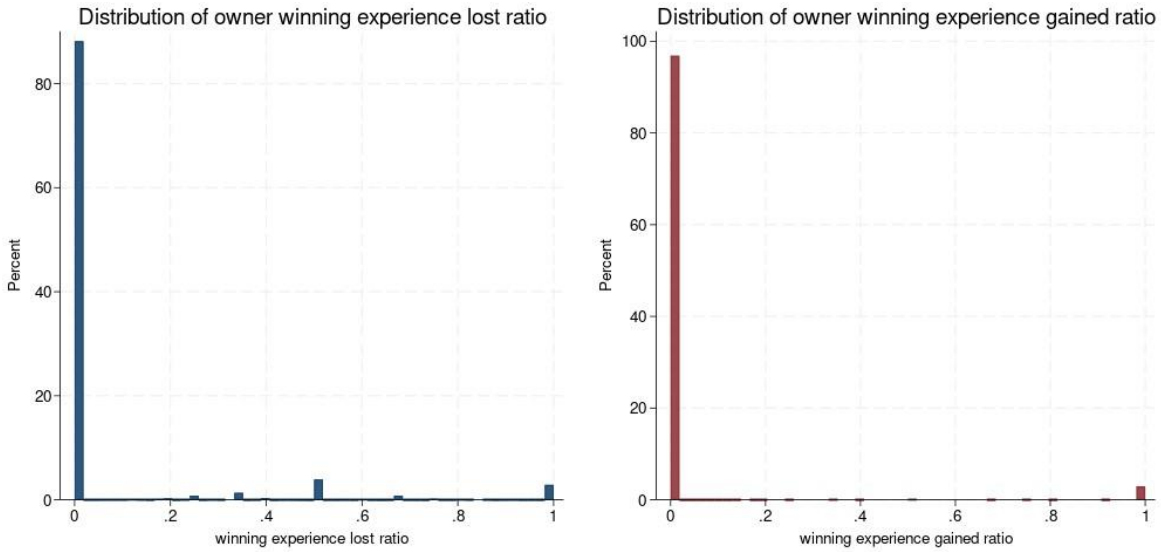
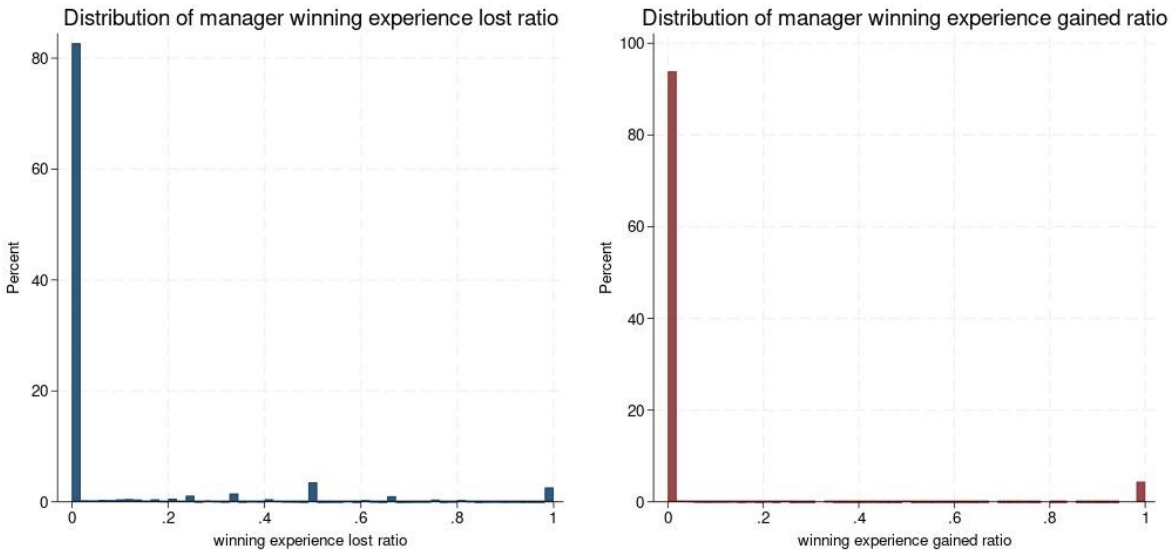


Figure 2. Manager winning experience ratio distributions



V. Conclusion

Using Hungarian procurement data, I analyse the impacts of owner and manager fluctuations within firms on procurement outcomes. The relationship between managerial and ownership experience or knowledge and firm performance has been studied for decades, yet the usual measures of performance have been productivity or financial indicators. In my thesis, I approache this research question, by examining firm performance as the capability to win public tenders. Procurement outcomes matter both on the firm and macroeconomic level, as tenders can be a significant part of a firm's production as well as GDP. The study exploits the fact that bidder firms and requestors of tenders interact with each other from time to time, allowing for the measurement of past experience both on firm and leadership level. I define experience two ways: past participation experience at a given requestor's tender or past winning experience with such a tender. I find statistically significant evidence on owners and managers acquiring winning experience increases winning probability. For a given tender, if the firm had any owners with winning experience either at the previous tender with the same requestor or the current tender or both, the winning probability increases by 8.8-10.8 percentage points. This scenario with managers instead of owners increases winning probability by 8.7-10.5 percentage points. If any owner or manager acquires winning experience outside of the firm, winning probability increases by 8 or 5 percentage points respectively. The firm losing owners or managers with winning experience after the previous tender with the same requestor worsens winning chances by 2 or 1.9 percentage points respectively. I find no such effects with owner and manager participation experience. Trying to understand if the magnitude of the fluctuations matter when leaders arrive and leave, I define two ratio variables to measure the ratio of left and arrived, knowledgeable leaders. Although not statistically significant, I find contradictory results to my hypothesis. The greater fraction of owners or managers with winning experience leave the firm, the higher the winning probability, and vice versa for the arrival of experienced

owners or managers. The reasons behind these inconclusive results are likely to be either conceptual or empirical. The former possibility is suggested by the relevant literature (Garicano (2000), Bloom et al. (2014), Caliendo and Rossi-Hansberg (2012)), as the spread of information within firms is more complex and sophisticated than my model assumes. From the empirical point of view, my sample is likely to have too low variation in the ratio variables to efficiently estimate their impacts, hence the non-significance.

My thesis contributes to the existent literature by combining the topics of managerial and ownership experience with procurements, granting a simple way to measure firm performance. Although my approach has several potential shortcomings, I believe my results prove that by applying the existing hypothesis about leadership knowledge on procurement data, one can obtain valuable insights about the role of ownership and managerial experience in firm performance.

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Appendix

Table 6. OLS results of equation (1) conditioning on past firm participation

	Owners		**Managers**	
VARIABLES	(1) Participation experience	(2) Winning experience	(3) Participation experience	(4) Winning experience
current tender experience	-0.0064	0.1324***	-0.0602*	0.1288***
	(0.0145)	(0.0073)	(0.0352)	(0.0076)
last tender experience	0.0220	0.1257***	-0.0325	0.1271***
	(0.0230)	(0.0219)	(0.0362)	(0.0344)
current tender experience	0.0277	-0.1090***	0.0877**	-0.1108***
× *last tender experience*	(0.0231)	(0.0218)	(0.0366)	(0.0351)
Constant	0.1555***	0.0862	0.1751***	0.0617
	(0.0581)	(0.0564)	(0.0548)	(0.0442)
Observations	241,740	241,740	263,885	263,885
Adjusted R^2	0.280	0.289	0.277	0.284

Notes: Results of OLS regressions. Columns (1)-(2) show owner experience dummy coefficients, columns (3)-(4) show manager experience dummy coefficients. Standard errors are clustered at the tender level, and in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. 11 years in total: 2011-2021. Regressions are run on subsamples of the joined datasets, conditioning on past firm participation at an earlier tender of the requestor of the current tender

Table 7. OLS results of equation (1) conditioning on past firm win

	Owners		**Managers**	
VARIABLES	(1) Participation experience	(2) Winning experience	(3) Participation experience	(4) Winning experience
current tender experience	-0.0196	0.0079	-0.0637	-0.0091
	(0.0187)	(0.0138)	(0.0529)	(0.0245)
last tender experience	-0.0084	0.0240	-0.0801	-0.0349
	(0.0282)	(0.0251)	(0.0530)	(0.0263)
current tender experience	0.0209	-0.0056	0.0902*	0.0509*
× *last tender experience*	(0.0286)	(0.0255)	(0.0544)	(0.0276)
Constant	0.2636***	0.2351***	0.2327***	0.1789***
	(0.0666)	(0.0662)	(0.0701)	(0.0521)
Observations	195,349	195,349	215,029	215,029
Adjusted R^2	0.328	0.328	0.322	0.322

Notes: Results of OLS regressions. Columns (1)-(2) show owner experience dummy coefficients, columns (3)-(4) show manager experience dummy coefficients. Standard errors are clustered at the tender level, and in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. 11 years in total: 2011-2021. Regressions are run on subsamples of the joined datasets, conditioning on past firm win at an earlier tender of the requestor of the current tender.

Table 8 Poisson regression for precise arrival effect

	Owners	**Managers**
VARIABLES	(1) Winning experience	(2) Winning experience
current tender experience	0.6427*** (0.2105)	0.3309** (0.1598)
last tender experience	0.4666** (0.1919)	1.2056*** (0.3217)
current tender experience × *last tender experience*	-0.4576 (0.2872)	-0.8532** (0.3462)
Constant	-2.0865** (0.8269)	-1.6318*** (0.5537)
Observations	44,945	48,513
Adjusted R^2	0.193	0.191

Notes: Results of Poisson pseudo-likelihood regressions. Standard errors are clustered at the tender level, and in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. 11 years in total: 2011-2021. Regressions are run on subsamples of the joined datasets, conditioning on past firm win at an earlier tender of the requestor of the current tender and the firm not winning the previous tender with the current requestor.

Table 9 Distribution of current and last tender experience dummies, conditioned on past firm win

			Owners		**Managers**	
			Last tender experience		Last tender experience	
Participation leader experience			0	1	0	1
	Current tender experience	0	2,425	6,898	2,699	5,371
		1	46,940	239,760	45,765	261,800
Winning leader experience						
	Current tender experience	0	5,928	6,815	6,954	5,383
		1	57,436	225,844	55,878	247,420