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FACULTY OF SOCIAL SCIENCES

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**Anonymous Companies and Public
Procurement: Evidence from the Czech
Republic**

Master's thesis

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain any other academic title. This thesis consists of 130 621 characters, not including its abstract, bibliography and addenda.

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Prague, July 31, 2020

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Abstract

This thesis follows up on previous research concerning inefficiencies linked to tenders awarded to anonymous companies. After anonymous shares were abolished in 2014, the question is whether similar inefficiencies can be detected in the case of companies that ceased to be anonymous. A balanced sample of formerly anonymous companies and their comparable peers was constructed via a matching algorithm. A Welch unequal variance t-test was then used to check whether a disproportionate drop in selected performance indicators and in the share of formerly anonymous companies on total volume of public procurement can be detected. A linear regression model was further applied to inquire about the effect of anonymity and former anonymity on tender-specific savings. The results show that anonymity significantly contributes to lower tender savings, but no similar negative effect can be found in case of formerly anonymous companies. Profitability of the formerly anonymous companies also decreased, but no long-term drop in tender volume was found, indicating that a large portion of the inefficiencies can be traced back to well-established businesses rather than special purpose shells. This thesis thus extends the present research in the area of procurement efficiency and indicates that an increase in bidder ownership transparency can enhance procurement efficiency.

JEL Classification K22, K23, K42, H72, H83
Keywords public procurement, transparency, state capture, corruption

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Abstrakt

Tato práce navazuje na dřívější výzkum týkající se anonymních společností v souvislosti s nižší efektivitou zadávacího řízení. Po zrušení anonymních akcí v roce 2014 se nabízí otázka, zda lze podobné nesrovnalosti vypořádat i v případě dříve anonymních společností. Za tímto účelem byl spárován vyvážený vzorek dříve anonymních společností a srovnatelných transparentnějších společností. S pomocí Welchova t-testu pro rozdílné rozptyly byla

testována hypotéza poklesu vybraných indikátorů ziskovosti a celkového podílu na zadaných zakázkách v případě dříve anonymních společností. Dále byl sestaven model lineární regrese k odhadu dopadu anonymity a dřívější anonymity dodavatele na úspory spojené s jednotlivými zakázkami. Výsledky ukazují, že zatímco anonymita dodavatele má signifikantně negativní dopad na úspory zakázky, podobný záporný efekt však nelze vysledovat v případě dříve anonymních dodavatelů. Došlo rovněž k poklesu v ukazatelích ziskovosti, ale v případě celkového podílu na zadaných zakázkách nebyl vysledován žádný signifikantní pokles, nejspíše protože velký podíl na nesrovnalostech měly zavedené podniky a nikoli entity sloužící jedinému účelu. Tato práce tak rozšiřuje dosavadní výzkum v oblasti efektivity zadávacího řízení a ukazuje pozitivní dopad transparency dodavatelů na efektivitu samotného zadávacího řízení.

Klasifikace JEL	K22, K23, K42, H72, H83
Klíčová slova	veřejné zakázky, transparentnost, převzetí státu, korupce
Název práce	Firmy s anonymními akciemi a veřejné zakázky: případ České republiky
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Acronyms

AML	Anti Money Laundering
BCA	Act No. 90/2012 Coll., Business Corporations Act
CC	Act No. 89/2012 Coll., Civil Code
CEE	Central and East European
CoC	Act No. 513/1991 Coll., Commercial Code
CPV	Common Procurement Vocabulary
EU	European Union
FATF	Financial Action Task Force
GDP	Gross Domestic Product
MEAT	Most economically advantageous tender
NACE	<i>nomenclature statistique des activités économiques dans la Communauté européenne</i>
OPPA	Act No. 137/2006 Coll., Public Procurement Act
OECD	Organisation for Economic Co-operation and Development
PPA	Act No. 134/2016 Coll., Procurement Procedures Act
ROA	return on assets
ROE	return on equity
ROI	return on investment
Transparency Act	Act No. 134/2013 Coll., on measures to increase transparency of joint stock companies and amending other Acts
WLS	weighted least squares

Master's Thesis Proposal

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Proposed topic	Anonymous Companies and Public Procurement: Evidence from the Czech Republic

Motivation Until 1 January 2014, the Czech law (and namely the then-effective Commercial Code) allowed companies to issue so called anonymous shares. This colloquial name was used to describe shares emitted as bearer securities in physical form. When a company issued this kind of shares, it was possible to make it very difficult or even impossible to backtrack its shareholders, therefore anonymous shares.

This property of anonymous shares led to a suspicion that this form of company ownership can be abused to achieve illicit ends. Some of the possible ways of abusing the possibility to hold a share in a company anonymously have been described by Sharman (2010). Notably for the purposes of this master's thesis, Chvalkovská, Janský & Skuhrovec (2012) have presented results leading to the conclusion that public tenders won by companies issuing anonymous shares are linked to abnormal profits on part of the anonymously owned companies and to more costly tenders for the state. One of the possible explanations of this phenomenon is that the agents deciding on the tender do hold a vested interest in the well being of the anonymously owned company. The anonymity of the ownership structure would thus allow the agents in question to hide unlawful use of public money to their own benefit.

It is noteworthy in this context that the result above stand in contrast to the findings of the study of a sample of CEE companies by Berglöf & Pajuste (2005), according to which better performing firms should generally be more prone to disclose their ownership structure, as pointed out by Skuhrovec (2017). The fact that the case above leads to quite clearly opposite results provides further evidence that the processes that led to the abnormal profits described above are non-standard to say the least.

In reaction to the widespread public critique¹ of the possibility to issue anony-

¹See e.g. the (currently already outdated) critique by the Anticorruption Endowment

mous shares and its repercussions, the Czech legislature has abolished anonymous shares as of 1 January 2014 (explicitly by Act No. 134/2013 Coll. and implicitly by the new Business Corporations Act). Currently, bearer shares can only be issued either in form of book-entry shares or in form of immobilized physical securities. In both cases, the owner of the share should be known and/or relatively simple to identify.

The aim of this work is, in broad terms, to assess the impact of the new regulation in the area of public procurement. Five years since the abolishment of anonymous shares, it is time to look whether there has been any significant improvement in this sensitive area of handling public funds in private-law contractual relationships. Building on the findings published in the literature cited above, this master's thesis primarily pursues the goal of monitoring the effect of the regulation on the former anonymous companies. Did the change in regulation affect the ability (or willingness) of the former anonymously owned companies to win public tenders? How did the anonymous companies react to the revelation of their ownership structure? Is there a visible drop in their participation in public tenders? Did they (or possibly new market entrants) find a different way of effectively hiding their ownership structure?

If the results of the analysis prove that the former anonymous companies dropped out of public tenders when facing the necessity to reveal their true owners, it will provide further supportive evidence for the findings of Chvalkovská, Janský & Skuhrovec (2012), as far as the concealment of the ownership structure appears to allow the anonymously owned companies to do abnormally well in tenders. Also, if the analysis reveals that the companies turned to different, similarly effective ways of concealing the ownership structure, I will attempt to replicate the results concerning the profits of anonymously owned companies on the new sample of "anonymized" companies using different methods of ownership concealment.

It can be said already at the outset that even the report accompanying the very act abolishing anonymous shares (134/2013 Dz) stated that there would remain ways to circumvent the transparency requirement even after having abolished anonymous shares. The report mentions the example of so called "white horses": shareholders that bare the rights related to the share only formally because they are in fact strictly contractually bound by a third person that factually exercises the rights stemming from the given share.

Nonetheless, it also has to be mentioned as a caveat that the results of the analysis may be influenced by other regulatory requirements seeking to enhance transparency that have been introduced after 2014, be it the new requirement to disclose beneficial owners stemming from EU law or other measures. I will map the progress in this

claiming that anonymous shares simplify tax evasion as well as hide true owners of tender participants <http://www.nfpk.cz/zakladni-informace>.

field in order to take it into account for the purposes of the subsequent analysis. All things considered, it merely illustrates that the abolishment of anonymous shares is a step forming part of a larger regulatory effort to achieve more transparency of the ownership structure of certain companies. More regulatory oversight over bearer shares was one of the topics of the OECD tax transparency report as late as 2018 OECD (2018).

Hypotheses

Hypothesis #1: The former anonymously owned winners of tenders are less likely to win tenders after 2014.

Hypothesis #2: The abolishment of anonymous shares had a negative effect on public procurement related profits of former anonymously owned companies.

Hypothesis #3: Companies that have anonymized the ownership structure using other means reach abnormal profits in public tenders.

Methodology The first step is the collection of data concerning companies issuing anonymous shares before 2014. Both the data on company structure (as well as its basic accounting figures contained in their annual statements) and the data on (most of the) public tenders is publicly available, that leaves the possible problem of efficient extraction but not of availability of data per se.

To test the first hypothesis (provided that there will be a non-zero number of former anonymously owned companies that won a tender post 2014), I intend to construct a sample of both anonymously owned companies and companies with a transparent ownership structure that won a tender before 2014. On this sample, I will observe whether these companies won a tender again after 2014 and, more specifically, how did the fact that a company used to be have a non-transparent ownership structure influence the likelihood of winning a tender after the abolishment of anonymous shares. This will be tested against the null hypothesis of the former anonymity having no effect within the framework of a probabilistic statistical model.

To test hypotheses 2 and 3, a similar approach as in Chvalkovská, Janský & Skuhrovec (2012) will be taken. First, regarding hypothesis 2, I will test the effect of the abolishment of anonymous shares on the profitability linked to public procurement regarding formerly anonymously owned companies without closer determination. I expect the overall effect on their profitability linked to public procurement to be negative compared to the same results before 2014. Second, as regards hypothesis 3, a discussion of the legal possibilities of hiding the ownership structure after 2014 will have to specify which companies can be identified as having an anonymous or opaque ownership structure. Of course, only the anonymization methods that

are discoverable can be used for the sake of the analysis. The specific timeframe of the analysis will be particularly relevant because of the recent advances in the EU regulation concerning mandatory disclosure of beneficial owners and other relevant regulatory changes. Having identified companies with opaque ownership structure and the proper timeframe for their assessment, a similar analysis as regards hypothesis 2 will be conducted. In this respect, it is quite likely that the data will not be normally distributed, as was the case in Chvalková, Janský & Skuhrovec (2012), which might require using a non-parametric test statistic.

Expected Contribution This master's thesis will provide an assessment of the impact of abolishment of anonymous shares (physical bearer shares) on the former privately-owned companies in relation to their ability to win tenders and possibly to reap extraordinarily high profits in public procurement in the Czech Republic. It is a logical continuation of the research in the field regarding the positive correlation between profits and anonymity of the ownership structure in the era when issuing anonymous shares was possible. This work will also contribute to the body of research regarding one of the pressing issues in the area of anti-corruption and anti-tax evasion policy—ownership transparency.

Outline

1. Introduction and motivation: after having abolished anonymous shares, it is logical ask about the effect of the regulation in question and whether it contributed to a mitigation of the issues discussed above.
2. Theory: I will present an overview of the relevant literature concerning the issues of ownership structure transparency in the broader context of corporate governance as well as literature related to public procurement from an economic perspective. This chapter will also contain a discussion of the possibility to hide a company's ownership structure before and after 2014.
3. Data: I will explain the origin, collection and structure of the samples used for the main analysis.
4. Methods: An explanation of the choice of the models used for the purposes of the analysis as well as their rationale.
5. Results: I will discuss the results as such, including robustness checks.
6. Concluding remarks: I will summarize my findings and their implications for policy and future research.

Core bibliography

AURIOL, E., 2006. Corruption in procurement and public purchase. *International Journal of Industrial Organization*, 24(5), pp.867-885.

AURIOL, E., STRAUB, S. and FLOCHEL, T., 2016. Public procurement and rent-seeking: the case of Paraguay. *World Development*, 77, pp.395-407.

BERGLÖF, E.; PAJUSTE, A. 2005. What do firms disclose and why? Enforcing corporate governance and transparency in Central and Eastern Europe. *Oxford Review of Economic Policy*. 21(2): p.178.

FAZEKAS, M. and TÒTH, I.J., 2014. New ways to measure institutionalised grand corruption in public procurement. U4 Brief: October, 9, p.U4.

CHVALKOVSKÁ, J., JANSKÝ, P., & SKUHROVEC, J. 2012. Listinné akcie na majitele a veřejné zakázky. *Politická ekonomie*, 60(3).

MANN, H. B.; WHITNEY, D. R. 1947. On a test of whether one of two random variables is stochastically larger than the other. *The annals of mathematical statistics*, p.50.

OECD, 2010. *Tax Co-operation 2010: Towards a Level Playing Field*. 2010, OECD.

OECD. 2018. *Tax Transparency 2018: Report on progress*. OECD.

ŠEDO VÁ, J. 2014. Transparency of Shareholders in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 62(2): p. 415.

SHARMAN, J. C. 2010. Shopping for Anonymous Shell Companies: An Audit Study of Anonymity and Crime in the International Financial System. *The Journal of Economic Perspectives*, 24(4): p.127.

SKUHROVEC, J. 2017. Three essays on public procurement. Three essays on public procurement / Jiří Skuhrovec ; supervisor Karel Janda ; opponents Michal Mejstřík, István János Tòth, Lawrence King.

WILCOXON, F. 1945. Individual comparisons by ranking methods. *Biometrics Bulletin*. (1) 6: p. 80.

Chapter 1

Introduction

So called anonymous companies (joint stock companies issuing physical bearer shares) have been linked to inefficiencies and possible corruption in research concerning Czech public procurement. Anonymous companies participating in public procurement were specifically found to be more profitable, to be connected to lower tender-related savings (Chvalkovská *et al.* 2012) and to be abnormally likely to win tenders just below the regulatory threshold for simplified tender procedures (Palguta & Pertold 2017). In reaction to recommendations of both domestic and international bodies, anonymous shares were abolished in the Czech Republic in 2014.

This master's thesis aims to follow up on the above research by looking at the performance of formerly anonymous companies in public procurement. Specifically, it asks whether the share of formerly anonymous companies on the total volume of public procurement dropped after their transition, whether their profitability dropped and if they can still be linked to abnormally low tender-specific savings. This is a slight departure from the hypotheses formulated in the proposal to this thesis. The new hypothesis on savings is merely another extension on the previous research in this area, though. The idea behind the third hypothesis in the proposal (that concerned profits of companies using other forms of anonymization) was meant as a further inquiry into ways of concealing company ownership. It was eventually omitted because it compromised the thematic coherence of the thesis as a whole.

To test the above hypotheses, a sample of anonymous companies was selected and paired with joint stock companies with a more transparent structure, that were active in the same industry and of roughly similar size. The populations of anonymous companies and their comparators were then tested for

significant differences in the distribution of share on total procurement volume and of their normalized performance indicators. In case of the third hypothesis, normalized savings of individual tenders awarded to companies in the data set were regressed on a number of covariates.

Based on the results presented in this thesis, no significant supportive evidence was found for a drop in the volume of tenders awarded to formerly anonymous companies. As a matter of fact, aggregate data show that the combined share of anonymous and formerly anonymous companies on the total volume of public procurement stays more or less on the same levels. Despite this result, there is a certain decrease in the performance indicators of formerly anonymous companies and, most importantly, anonymous companies are confirmed to have a negative impact on tender-specific savings while no such negative relationship is found in the case of formerly anonymous companies.

These findings show that abolishing anonymous shares and related transparency measures in rules on public procurement procedure seem to have had a beneficial effect on the system's overall efficiency. As for the fact that no significant effect on volume of awarded tenders, it is proposed that this is caused by the ubiquity of this legal structure at the beginning of the last decade (i.e. a large share of companies was likely not using this structure with ill intent). Furthermore, the results could be explained by the fact that most corruption did not happen through "shells" that would be set up as a mere cover up, but via otherwise well-established businesses. The results of this thesis serve as a natural extension of the previous research on anonymous companies in public procurement by explaining what happened to the same companies after they ceased to be anonymous.

The thesis consists of six parts, including this Introduction. Chapter 2 presents a theoretical discussion of company anonymity, its relation to performance and procurement efficiency, and Chapter 3 describes the data used in this thesis and elaborates on some of its basic tendencies. Chapter 4 then explains the methodology used in this thesis and the achieved results. Finally, Chapter 5 puts the results into a broader context, suggests their possible interpretation, and proposes how they may inform future policy. Chapter 6 summarizes the thesis.

Chapter 2

Theoretical Background

In this chapter, the context and underlying theory of this work will be explained. The Chapter consists of three parts. First, a brief outline of the Czech regulation of transparency of both (1) the ownership of joint stock companies (*akciová společnost*) before and after the abolishment of physical bearer shares and (2) public procurement as such is presented. Second, the question of ownership transparency vis à vis firm efficiency is analyzed in the light of corporate governance literature. Finally, the chapter ends by a review of literature on the issue of efficiency in the area of public procurement and mentions empirical links between hints of possible corruption and anonymous companies hinted by previous literature.

2.1 Legal Background

The first subsection discusses the transparency of ownership structures of joint stock companies issuing various kinds of shares under the “old” and currently effective regulation. The second subsection briefly outlines the regulation of transparency of Czech public procurement as such.

2.1.1 Transparency of Joint Stock Companies

The change in the Czech legal order that is central to this work came along largely hand in hand with the so called *recodification* of Czech private law. It was a set of sweeping changes to Czech private law, represented mainly by two new Acts of Parliament: the Act No. 89/2012 Coll., Civil Code (CC), repealing the old and many times revised civil code from 1964, and the Act No. 90/2012 Coll., Business Corporations Act (BCA), setting up basic rules for companies

and replacing the Commercial Code adopted shortly after the Czech Velvet Revolution in 1991. Both codes are legally effective since 2014.

The relevant changes introduced during the recodification largely revolve about rules on shares. The concept of a share (*akcie*) is one of the key notions necessary to explain the notion of an anonymous company. In the Czech legal tradition, a share's function is threefold (Černá 2006, p. 110). It is (1) a part of a company's capital, (2) the conglomerate of the shareholder rights stemming from their membership in the company and (3) a security. The last two considerations are especially important, as will become clear bellow.

Both before and after 1 January 2014, there were two forms of shares. As follows from Section 156 Subsection 1 of the repealed Act No. 513/1991 Coll., Commercial Code (CoC), shares can be issued either as registered shares (*akcie na jméno*) or bearer shares (*akcie na majitele*). The same is stipulated in Section 264 Subsection 1 of the BCA, effective since 1 January 2014. Moreover, shares can both be physical and immaterial. This generally held before the recodification (Černá 2006, p. 127) as well as after it, as follows from Section 256 Subsection 1 of the BCA.¹

What is the relevant difference between registered shares and bearer shares? It relies partly on the different methods of ownership transfer. In the case of registered shares, the rights stemming from them could be invoked only by persons registered in the list of shareholders of the given company pursuant to Section 156 Subsection 3 of the CoC. One was able to prove that the list of shareholders did not correspond with reality but even then their rights were limited. Moreover, the transfer of ownership of a registered share was legally effective towards the company only if the change in ownership was recorded in the list of shareholders, as stipulated in Section 156 Subsection 6 of the CoC. Thus, a legally relevant form of ownership of a registered share was largely linked to the fact that one was registered. This holds similarly under the currently effective regulation, as can be seen from Section 264 Subsection 1 of the BCA read in conjunction with Section 265 Subsection 3 of the BCA.

On contrary, bearer shares had to be fully transferable and the rights stemming from physical bearer shares could be exercised by anybody who presented them to the company following Section 156 Subsection 7 of the CoC. This means there was no straightforward way to verify the true owner of a given share in

¹The applicable law should be read in the light of the terminological shift linked to the introduction of the CC, according to which only securities in physical form are called securities.

this particular form at any particular time. Hence the term *anonymous shares*. As expressed e.g. by Jarmila Pokorná in her commentary to Section 156 of the CoC, bearer shares make their owners anonymous to the company, see Pokorná *et al.* (2009). If the bearer share is issued in physical form, the identity of its owner can in fact remain concealed to anybody. Note that the same does not immediately hold for bearer shares that are immaterial or immobilized (the latter term refers to shares held by a third person who keeps record of the security's ownership and its transfers). The owner of immaterial shares is registered at the Czech Central Depository of Securities while the ownership of immobilized shares is kept track of by their holder.

In order to shift the regulation of bearer shares towards higher transparency of the ownership structure of joint stock companies, there have been two major legislative changes going in the same general direction: one being the recodification of Czech private law itself and the other one being an amendment to the CoC. The latter was the relatively short Act No. 134/2013 Coll., on measures to increase transparency of joint stock companies and amending other Acts (Transparency Act). Its Section 2 stipulates that all physical bearer shares are *ex lege* transformed into registered shares, effective since 1 January 2014. The companies in question were obliged to amend their statutes accordingly on 30 June 2014 at latest. The legal consequence of a shareholder failing to present the share to the company before 30 June 2014 (to make the necessary changes of the share as such or exchange it for a new one) is their inability to exercise rights stemming from the share in question pursuant to Section 3 Subsection 1 of the Transparency Act and an inability to assume rights to dividends during the period of delay. Moreover, the Transparency Act amended Section 155 Subsection 2 of the CoC to read that a joint stock company could issue bearer shares only as an immaterial security or as an immobilized share, effective as of 30 June 2013.

The former Act was the BCA, a part of the recodification package. Its content is effectively the same as the abovementioned amendment to the CoC. The difference is that the BCA is forward-looking, attempting to regulate affairs in the future rather than fix the current issues. Section 263 Subsection 2 of the BCA thus simply stipulates that bearer shares can be issued only as immaterial securities or be immobilized, effective since 1 January 2014.

Lastly, a terminological note concerning anonymous shares and companies is warranted. Some authors, like Skuhrovec (2016), refer to companies being anonymous even after 1 January 2014. This clearly does not correspond with

the legal state of affairs. What the authors describe is the factual situation: the companies in question did not comply with their statutory duties connected to the change of the form of the shares. This might mean a simple failure to amend the company statutes or, in the worst case scenario, no reaction whatsoever. From this point further, the notion of anonymous companies will be used in the broader “factual” sense, unless expressly provided otherwise.

2.1.2 Transparency of Czech Public Procurement

Public procurement in European Union (EU) Member States is heavily regulated by EU Directives,² at least as far as concerns the procurement contracts exceeding a certain volume. They lay down the basic rules concerning the types of procedures and their general architecture. The Directives were transposed into Czech national law by the Act No. 134/2016 Coll., Procurement Procedures Act (PPA), which replaced the older Act No. 137/2006 Coll., Public Procurement Act (OPPA). There are certain rules that go beyond the general level of transparency required by EU law and are relatively interesting for the purposes of this master’s thesis. The first one concerns the requirement for economic operators to provide beneficial ownership information and the other one concerns the formal requirements concerning the shares of the companies involved in public procurement.

Information on Beneficial Ownership

There is one remarkable thing to note concerning the rules governing Czech public procurement. According to Section 122 Subsections 4 and 5 of the PPA, it is the duty of the contracting authority (*zadavatel*) to obtain information about the beneficial owner (*skutečný majitel*) of the company that was selected for award of the tender. This is a rule that came into effect in November 2016 and it departs from the requirements on the level of EU law.

The notion of a beneficial owner as such is a term defined on the level of EU law. It is any natural person or persons who ultimately own or control the company in question and/or the natural person(s) on whose behalf a transaction or activity is being conducted, to paraphrase Article 3(6) of the EU 4th Anti Money Laundering (AML) Directive.³

²See e.g. Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, OJ L 94, 28.3.2014, pp. 65 through 242.

³Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015

The notion of beneficial ownership existed in EU law one form or another at least since 1998, drawing from the commentary by Hinnekens (2000). Pursuant to the AML Directive, a list of beneficial owners has to be held in a register on the Member States's national level according to Article 30(3) of the quoted AML Directive since mid 2017.⁴

The EU public procurement rules do not mention beneficial ownership of economic operators (*dodavatelé*) in no meaningful way, though. Coming into effect in November 2016, it even predated the legal requirement for the Member States to establish registers of beneficial ownership. The Czech legislator used this opportunity to require beneficial ownership information from companies in public tenders, going beyond what was required by EU law in this respect, as explained by a commentary to Section 122 of the PPA by Dvořák *et al.* (2017). This led to a general requirement for Czech contracting authorities to require information concerning beneficial ownership of the economic operators on their own. Once the Czech version of the beneficial ownership register (*evidence skutečných majitelů*) was introduced, the economic operators would be further merely required to consult the register and resort to requiring the information directly in case the necessary information is not available from the register.

There is an interesting discussion to be had on the topic of possible usefulness of beneficial ownership information retrieved by Czech courts running the beneficial ownership register *vis à vis* the beneficial ownership information drawn by contracting authorities directly. Such a discussion would go beyond the topic of this thesis, though. Irregardless, a simple conclusion can be drawn: departing roughly from 2017, the transparency of public procurement may be influenced by the fact that the beneficial ownership information is required.

The Formal Requirements Concerning Economic Operators's Shares

After 1 January 2014, an additional requirement concerning the type of shares of an economic operator has been introduced. As mentioned above, shares can

on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) No 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC, OJ L 141, 5.6.2015, pp. 73 through 117. This Directive was recently updated by Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU, OJ L 156, 19.6.2018, pp. 43-74.

⁴Member States were to transpose the AML Directive by 26 June 2017 pursuant to its Article 67(1).

not only take form of bearer shares and registered shares, they may also take physical and immaterial form. Since November 2016, Section 48 Subsections 7 and 9 of the PPA read in conjunction *de facto* require the contracting authorities to disqualify most Czech joint stock companies which have issued at least part of their shares in material form from procurement proceedings. This reading is confirmed e.g. by expert commentary to the PPA Dvořák *et al.* (2017). This fact is important. As was discussed above, the *de iure* abolishing of anonymous shares does not necessarily have to coincide with the necessary steps to establish transparency in the ownership structure. After November 2016, no anonymous companies (e.g. companies hiding their ownership structure through the type of shares used) should be allowed to win public contracts (with several exceptions allowed for by the transition provisions of the PPA).

Notably, this is not the first time anonymous companies have been barred from public procurement. Act No. 179/2010 Coll. brought an amendment to the OPPA that, among other things, effectively only allowed joint stock companies that have exclusively issued registered shares to participate in procurement procedures. This interpretation is confirmed by the commentary authored by (Jurčík 2011, p. 296). Anonymous companies were excluded from procurement proceedings that began after 15 September 2010. This rule was subjected to critique by some practitioners based on its unclear wording—see e.g. Mlíčko (2011)—and has been swiftly amended by Act No. 423/2010 Coll. According to this Act (effective for proceedings that began on 7 December 2010 or later), anonymous companies were once again allowed to participate in procurement proceedings. This being said, joint stock companies were further subject to rules resembling a weaker alternative to present information on their beneficial ownership. They were (as any other economic operator that happened to be a legal person) required to present a list of all natural persons that have worked for them as members of their executive body (*statutární orgán*) during the last three years and (joint stock companies specifically) a up-to-date list of all shareholders holding a share in the company exceeding 10 %.

This is but to show that the efforts to increase transparency of public procurement in the Czech Republic are continuous and multifaceted. More time will probably provide better data to estimate the effect of the requirement on beneficial ownership information from economic operators, although a proper test of such an effect would likely require a degree of sophistication because of the gradual nature of the development of the pertinent rules. This is only to make abundantly clear that the removal of the possibility to issue physical

bearer shares is one step on the path of a concentrated effort to eradicate inefficiencies and corruption in public spending. Thus, rather than judging whether it was a complete success or complete failure, it is more prudent to ask whether it is a step in the right direction.

2.2 Transparency and Performance

As noted by Chvalková *et al.* (2012), the body of corporate governance literature on the relationship between transparency of the companies's ownership structure and their economic performance does not always provide straightforward conclusions on this topic. Nevertheless, it seems to allow for a formulation of a tradeoff underlying the relation between company transparency and performance and some of its basic parameters. Thus, the starting point for a discussion may be that transparency of corporate ownership as such is not a black and white problem. The corporate governance guidelines published by G20/OECD (2015) have an entire chapter dealing with disclosure and transparency but they also do mention that absolute disclosure and/or transparency is not the ultimate goal. Departing from a certain point, the degree of disclosure might negatively affect the company's legitimate ability to protect its own trade secrets and know-how. Moreover, a high degree of disclosure might simply come hand-in-hand with high administrative costs linked to this exercise, at least hypothetically being able to lead to a point where the overall social cost of disclosure outweighs possible benefits.

When discussing physical shares as such, there is also a specifically Czech problem that should be added to the equation. While immaterial shares were a relatively common and widespread phenomenon observable in relation to the so-called coupon privatization of companies after the Velvet Revolution, there was an observable shift from immaterial shares to shares in physical form. This was by no means caused exclusively by an intent to cover up the ownership structure of the corporations. The Czech rules on immaterial shares were rather formalistic and linked to higher transaction costs, thus incentivizing many companies to shift to shares in physical form Vondráček (2012).

All this being said, intergovernmental organizations active in the field of taxation and/or money laundering do either recommend to fully abolish physical bearer shares or at least introduce ways to keep them under control using e.g. immobilization, as described above. This in fact follows from the updated 2019 version of the Financial Action Task Force (FATF) Recommendations along

other proposed measures such as legal treatment of nominee shareholders and directors etc. (FATF 2019). This is far from insignificant, as these recommendations serve as a basis for mutual evaluation on the level of the Council of Europe with the MONEYVAL group⁵ and as a source material for EU legislation in the area.⁶ Thus, at least on the level of the international community, unregulated bearer shares in physical form seem to be harmful enough to be banned. Below, I suggest an economic rationale for this ban and discuss some possible limitations to such a decision.

2.2.1 General Observations

The body of literature on corporate transparency is far from insignificant in terms of its volume, a discussion on this topic therefore deserves a degree of structuring. Corporate transparency issues are, first of all, a world-scale phenomenon, not merely related to a few “tax havens.” Sharman (2010) shows the ease with which an anonymous shell company can be incorporated even in quite “reputable” jurisdictions. This can certainly be seen as supportive evidence for a more general call for a holistic approach to treatment of transparency in corporate governance world wide, as advocated by Millar *et al.* (2005). Perhaps more importantly, though, the question of a striking the correct balance of transparency cannot be brushed away as merely a problem of a limited number of jurisdictions located on removed islands. Where justified, an effort to increase corporate ownership transparency will be relevant in a number of jurisdictions.

The second relevant question is the overall societal economic impact of impaired corporate transparency as a justification for the efforts tackling it. The answer to this question is multifaceted. The question of corporate transparency is discussed at least in relation to taxation, AML and rent-seeking behavior.

Policymakers see a possible lack of corporate transparency as a problem to be addressed for the purposes of enhancing the efficiency of tax collection systems, among other things. The concern of governments about the link between tax avoidance and non-transparency and/or opacity of corporate ownership structures is one of the problems identified and validated by some academics, see e.g. the contribution of Zucman (2014). For a more concrete example of

⁵A relatively recent evaluation of multiple facets of the Czech system of anti-money laundering legislation and practice is available online at the following URL: <https://rm.coe.int/czech-republic-5th-round-mer/168094b621>.

⁶See e.g. recital 3 of the AML Directive No. 2015/849 cited above.

results backing up the link between company transparency and aggressive tax planning, the work by Balakrishnan *et al.* (2019) serves as an example. The authors studied the relation between a measure of aggressive tax planning in relation to corporate disclosure on a sample of about 27 thousand year-firm observations spanning between 1990 and 2013. The measure of aggressive tax planning constructed by the authors identifies abnormalities in the firm's effective tax rate compared to its peers in the same industry and of about the same size. In this setting, Balakrishnan *et al.* (2019) suggest that companies face a trade-off between tax benefits and financial transparency.

In the vein of promoting transparency in relation to taxation, there are noteworthy efforts on part of the Organisation for Economic Co-operation and Development (OECD). As documented by Eccleston & Woodward (2014), the OECD has exerted efforts in the area of tackling tax avoidance (*inter alia* in relation to transparency) at least since the last two decades of the twentieth century. Some examples of these efforts can be seen from OECD (2010) or from OECD (2018). (OECD 2018, p. 38) explicitly speaks about offshore tax evasion schemes facilitated by incorporation of shell companies issuing bearer shares.

Furthermore, a push for increased corporate transparency is an important part of the discourse in the area of AML. Some of the above-cited materials issued by the FATF call for collection and storage of beneficial ownership information for this very reason. The efficacy of the individual measures may certainly vary. For an example in the area of mandatory beneficial ownership identification, a bank providing service to a client will face different incentives than a company that has to self-report information on its beneficial ownership for a public register—as currently required by EU AML rules described above. On an intuitive level though, it truly seems that linking a company or a legal arrangement (a trust, for example) to a real person that can control it or benefit from it can dissuade exploitation of the company for money laundering purposes. A hidden or opaque ownership structure can at least serve as an additional buffer between the “dirty” money entering the corporate vehicle and the person standing behind the transaction (Meunier 2018).

Lastly, corporate transparency can help identifying conflicts of interest leading to rent-seeking behavior. Interestingly, rules attempting to prevent this form of exploiting the system may partly rely on the above systems established to tackle AML issues. For example, Section 44 of the PPA requires the contracting authorities to avoid conflict of interest. Scenarios involving conflict of

interest (e.g. a person deciding on the winner of a tender holding a share in one of the bidding companies) may clearly lead to rent-seeking behavior that lowers the system's overall efficiency. One of the PPA's tools designed to discover possible conflicts of interest is the contracting authority's obligation to collect information on the bidder's beneficial ownership. The goal of this rule differs from the original purpose of the AML regulatory framework, though. Rather than protecting the integrity of the financial market, this rule aims at preventing situations involving conflicts of interest, see Derková *et al.* (2017) for a brief discussion concerning the purpose of the discussed provision in the context of public procurement.

Therefore, while the rules on corporate transparency might follow different goals and overlap in certain instances, it is useful to discuss them in relation to the specific goal they are supposed to follow. In relation to public procurement data which are analyzed in this master's thesis, the effect of transparency on rent seeking behavior is the most relevant. A basic motivation of actors to conceal the ownership structure of bidders in public procurement seems to be clear from the discussion above. This is not sufficient, though. For the sake of completeness, a more detailed inquiry into the relationship between corporate transparency and economic efficiency is presented in the following subsection. Should there be no or even a negative link between transparency and efficiency, there would be no plausible explanation for ownership concealment and one would have to look at other motives.

2.2.2 The Relation Between Transparency and Company Efficiency

If one asks about the relationship between transparency and efficiency on the level of individual companies, the question of ownership transparency is not that often discussed as an isolated topic. Thus, a caveat has to be raised regarding the literature on corporate transparency: it often speaks solely of—or at least includes—financial transparency (which usually seems to aim at the question of timely and reliable financial reporting). Transparency of the ownership structure and the related attempts to deal with its concealment and/or opacity are usually considered a subset of so-called governance transparency Habib (2008). Some authors do not make this distinction clear right away. Therefore, a certain degree of caution is in place.

Keeping this in mind, there is a strand of literature hinting that higher cor-

porate transparency may be linked to better firm performance. The literature on the topic varies in the degree of specificity. A broad and general survey has been conducted by Bushman *et al.* (2004) who ran a cross-country regression on a sample of 46 countries to estimate the effect of country specific variables (like the type and efficiency of the legal system or risk of expropriation) on a governance transparency indicator. Their conclusion is that higher governance transparency is positively correlated with a more efficient judicial system. The authors of the paper further find that a higher degree of governance transparency should also be linked to higher levels of their investor protection indicators while raising caution about the interpretation of this latter result—companies are known to cross-list in countries with higher investor protection standards to protect minority shareholders (Reese Jr & Weisbach 2002). One way or another, the above results pertain more to higher transparency linked to efficiency of the system rather than to the micro-level performance of individual companies.

A more micro-level approach can be found in the works of Chi (2009) and Kim *et al.* (2013). Li-Chiu Chi runs a back-propagation neural network algorithm to estimate Tobin's Q ratio (a ratio between the company's market value and the replacement value of its assets, see the work of Lindenberg & Ross (1981) for a theoretical introduction) as a performance metric using lagged outcomes of an officially issued generalized transparency ranking and other company-level determinants on a set of Taiwanese companies. Chi comes to the conclusion that better disclosure is linked to better firm performance. Such a finding does seem to make sense at least on an intuitive level. A lack of transparency in the ownership structure of a company should e.g. negatively influence cost of capital. As claimed by Demsetz & Lehn (1985), among others, the ownership structure is far from irrelevant regarding the company's performance. Uncertainty regarding this indicator on part of lenders thus should lead to an increased cost of lending.

The finding that governance transparency positively affects various indicators of company performance is not universal, though. Kim *et al.* (2013) run an FGLS panel regression on a sample of 162 Korean venture firms over four years to estimate performance on a one year lag of explanatory variables including various indices of corporate transparency. They come to the conclusion that while governance transparency is linked with higher company value, its return on assets (ROA) is actually negatively correlated with it. They explain this phenomenon by higher costs linked to a high standard of governance transparency.

It should be noted, though, that the companies studied in the last survey were all listed on KOSDAQ Exchange, a Korean stock market. This likely implies a fairly high standard of transparency and oversight to begin with.

For a description relevant for the behavior of Czech companies, the study conducted by Berglöf & Pajuste (2005) on empirical data from the Central and East European (CEE) region seems to be useful. It must be noted that this paper does not distinguish between financial and governance transparency. The authors studied 370 non-financial companies quoted on CEE stock exchanges including the Czech Republic. They devised a measure of transparency that combines governance and financial transparency by inquiring about the general level of disclosure (1) on the company's website and (2) in the company's annual reports. The measure takes form of an index inquiring e.g. about online access to the latest annual report, availability of board member names, dedicated information on corporate governance or the company's ownership structure. Using this measure, the authors find a significant and negative relationship between transparency and company performance (expressed as ROA, market to book ratio and growth of sales). They explain the observed phenomenon by suggesting that CEE companies do not (did not) understand better disclosure as a mechanism to decrease cost of capital in general by attracting investors. Rather, better performing firms tend to disclose more for the simple fact that they do not need to worry about worsening their reputation among investors because of revealing a problem. This obviously holds for financial transparency.

The results presented by Berglöf & Pajuste (2005) were further used by Skuhrovec (2017), who pointed out that if there was any economic impact to be inferred from a lack of transparency in ownership structure *in general*, it would be the less transparent being worse-off on average—unlike the results of his research of a sample of winners of public tenders in the Czech Republic (Skuhrovec 2017, p. 27). The takeaway thus is that well performing firms do not seem to have a reason to disclose less than the worse performers, at least *ceteris paribus*, that is.

This finding can of course be contrasted with the results of Kim *et al.* (2013), where a negative correlation between governance transparency and performance has been identified. Both the results presented by Kim *et al.* (2013) and Berglöf & Pajuste (2005) concern companies quoted on the stock market, i.e. likely being submitted to more stringent transparency requirements. It would be audacious to make broad conclusions from a comparison of two analyses conducted on two very different samples coming from a different time period. It might be

the case that the administrative costs linked to the transparency of companies quoted on the stock market in fact may reach levels where the economic effect of transparency becomes ambiguous. If this is just an exception from a general trend (as other quoted studies would suggest), a general threshold of possible negative influence of increased governance transparency could be mainly an issue for companies quoted on the stock exchange. As most Czech joint stock companies are not quoted on the stock exchange, this possible ambiguity does not seem to undermine the general finding in the previous paragraph. At least not for the purposes of this master's thesis.

2.3 Efficiency of Public Procurement

The question of improving the efficiency of public procurement is an ever lasting one. It is directly related to the sensitive issue of efficient spending of public funds and, as remarked by Saussier & Tirole (2015) in relation to French public procurement, often criticized as not being efficient enough. At the same time, it is far from being insignificant in terms of impact. Ochrana & Pavel (2013) have pointed out that the bulk of public procurement accounts for 14 – 16% of the Czech Gross Domestic Product (GDP) based on data provided by the Czech Ministry of Regional Development. Similarly, the European Commission has estimated the related indicator of total general government expenditures on works, goods and services to represent 13.1% of the EU's GDP in 2015 (with the rate of published tenders oscillating around 3% of the GDP).⁷ Moreover, the importance of public procurement relative to the rest of the economy can be expected to increase in the next few months and years in relation to the economic decline anticipated in mid 2020 combined with new governmental programs intended to tackle it.⁸

When talking about the relevant research and its conclusions and propositions in this field, the notion of public procurement systems will be used in line with Trybus (2005). As a concept, it is a broader notion than the mere legal framework as such. Above that, it also encompasses *inter alia* the institutional background, expertise, the pool of relevant suppliers, etc. This, of course, does not change the selection of data on public procurement—that is collected by

⁷The report is available at <https://ec.europa.eu/docsroom/documents/20679>.

⁸For example, the EU is deliberating on a new EUR 750 billion recovery plan at the time when the manuscript of this master's thesis has been finished. See <https://ec.europa.eu/info/sites/info/files/communication-europe-moment-repair-prepare-next-generation.pdf>.

the government based on fixed legal criteria. Nevertheless, it illustrates that a broader scope of factors comes into play. This is better to be kept in mind for a proper discussion about the system of public procurement as a whole.

There are many angles from which efficiency of public procurement can be discussed. As listed by Ochrana & Pavel (2013), some of the areas of research are the question of transaction costs related to tenders, the effect of transparency in public procurement, the question of quality of the services provided or ownership effects. In their cited work, František Ochrana and Jan Pavel undertake to analyze *inter alia* the transparency and efficiency (or rather an “*effective administrative award procedure*”) a limited sample of about 170 public contracts awarded on the Czech regional level (*kraje* or *vyšší územně samosprávné celky*—to include both regions and Prague as a capital city with a special “region-like” status) using mainly contingency tables and conditional means to conclude that the price criterion seems to be dominant in the evaluation of tenders, but the tender prices for which are contracts are officially awarded do not seem to “undershoot” the actual price paid by a large margin. This leads to a positive result that there seems to be no apparent waste of public money concealed by inflating costs of already awarded contracts. This being said, the analysis above uses aggregated results of procurement procedures from the viewpoint of the contracting authority, it cannot benefit of insights into specific kinds of competing firms.

Similarly, Sičáková-Beblová & Pavel (2008) deal with the issue of public procurement transparency in the Czech Republic and Slovakia via transparency indices based on aggregated publicly available data. Their Czech sample stretches between the years 2001 through 2006 and shows a slight and steady increase in transparency (based on the procedure applied) after a short and sudden drop linked to a substantial change in legislation linked to the Czech accession to the European Union, which was accompanied by large-scale adoption of EU procurement rules. A more global approach is also taken by Chvalková & Skuhrovec (2010), who construct a weighted transparency index that compares the behavior of a contracting authority against OECD best practices.

Man *et al.* (2014) take a more “micro” approach by analyzing a sample of 197 procurement procedures in order to describe the difference between the estimated value of the public contract the actual tender price as the dependent variable (“savings”, so to say), and the type of procedure (open or restricted), number of offers in the procedure and the estimated value of the procedure. Using this very simple regression model, the authors come to the conclusion

that an open procedure and a higher number of competitors lead to a bigger difference between the estimated and actual tender price. This seems to be quite an intuitive finding in line with the conventional idea that “more competition” will lead to higher efficiency. If the officials of the contracting authority will use same methods in different proceedings, the more competitive proceedings should indeed prove to have a higher relative gap between the estimated and actual tender price.

One thing should be noted, here. In the vein of research focusing on tender-related savings, it seems to be standard practice to standardize the savings in one way or another, though. This is done e.g. by Nikolovová *et al.* (2012) or Pavel (2009). The details of the standardization methods are explained and discussed in Chapter 4 because they are directly linked to the methodology applied in this thesis.

Departing from transparency alone, though, it must be noted that some of the aspects of public procurement mentioned above may in fact stand in a trade off to one another. More elaborate rules on ensuring the transparency or, say, better *a posteriori* review of the decisions made in course of the procurement proceedings seem to require more effort and costs incurred both on part of the public body running the proceedings and the competitors, when compared to contracts entered by private individuals. Thus, more transparency rules may bring along higher transaction costs to the system. In this vein, Gelderman *et al.* (2006) cites some older research suggesting that public procurement can bare considerable transaction costs that could even outweigh the efficiency benefits of the transaction itself in some scenarios. Of course, transparency itself strives to enhance efficiency. Finding the balance between transparency and cost minimization is not a question of principle but a question of degree. For example, Man *et al.* (2014) underline, at least theoretically, the importance of transaction costs related to the procurement process in the Czech Republic. Unfortunately, while raising the important question of transaction costs in public procurement, the authors do not explain how their research bares on them. The issue of transaction costs is further addressed by Pavel (2014) (as quoted by Ochrana & Hrnčířová (2015)), who estimate their magnitude to be rather limited—about 1.6 % of the contract price.

The notion of the tradeoff between transaction costs and transparency has also been discussed by Palguta & Pertold (2017) who seem to indicate that the balance of the trade-off might vary based on the institutional background of individual countries. Based on Czech data on public procurement between years

2005 and 2010, they use a regression discontinuity design to test for possible manipulation of procurement values to be able to use a simpler procedure. They come to the conclusion that this indeed seems to be the case in some areas. They further conclude that anonymous companies in the Czech Republic were three times more likely to win tenders that fall below the threshold allowing for a simplified procedure under Czech law. Taken together, these findings can be explained by rent-seeking behavior of the bidders and contracting authorities, the cost of which might outweigh the cost of specific precautionary measures taken to prevent it. Other evidence for rent-seeking in public procurement was presented by Titl & Geys (2019), who ran a fixed effects regression on data on public procurement and political donation between 2007 and 2014 to estimate procurement value per company and year by the amount of donations to political parties and other control variables in their baseline specification. They conclude that donations to a party that gains power is linked to an increase in the public procurement contracts awarded to the company.

Furthermore, Chvalková *et al.* (2012) also analyze firm-specific data to come to the conclusion that anonymous companies seem to disproportionately benefit from Czech public procurement, as indicated above. They have done this by (1) analyzing data on performance indicators of 50 anonymous companies that have been awarded tenders worth more than CZK 100 Million between years 2005 and 2009 with a randomly selected group of transparent tender winners with similar characteristics and of equal size, and (2) on the number of bids and difference between the expected and actual tender price on a sample of about 32 thousand tenders awarded between 2007 and 2011. They proceed to compare both the standardized performance indicators and general information on tenders using the Mann-Whitney U-test. This test can be used to ascertain whether one of two random variables is stochastically larger than the other one when the regular t-test cannot be used because the assumptions of normality is not fulfilled (Mann & Whitney 1947). The authors come to the conclusion that the difference between the return on equity of anonymously owned companies is significantly higher on the 5 % significance level. Furthermore, anonymously owned companies did consistently win in procurement proceedings with a lower number of bidders and lower savings in terms of final price being lower than the expected price.

With respect to the tradeoff between transparency and transaction costs in Czech public procurement, there appears to be quite solid evidence of rent-seeking behavior in Czech public procurement to be found in the available

data. The vein of available literature proving this, for example the already discussed work of Chvalkovská *et al.* (2012), is quite clear in its implications. The work of Palguta & Pertold (2017) mentioned above comes to a similar conclusion. Unable to quantify total welfare losses of this trend because of data limitations, the authors claim that below-threshold contracts awarded to anonymous companies are linked to higher contract costs. This finding combines the aspect of reduced traceability of the true owners in question and the higher degree of discretion on part of the administrative body awarding the contract. The second of the criteria is a chapter of its own. The authors of these studies themselves admit that their access to data is limited.

Admittedly, the studies taking a more “macro” approach (like the work of Sičáková-Beblavá & Pavel (2008)) seem to be more optimistic in their results. These often seem to be dependent on the regulatory background that seems to be pushed to more transparency over time. This does not diminish the good news delivered by some of these results. Nonetheless, one has to ask if this shift seen in some of these studies means eradication of inefficient behavior or rather a mere shift of rent-seeking to other channels. Works on donations to political parties as the one carried out by Titl & Geys (2019) are invaluable in this respect.

This master’s thesis is in part a backward-looking analysis, assessing the effects of certain policy changes taken some years ago. It also relevant for future policy, however. The current rules on procurement transparency will be continually updated just like any other law. These changes should be informed by empirical evidence. Taking a “micro” approach that looks at individual contracts allows this work to attempt to pinpoint certain developments to more specific phenomena. A lack of all the relevant explanatory variables is certainly an issue even in the case of research concerning contract-specific data. Nevertheless, I believe that this does not trump its ability to look at some of the more concrete company-specific traits, such as their governance transparency or links to political parties. In the light of the many possible ways to exploit the system, even a broad-stroked approach that e.g. compares the data on normalized returns of companies—as done by Chvalkovská *et al.* (2012)—might be warranted to identify a discrepancy.

To conclude this theoretical part of the work, it has to be noted that, at least in relation to the abolition of anonymous bearer shares, the tradeoff between transparency and costs does not seem to be much of an issue. Except for the one-off costs born by companies with anonymous shares that were supposed

to convert them, there do not seem to be any additional transaction costs born either by the contracting authorities or by the bidders. Any increase in efficiency linked to the abolishing of anonymous shares would not seem at a significant societal cost.

It has to be noted that the same cannot be said by the later requirements to only award contracts to joint stock companies that have stocks in immaterial form (which is claimed to come at higher transaction costs in the Czech Republic) or the requirement of contracting authorities to retrieve information concerning the beneficial owners of the bidders. In relation to these two phenomena, the analysis below can only speak of the immediate effect of these measures on variables like contract-specific savings. This master's thesis cannot, on the other hand, provide a definitive answer on the broader societal costs linked to the introduction of these two measures.

Chapter 3

The Data Used and its Basic Characteristics

Here, the basic properties of the data sets used are discussed. Two main data sets were used in this master's thesis: data on anonymous companies scraped from the Commercial Register and data on public contracts scraped from the Czech Public Procurement Bulletin kindly provided by Jiří Skuhrovec and the company Datlab s.r.o. Some additional company specific information was further drawn from the *MagnusWeb* database ran by Bisnode Česká republika, a.s., to obtain data on their profits, total assets etc.

The two main data sets both consist of information that was either manually copied from official sources (as concerns the anonymous companies) or manually filled into a standardized form in case of the data on public procurement. This leads to a certain number of typos and inaccuracies in both data sets that cannot be readily identified. Fortunately, this is likely not a source of any systematic error. Where problematic entries can be easily identified and treated, this fact is mentioned below.

3.1 Information on Anonymous Companies

The basis of this work is formed around a data set of 19 728 companies that used to be, or still are, held anonymously. It is a comprehensive list of all Czech joint stock companies that ever held physical bearer shares. This data set was provided by courtesy of the company Datlab s.r.o. The basic data set contains the company's unique identification number (*identifikační číslo osoby* - *IČO*), the day it began to be anonymously held and the day it ceased to

be anonymously held (if ever). This allows to precisely identify whether the company was anonymously held at the moment it was awarded a tender. Some of the companies in question ceased to be based on physical bearer shares in the early nineties, some of them have done so quite recently, if ever.

3.1.1 General Overview

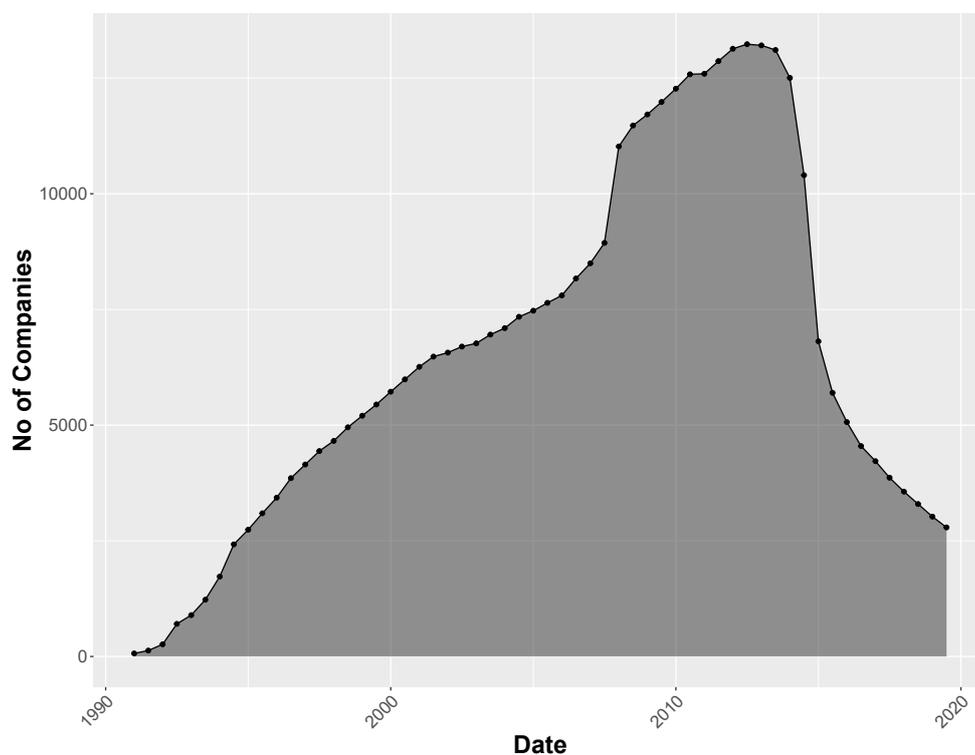
Out of the 19 728 anonymous companies, most have already ceased to be held anonymously or ceased to exist. On 10 July 2019 (the last moment when one of the companies ceased to be held anonymously), there was a total of 2 785 companies that have not updated their statutes according to the new rules and remained to be held anonymously. In other words, about 14% of the previously anonymous companies are held anonymously to this day.

Thus, the average “lifespan” (time spent being held anonymously) of the entire sample of companies is slightly more than 3 495 days, or about 9.5 years. The sample can be split into two subsets - companies that have ceased to be held anonymously and those who were not. The average lifespan of the currently anonymous companies is almost 14.5 years, as opposed to 8.8 years in the other group. It can be assumed that the longer lifespan of currently anonymous companies is longer because this part of the sample contains more “dead shells”: companies that have been abandoned, ceased to function, but their shareholders never bothered to formally take the proper steps to terminate the company, liquidate its property and have it struck from the Commercial Register.

One last thing that may be interesting about the sample of anonymous companies alone is the question when, if ever, they ceased to be anonymous. According to the Transparency Act, the then-existing companies were obliged to transform their statutes on 30 June 2014 at latest to comply with the new rules. Nonetheless, only 36 companies complied with the rules effective that day specifically. But the number of companies that have updated their statutes or officially ceased to exist after this date is quite substantial, it amounts to 7 716 companies, i.e. about 39% of the entire sample. As a matter of fact, the number of anonymous companies in the Czech Republic peaked at slightly above 13 200 in mid 2012 and has decreased ever since. Figure 3.1 shows the development of the number of anonymous companies over time.

Thus, it can be said that the Transparency Act succeeded at eliminating most of the anonymously held companies that existed before 30 June 2014. The new

Figure 3.1: Anonymous companies over time.



regulation changed at least the legal standing of formerly anonymous companies. Its effect on their ability to win tenders and related gains both on their side and on the side of the contracting authorities is to be determined. Table 3.1 contains an overview of most of the figures discussed in this Subsection.

Table 3.1: Overview of the data set on anonymous companies.

<i>Companies total</i>	19 728
<i>Largest No. at a given time</i>	13 200
<i>Time of peak</i>	mid 2012
<i>Average time spent anonymous</i>	9.5 years
<i>No. of companies in 2019</i>	2 785

3.1.2 Treatment of Errors

The collection of data on anonymous companies necessarily entails parsing through scanned company bylaws¹ that do not conform to any unified stan-

¹Available online at the web page of the Czech Commercial Register: or.justice.cz.

dard. Errors like this are hard to identify without checking the entire data set, therefore only entries on companies that supposedly gained anonymity after 1 January 2014 have been dropped (41 companies in total). Such a change of bylaws would be clearly illegal and, if even possible, a source of significant uncertainty regarding the companies's ownership and its transfer. Several individual dropped data points were checked manually—they were all added to the list based on a typo and/or misinterpretation of the bylaws in question. The companies in question were awarded 65 published tenders in total.

As for other possible errors, there seems to be no other systematic way to identify false positives except for a manual revision of the entire sample. Identifying false negatives would be an even harder task. Luckily, the data set seems to generally adhere to the numbers that were usually quoted in the public debate. As mentioned by (Josef 2013, p. 241) in 2013, the ČEKIA agency (predecessor of Bisnode) estimated the number of anonymous companies to be about 12 000, more than half of all joint stock companies at that time. This result does not dramatically differ from the sample used in this master's thesis. It also shows the widespread usage of this form of ownership.

3.2 Data on Czech public procurement

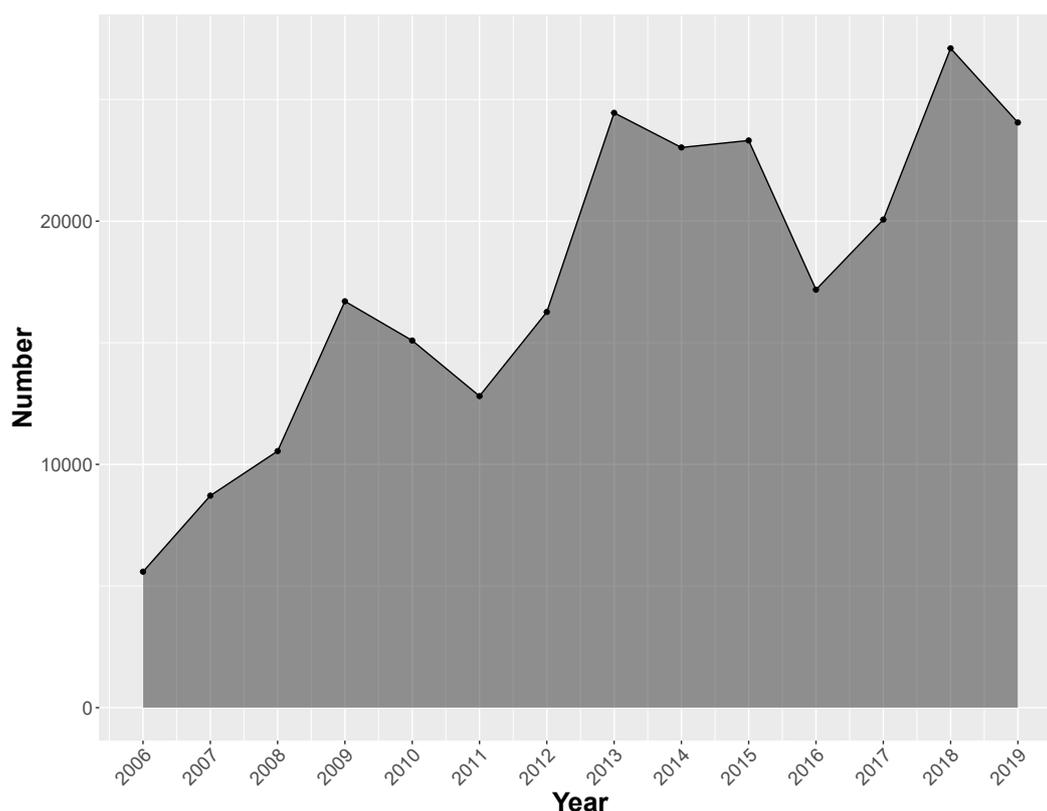
The data on Czech public procurement used in this work consists of accumulated information on all individual tenders from the Czech Public Procurement Bulletin (*Věstník veřejných zakázek*). This data set was kindly provided by courtesy of company Datlab, who have collected and processed the data from the Bulletin.

3.2.1 General Properties

The public procurement data set contains a total of 313 609 entries. The first tender in the data set was recorded in the Bulletin on 7 July 2006 while the last one was entered on 12 December 2019. This sizable data set had to be reduced because a significant number of observations could not be used for the purposes of the later analysis. First, only observations where the tender's award date is recorded can be used for an analysis of the consequences of a change in a company's ownership transparency. Furthermore, only observations that contain the winning bidder's ID or name can be used. After dropping observations that did not fit these criteria, only 211 184 observations remain.

It is clear from the data set that tenders in the Czech Republic have grown both in number and in volume. As can be seen from Figure 3.2, the number of tenders awarded has grown from about 5 000 published in 2006 to approximately 20 000 with an exception of two drops.

Figure 3.2: Yearly number of awarded tenders over time.



The first follows the beginning of the Great Recession and the second one occurred in 2016. This might be related to the fact that the PPA has come into force on 1 October 2016 and introduced higher transaction costs in the short run (the necessity to learn new procedures) and possibly led to a higher value per transaction. There is another drop visible in 2019 but this is possibly caused by the fact that the data set does not contain all the pertinent tenders awarded in 2019. Pursuant to Section 126 of the PPA, the contracting authority has a time window of 30 days to send a notice on a tender award for publishing. The data set was generated in early 2020 at latest. Moreover, the last published tender in the data set comes from mid December, not from the very end of the year. Thus, the data for late 2019 may not be entirely complete.

The aggregate value of published tenders in current prices presented in Figure 3.3 paints a similar picture. Starting at some 120 billion CZK, the

yearly aggregate volume of awarded tenders has grown to over 450 billion CZK in 2018. Once again, there can be seen a drop during the Great Recession and in years 2015 and 2016. The second drop is far less pronounced this time. Indeed, the average value of a single tender started growing in 2016 after a previous decline. After dropping to about 9 Million CZK in 2013 and hovering around 13 Million in 2014 and 2015, it rose to 16 Million in 2016 and continued to grow afterward.

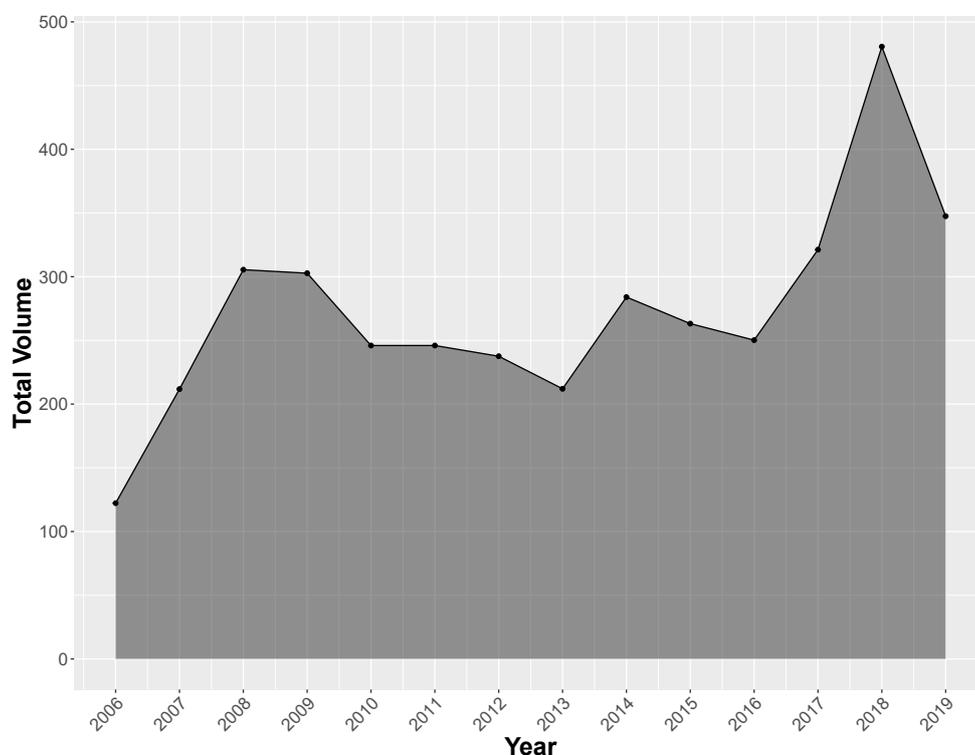
The volume of the contracts in the data set is lower than the official numbers published in a report by the Czech Ministry of Local Development (*Ministerstvo pro místní rozvoj*), see Ministry of Local Development (2019). This is likely caused by the fact that the Ministry included tenders in the area of defense and security in the figures. These tenders adhere to special procedures and are published separately—they are not part of the data set used in this master’s thesis. Older research working with officially published data on public procurement seems to operate with similar or somewhat smaller figures, for example Nikolovová *et al.* (2012).

The Ministry’s report further indicates that the tenders published in the Bulletin should account for about 50 to 75% of the public procurement market depending on the year—the data set used here should thus represent a significant portion of the market of public procurement. One should nonetheless not make hasty conclusions about the entirety of the procurement market based on an extrapolation from published tenders. Small tenders follow different rules and a limited degree of public oversight may be a negative factor which cannot be readily accounted for without studying this kind of tenders directly.

Furthermore, there is no clear trend in the average size of published tenders. As can be seen from Figure 3.4, the maximum size of about 30 Million CZK was achieved in 2008 followed by a steep drop that reached a minimum of something under 10 Million CZK in 2013. The current size of published contracts has been about 20 Million CZK in the last few years. Thus, there is no clear change in average size linked to the regulatory change that came in late 2016 after the introduction of the PPA. The sudden drop after 2008 is likely linked to increased austerity in relation to the Great Recession and the contracting authorities accordingly taking part in fewer ambitious projects entailing significant investment.

Similarly, changes in regulation do not seem to have affected the choice of award criterion. There are generally two approaches a contracting authority can take. It will either set the rules of procedure to determine the winning bid based

Figure 3.3: Yearly volume of awarded tenders in Billions CZK (current prices) over time.

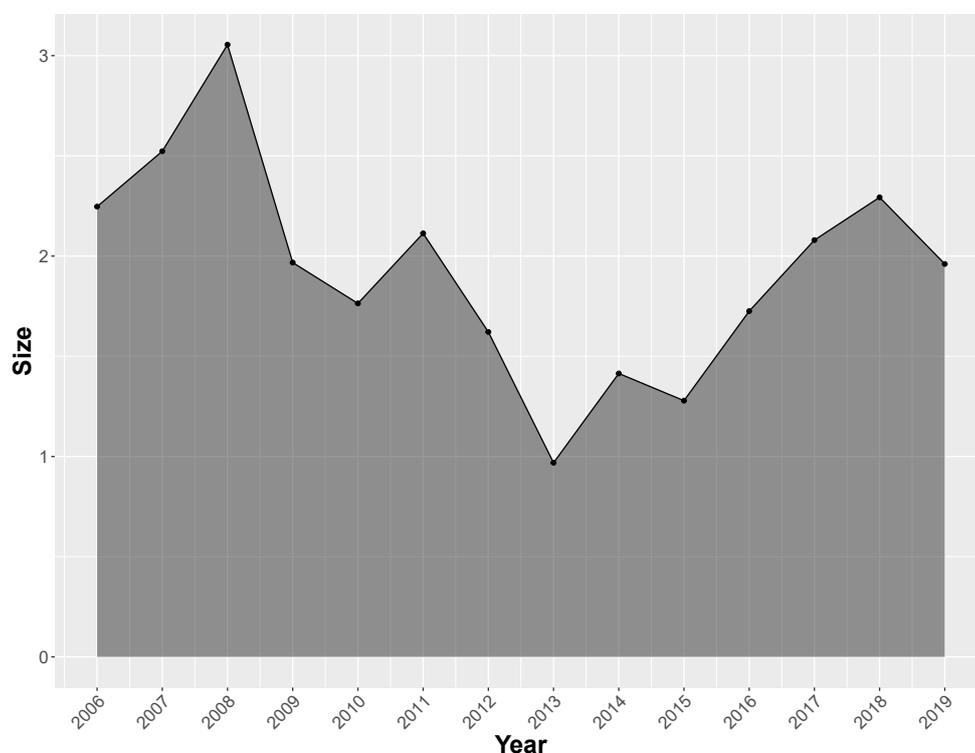


on the lowest price offered or based on the highest economic advantageousness—basically a set of criteria allowing for a more nuanced evaluation, also dubbed Most economically advantageous tender (MEAT). For tenders large enough to be covered by EU law, Section 114 of the PPA requires usage of the MEAT criterion in certain specific procedures (innovation partnership, competitive dialogue) and some tenders on services.

Interestingly enough, while the introduction of the PPA was widely understood as a clear endorsement of the MEAT criterion—as noted e.g. by Lukovič (2018)—the contracting authorities seem to have continued to steer in the opposite direction. Indeed, the highest ratio of tenders following the MEAT criterion was achieved in 2006—about 53%. The highest number of tenders following this criterion was awarded in 2009—almost 6400 tenders forming about 40% of the tenders awarded that year. In the last two years, on contrary, this criterion has dropped to about 7% of the total number of tenders awarded. The development of the numbers over time can be seen in Figure 3.5, the lowest price criterion (*lowest*) is represented by the black bars and the MEAT criterion (*meat*) is represented by dark gray bars.

In my opinion, this phenomenon cannot be judged straightforwardly on its

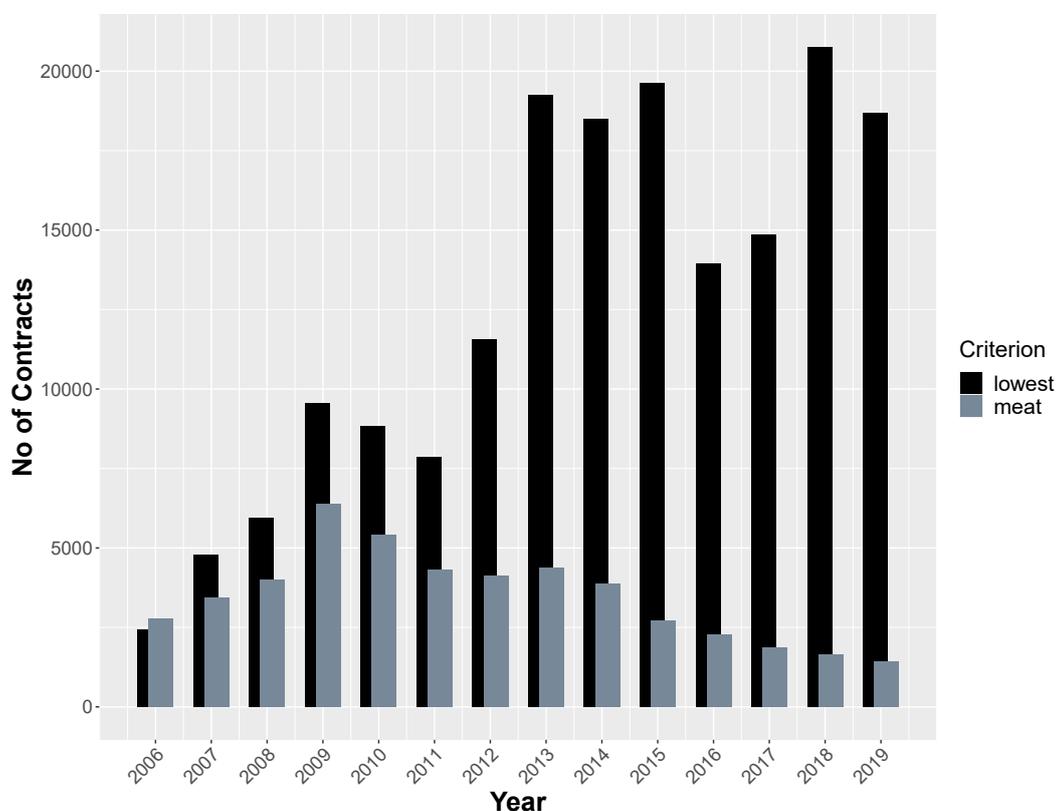
Figure 3.4: Yearly average value of awarded tenders in tens of Million CZK (current prices) over time.



own. Without additional information, drawing conclusions from this development would be largely reduced to guesswork. For example, extraneous factors like changes in the thoroughness of scrutiny might come to play and create a disincentive for contracting authorities to use the MEAT criterion. This would be a continuation of the trend indicated in the explanatory memorandum accompanying the PPA, which pointed out the trend between contracting authorities to prevalently apply the lowest price criterion to avoid procedural issues, as follows from Government of the Czech Republic (2016). One thing can be said for certain, though: the desired shift to preference of the MEAT criterion has not been very successful.

Finally, a look at the general tendencies in the choice of procedures leading to the award of a tender may prove to be interesting. The correct choice of procedure is largely dependent on extraneous factors like the estimated value of the contract or the results of a previous unsuccessful procedure concerning the same subject matter (see e.g. Section 63 Subsection 1 of the PPA). Therefore, the results presented in Figure 3.6 have to be understood as partly resulting from the general tendencies described above, especially the renewed growth of the average tender value in the last few years.

Figure 3.5: Yearly number of tenders awarded over time by evaluation criterion.

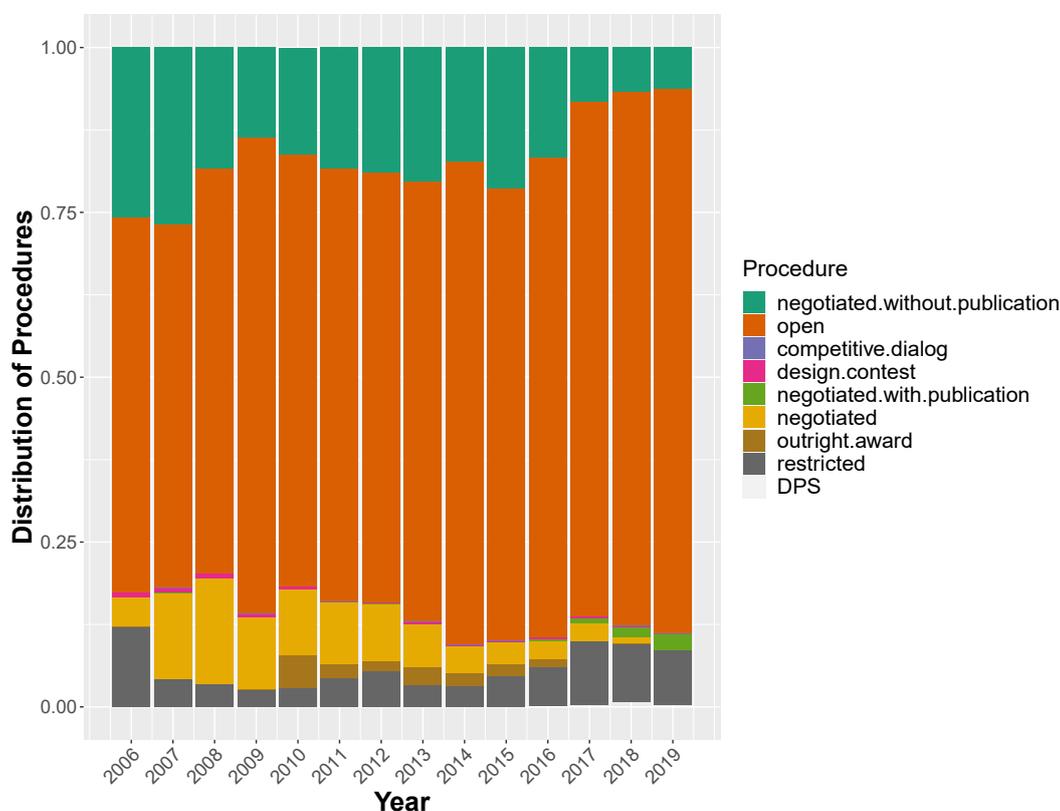


This being said, the fact that the share of open procedures (*otevřené řízení*—a relatively transparent and accessible kind of procedure) has grown rather steadily over time, notwithstanding most of the fluctuations discussed above. Furthermore, a clear drop can be seen in the negotiated procedure without publication (*jednací řízení bez uveřejnění*—a loosely defined procedure that can generally be used e.g. if a more transparent and sophisticated procedure has failed before or an unexpected pressing need renders other procedures ineffective *vis à vis* the desired outcome), especially after the adoption of the PPA in 2016. Similarly, the data set contains no outright awards (i.e. awards without a proceeding procedure) after 2016. The data set only allows to judge published tenders. In this realm, though, more transparent procedures seem to be on the rise.

3.2.2 Anonymous Companies in Public Procurement

In this subsection and for the purposes of the analysis in the remainder of this master's thesis, certain corrections were made to rule out results that either

Figure 3.6: The share of procedures used to award published tenders over time.



had missing information or seemed to be skewed as a result of typos of the clerks entering the information into forms. In the first part of this subsection, these changes to the data set are briefly discussed. The second part of this subsection is a discussion of the general characteristics of tenders awarded to anonymous companies based on this data set.

Corrections Applied to the Data Set

First of all, observations missing the award date, bidder ID, final price or the estimated tender price. The last reduction is not strictly necessary for some of the steps taken below. It was made to be able to determine the “savings” related to every observation (the difference between the estimated tender price and the final bid price), which (1) will be useful for the analysis below and (2) are used to identify probable typos in the data set. The advantage of taking savings as a metric is that one value serves as a reference for the other. This allows to eliminate observations containing likely incorrect information both on the final price and the estimated price.

Based on these linear savings, a normalized measure of savings (SVG) is constructed from the estimated price (P_{est}) and the final price (P_{fin}) to create a metric similar to the one used in the work of Nikolovová *et al.* (2012):

$$SVG = \frac{P_{est} - P_{fin}}{P_{est}}. \quad (3.1)$$

This ratio is defined to have the same absolute value but to be the negative of the ratio used by Nikolovová *et al.* (2012). This allows the ratio to be intuitively interpreted as positively correlated with the savings achieved for every tender. The usage of this ratio is further discussed in more detail in Chapter 4, where it is applied in the context of a linear regression.

Based on this ratio, two sets of observations are dropped. The rationale of this change follows e.g. the decision of Nikolovová *et al.* (2012), who similarly dropped unlikely looking values of savings accounting for about 3% of the sample. First, observations with a savings ratio higher than 0.89 are dropped. This choice is arbitrary to an extent. It was chosen to avoid extreme cases including the value 0.9 which will often likely be a result of a clerk erroneously typing an additional zero in the form. Furthermore, ratios lower than -0.99 were also dropped. A similar simple heuristic cannot be applied to this case (a ratio of -1 would mean that the final contract was about 2 times more costly than the estimated price). This might certainly eliminate some interesting edge cases but it accounts for a sample reduction of similar proportions. From a sample of a size of 173 551 observations, 2 228 observations were thus dropped for having too low of a savings ration and 2 795 observations were dropped for the opposite reason. The total sample reduction based on this operation accounts for about 2.9% of its original size.

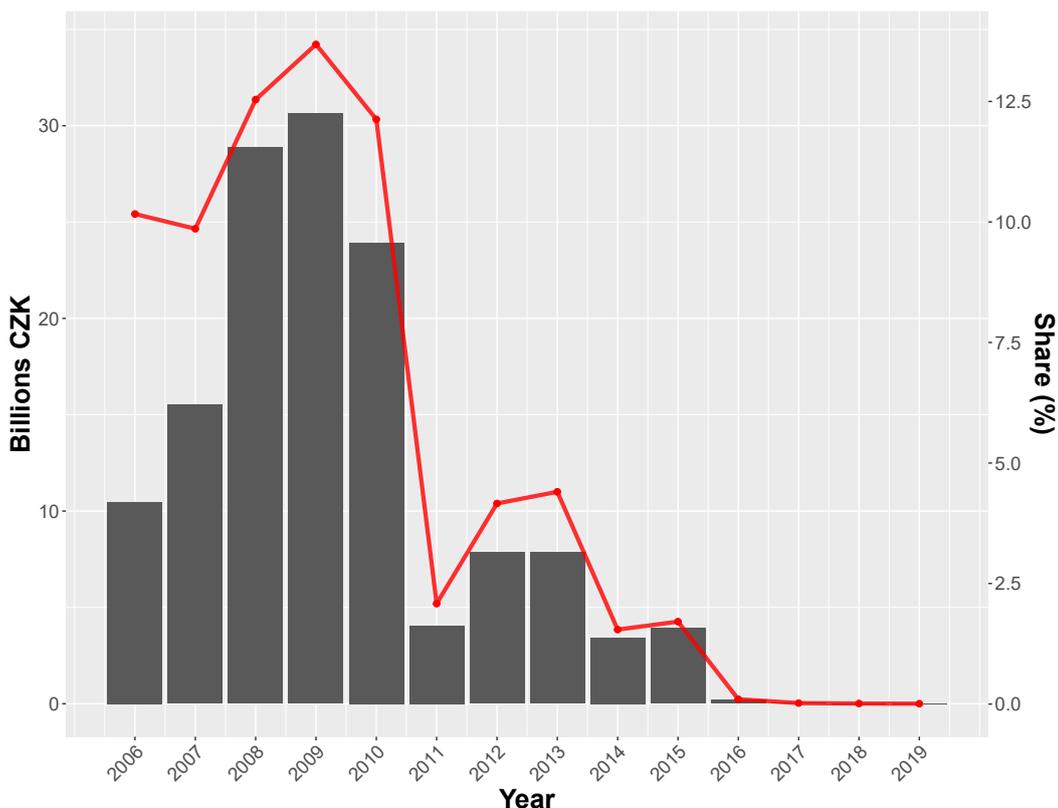
Tenders Awarded to Anonymous Companies

Having gone through some basic developments of Czech public procurement and after applying some preparatory corrections, it might be interesting to look at the behavior of anonymous companies specifically. As can be clearly seen from Figure 3.7, the largest volume of tenders has been awarded to anonymous companies in years 2008 and 2009 measured both by current prices (about 29 and 31 Billion CZK) and percentage (about 13 and 14 % of the total volume). This has been followed by a steep drop both in percentage and volume that clearly precedes the sudden drop in the number of anonymous companies in 2012. The share of anonymous companies becomes negligible after 2016, when

this kind of companies became officially barred from participation on tenders (as explained in Sub-subsection 2.1.2). Most of the remainders that can be seen in this Figure (and in the following ones) stem from procedures that began before November 2016 (and anonymous companies were allowed to participate).

This drop seems to be a result of the short lived ban on participation of anonymous companies in public procurement in 2010 that was discussed above in Sub-subsection 2.1.2. Some requirements introduced by the big change in 2010 remained but the share starts climbing once again after the absolute ban was removed. This climb comes to a halt in 2013, this time accompanied by the drop in the absolute number of anonymous companies in general after it became clear that physical bearer shares would not be a long-term viable legal form of ownership.

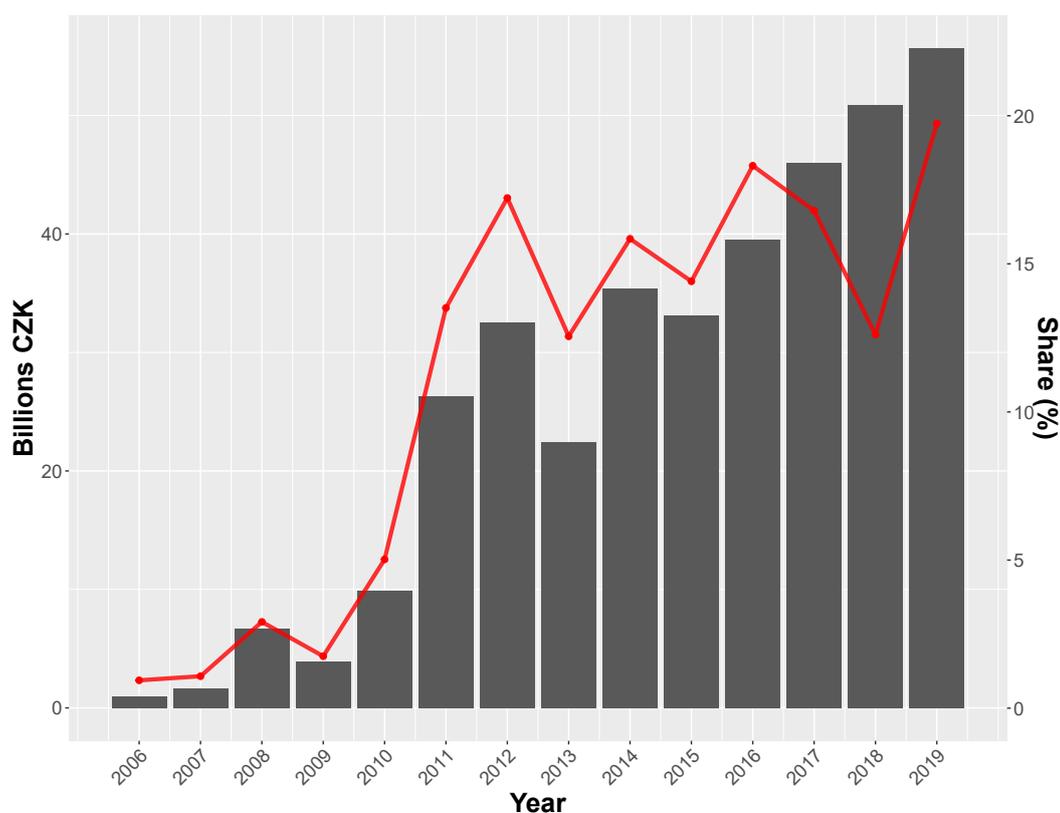
Figure 3.7: Tenders awarded to anonymous companies by yearly volume (bars) and percentage on total yearly volume of procurement (line).



Interestingly, the drop of the share of anonymous companies is accompanied by an increase in the share of former anonymous companies on awarded tenders. In this context, former anonymous companies are companies that have changed their ownership structure from anonymous to transparent during 2006 or later

to match the development with the public procurement data. It can be clearly seen that most of the previously anonymous companies in this sense likely simply updated their bylaws be able to further participate in procurement proceedings. A growth of the share of such companies on awarded tenders that came immediately after 2010 can be seen from Figure 3.8.

Figure 3.8: Tenders awarded to formerly anonymous companies by yearly volume (bars) and percentage of total yearly volume of procurement (line).

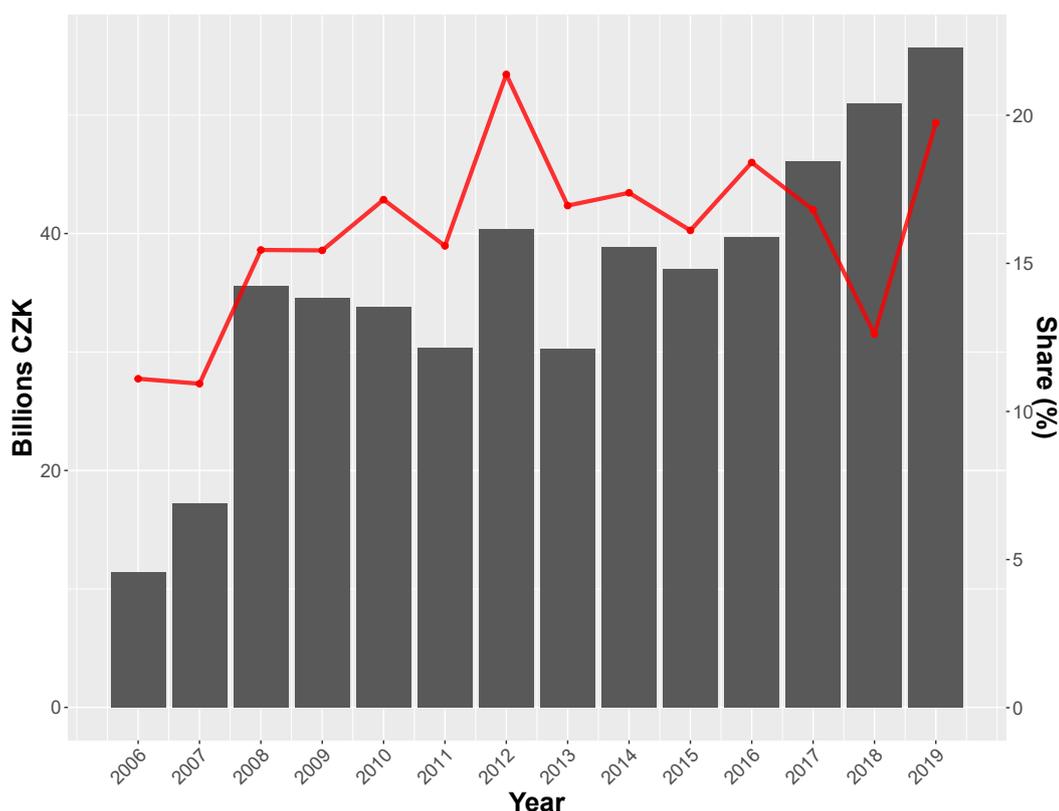


A combination of both information on volume of tenders awarded to anonymous and formerly anonymous companies can further be seen in Figure 3.9. Clearly, the share of such companies has grown until 2010. This was followed by a small drop, likely the result of friction caused by the absolute ban in 2010. After that, the shares have risen again but there does not seem to be any self-evident tendency to be seen in the figure. There was a steady decline in percentage of total volume after 2016 with the exception of a curious increase in 2019. The reliability of the results for 2019 may be questionable, though. All the tenders might not yet been published at the time the data set has been put together, as was already discussed above.

In any event, this general overview does not seem to tell a straightforward

story in the light of the first hypothesis of this master’s thesis: that formerly anonymous companies should fare worse in public procurement after switching to a more transparent ownership structure.

Figure 3.9: Tenders awarded both to anonymous and formerly anonymous companies by volume (bars) and percentage (line).



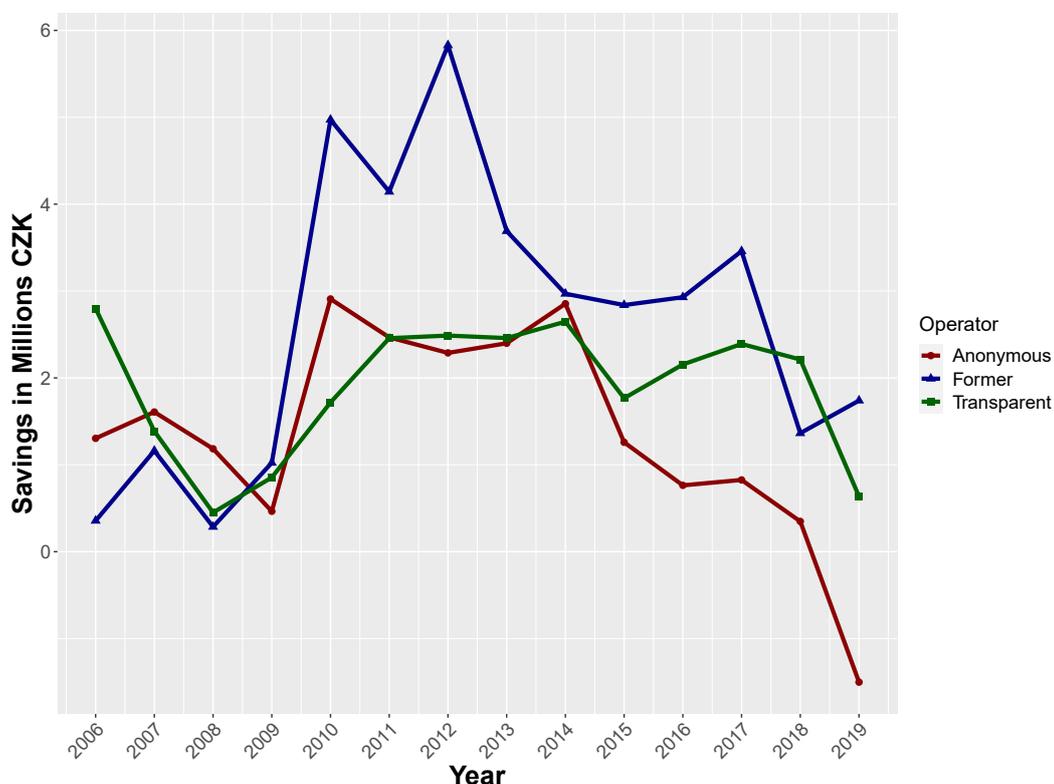
Finally, the question of savings related to public procurement is an interesting issue to look at. Here, “simple” savings expressed as the difference $P_{est} - P_{fin}$ from Equation 3.1 are discussed and analyzed. Under ideal circumstances, higher savings should indicate that the contracting authority was able to benefit from competition on the market. While the estimated price is constructed based on various valuation methods relating in one way or another to the market as a whole, the price proposed by a bidder pertains specifically to the bidders marginal costs, as observed by Kuhlman & Johnson (1983). This might ideally be evidence of rational savings achieved through the procedure but, at worst, also possible evidence of “irrational savings” caused by an unwise choice of a suboptimal bid that is cheapest at face value, as claimed by Půček & Ochrana (2014). Also, the estimate might be overstated at the first place, as pointed out by Ochrana *et al.* (2015). This implies that savings (or the savings

ration defined in Equation 3.1, for that matter) are at least a problematic tool to compare efficiency of various tenders.

This being said, they still might prove interesting when analyzing the position of anonymous companies in public procurement. However flawed a measure of efficiency they might be, the transparency of ownership structure should generally not make much of a difference in the related savings.

This stems from their definition: nothing changes on the side of the presumptively independent contracting authority that determines the estimated tender price. The final bid price is theoretically linked to the marginal costs of the economic bidder, on the other hand. If savings prove to differ significantly for anonymous companies, it certainly might be the case that anonymous companies are systematically less or more efficient. But especially if anonymous companies prove to have lower savings, as already shown on a smaller sample by Chvalková *et al.* (2012), the question remains what was different with the procurement proceedings that allowed for a less efficient competitor winning the tender.

Figure 3.10: Savings on tenders broken down to anonymous companies, formerly anonymous companies and all other economic operators.



Results on 'transparent' operators include entities other than joint stock companies.

Indeed, according to Figure 3.10 it seems to be the case that anonymous companies tend to have lower savings overall. Their savings are somewhat lower than those of the remainder of economic operators as a whole and significantly lower than the savings of joint stock companies that were formerly anonymous. The significant drop below zero of savings on tenders won by anonymous companies in 2019 is caused by the one single tender that was won by a company that was anonymous according to the provided data. Thus, this specific result does not bear much meaning.

The issue of savings related to tenders awarded to anonymous companies will be addressed more specifically in the following chapter, where the individual questions will be addressed on a sample of anonymous companies and their peers of roughly equal size and economic sector.

3.3 Accounting Data and Company-Specific Information

In some parts of this master's thesis, accounting data and other company-specific information concerning the relevant anonymous companies and their comparators is used. This information was extracted from the *MagnusWeb* database ran by Bisnode Česká republika, a.s., to obtain data on their profits, total assets etc. The database in question provides *inter alia* companies' annual financial statements in machine-readable form.

Chapter 4

Methods and Results

This Chapter discusses the methodology and immediate results of model setups used in this master's thesis. First, the basic sorting and choice of anonymous companies and their transparent counterparts will be discussed. Further on, the methods used to test the initial hypotheses will be described and applied. The hypotheses tested are the following.

- (i) Anonymous companies were awarded a lower volume of contracts after switching to a more transparent form of ownership. **(H1)**
- (ii) Anonymous companies registered a drop in profits after switching to a more transparent form of ownership. **(H2)**
- (iii) Savings on contracts awarded to formerly anonymous companies are not significantly lower. **(H3)**

4.1 Company Sample Selection

For the analyses conducted throughout this master's thesis, a reduced sample of joint stock companies was selected. Specifically, a limited sample of anonymous companies was selected and paired together with their transparent peers of roughly equal size and economic sector. The creation of the sample loosely follows the approach taken by Chvalkovská *et al.* (2012) and the main idea of this reduction is to isolate the defined issue and thus to allow for a proper testing of related hypotheses.

This reduction followed several rules. First, only joint stock companies that were awarded tenders between 2006 and 2019 were to be picked. Second, only anonymous companies that switched to transparent during the above period

were selected. Specifically, companies that switched between 2008 and 2017 were selected. This is to provide more than one year of results for both their states, so that the effects of such a transition can be better observed. Another reason for reducing the sample is that the relatively similar number of both anonymous and transparent companies. This could hamper the pairing process.

The chosen sample of anonymous companies was further paired according to the following criterion. The anonymous companies were sorted smallest to largest (to be able to assign the closest possible match for small and medium companies specifically) and their average size (total assets) over the period was calculated. For every individual company, size differentials were calculated by subtracting the average sizes for its transparent counterparts in the same *nomenclature statistique des activités économiques dans la Communauté européenne* (NACE) category. The counterpart with the smallest absolute value of the size differential was selected as a unique comparator for the anonymous company in question and excluded from the set of comparators to prevent multiple appearance of comparators. After having selected the sample, pairs with a ratio between their sizes differing by more than $\pm 20\%$ were further dropped. This led to a certain reduction of the sample (about one fifth) but seemed necessary to avoid extreme cases where the differential could be as high as 500%. The described algorithm to pair companies was implemented in form of an R for cycle.

The matching algorithm follows Chvalkovská *et al.* (2012) by pairing companies from same sector and of roughly similar size. While Chvalkovská *et al.* (2012) use company turnover as a measure of size, this thesis uses total assets instead. The reason for this departure is that the data span over a considerably longer period of time and total assets seem to be more time invariant. Turnover, being driven by income more directly, will react more sensitively to the economic cycle. Unlike Chvalkovská *et al.* (2012), the companies are not matched according to the volume of awarded tenders. As one of the tested hypotheses relies on the volume of awarded tenders, using volume as a preliminary criterion of sample selection may be a source of unwanted influence on the results.

As a result of the procedure described above, 504 pairs of anonymous companies and their comparators were obtained. Some basic differences between the two sets of companies can be seen in Table 4.1. There are no dramatic differences between the companies, as can be expected based on the method of selection. Anonymous companies seem to be somewhat smaller while being

somewhat newer and having fewer employees, though.

Table 4.1: Comparison of anonymous and transparent companies in the sample.

	Both	Anonymous	Transparent
Mean total assets (thous. CZK)	422 848	420 110	425 586
Median total assets (thous. CZK)	126 485	125 945	127 612
Average year of incorporation	1999	1999	1998
Average number of employees	127	122	133

4.2 H1: Formerly Anonymous Companies's Ability to Win a Tender

The first hypothesis of this master's thesis is to verify whether the ability of formerly anonymous companies to win tenders decreases after their change of the form of ownership. The logic of this hypothesis is based in the findings of Chvalkovská *et al.* (2012). When there is evidence of rent-seeking behavior in this kind of companies, the (oftentimes forced) switch to a more transparent ownership structure might decrease the company's motivation to participate in procurement proceedings because it may not further exploit its anonymity to conceal the beneficiaries of the transaction. Furthermore, such companies may be less likely to be able to win tenders because the revealed ownership structure may show a problem the contracting authority cannot ignore in the proceedings—a blatant conflict of interest, for example. Thus, companies that have been used only or prevalingly as vehicles for concealing corruption would presumably lose their reason to exist and companies that are more established should at least not win tenders which they were previously not supposed to win because of hidden conflict of interest.

Several methods were considered to test this hypothesis. The first one was a logistic regression setting asking about the probability of an anonymous company winning a tender after switching to a more transparent ownership structure. An inherent weakness of this setting is that it does not allow for much nuance, should a company be awarded more tenders or should the value of tenders awarded to it change. While better results could probably be achieved with a multinomial logistic regression, breaking down changes in value of awarded tenders into discrete categories is not desirable. Furthermore, the available

data does not seem to be ideal for the purposes of probabilistic modeling of tender awards. Models used for these purposes are usually based on variables that are not available in this case, see e.g. the study carried out by Malara & Mazurkiewicz (2012).

The data could, however, be formed as a panel mapping the development of individual companies over time. The testing of this approach on the available data led to results similar to those presented below. The tested panel setting did not seem to perform particularly well, though. The main issue with forming the data as a panel is the fact that this setting led to a high loss of information due to missing company accounting data in certain periods. This information, especially total assets of the companies, has also proven to be far from irrelevant. For these reasons I have chosen to pool the data.

The basic variable used to test the above hypothesis is the company's share on total public procurement over a given year. Using the total volume of tenders $vol_{i,t}$ awarded to company i in year t and the total volume of tenders awarded to every active economic operator j over a given year, the ratio $\sum_j vol_{j,t}$ is defined as follows:

$$\rho_{i,t} = \frac{vol_{i,t}}{\sum_j vol_{j,t}}. \quad (4.1)$$

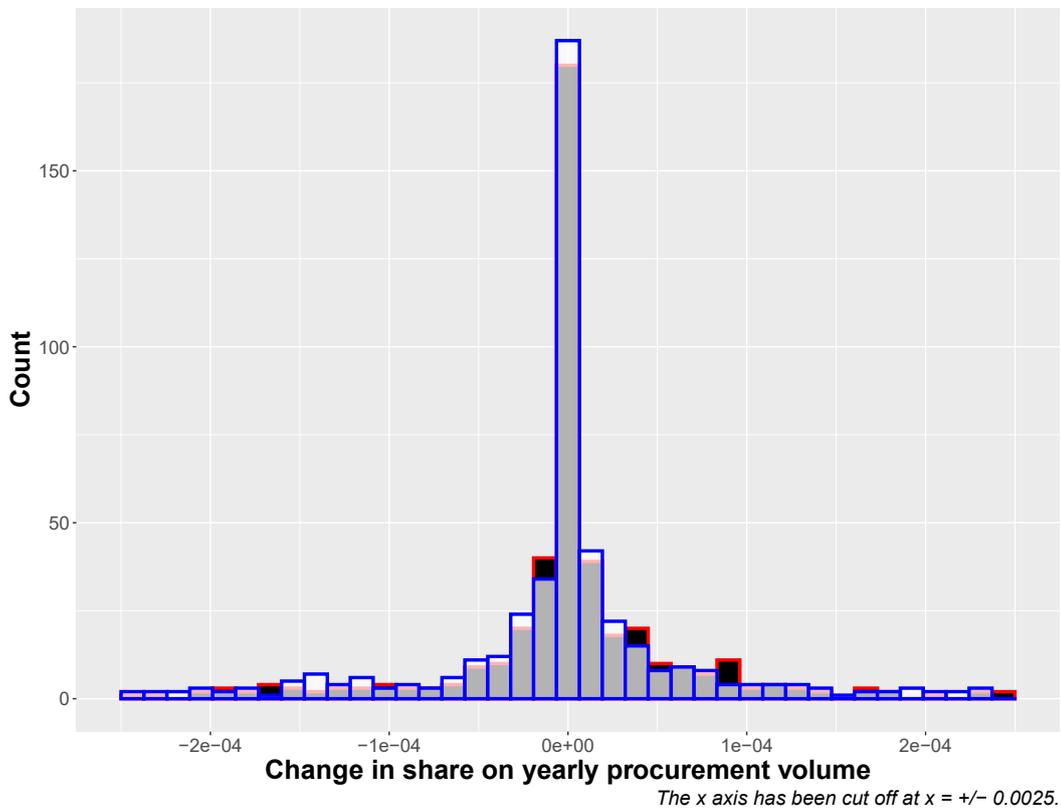
The usage of this variable has two advantages. First, it normalizes the volume of awarded tenders, thus largely eliminating the influence of variation in total volume of awarded tenders. Second, the side effect of this approach is that it eliminates the influence of the changing time value of money. Because the results have been pooled, change in *average* $\rho_{i,t}$ before and after the switching between forms of ownership is studied. Thus, this method allows to detect long-term changes in volume of awarded tenders. Any short-term drops would be rather hard to detect with this approach. The hypothesis here is that the permanent change in the form of company ownership should also have a permanent effect on its performance in public procurement, if any. A mere short-term drop followed by a new increase would be difficult to explain using the above rationale. In the case of the selected comparators, every comparator is assigned a "date of switching" identical to its closest anonymous counterpart. The date of switching is in fact a given year. Any finer distinction cannot be used because of the usage of accounting data. The year of switching is then counted into the period where the company was "anonymous".

4.2.1 Basic Comparison

A direct comparison of the linear difference between the anonymous company and its chosen comparator does not seem to yield convincing results. Out of 504 pairs (the sample had to be slightly reduced because of missing data), the anonymous company has performed worse than its comparator in 249 cases. It performed better in 255 cases, on the other hand. As a matter of fact, the share on public procurement of formerly anonymous companies has increased on average while the performance of its comparators has slightly dropped.

An overlay of histograms describing anonymous companies and their comparators tells a similar story. As can be seen in Figure 4.1, the changes were negligible for most companies in general. If anything, the histogram representing anonymous companies (dark with red border) seems to represent a somewhat flatter distribution.

Figure 4.1: Overlay of histograms describing the distribution of change in volume of awarded tenders awarded to anonymous companies (dark bars with red outlines) and their comparators after the decisive period (white bars with blue outlines).



4.2.2 Testing H1—the Expected Decrease in the Share on Awarded Tenders

For a simple test of the first hypothesis, a similar method as the one used by Chvalkovská *et al.* (2012) is applied, i.e. sample comparison based on the so called *Mann-Whitney U test*. This test is accompanied by an unequal variance t-test (*Welch test*) for the reasons described below. The Mann-Whitney U test is a nonparametric test used for comparing ordinal samples that are not normally distributed. Its null hypothesis is that two random variables come from the same distribution Mann & Whitney (1947). Its alternative hypothesis is that the distributions are not equal. The approach is also sometimes referred to as the *Wilcoxon rank sum test* (not to be confused with the Wilcoxon signed ranks test described e.g. by (Sokal & Rohlf 1987, p. 205)) because the original idea behind the test was published by Wilcoxon (1945).

Discussion of the Appropriateness of Individual Tests

The Mann-Whitney U test can be viewed as a nonparametric substitute for the well-known t-test. The t-test relies on the assumptions of normality and equal variance of the compared samples, as explained e.g. by Neuhauser (2002). Thus, the Mann-Whitney U test is popular for small samples where normality cannot be guaranteed. Nonetheless, there is a number of sources suggesting that not even the Mann-Whitney U test performs well under heteroskedasticity (Neuhauser 2002; Kasuya 2001; Fay & Proschan 2010). Fay & Proschan (2010) specifically point out the different interpretations of the Mann-Whitney test and come to the conclusion that the test is an inconsistent measure of significant difference in means (i.e. a *de facto* alternative to the t-test) under heteroskedasticity.

In the case of the sample used in this thesis, exact normality of the volume changes cannot be expected to be perfectly normal. The size of the sample may mitigate this issue, however. The sample is more than ten times as large as the one for which Chvalkovská *et al.* (2012) decided to use the Mann-Whitney U test. Assuming equality in variance may be more problematic in this case though. One can hardly assume that the anonymous companies are identical but for the form of their shares and that the variance will not differ significantly. On the contrary, the preceding research seems to indicate anonymous companies in public procurement were a source of systematic irregularity.

The sample variance may generally be compared by applying an F-test, but

although it has to be noted that using a formal test as a general test-determining criterion is discouraged by some because of the different interpretations stemming from rejection and non-rejection of a statistical hypothesis (Neuhauser 2002). This would imply that the application of a test assuming equal variance is warranted when one has a good reason to believe that there is no difference in the variances of the two samples.

Because this is not the case for the present sample, the Welch t-test is preferred. The yearly volume shares are thus standardized and compared on a sample of companies that are of similar size and active in similar fields. As heteroskedasticity can be expected, I follow the recommendation of Ruxton (2006) and perform an unequal variance t-test based on the work of Welch (1938). The advantage of this approach is that the unequal variance is accounted for. To allow for a comparison based on a similar methodology as the one used by Chvalková *et al.* (2012) (especially later on in case of H2 that stems more directly from the original work), I also provide results both for the Mann-Whitney U test for the sake of comparison. Based on the selected sample, I would argue that the results of the unequal variance Welch test should be preferred in this case.

Results

In case of H1, the two-sided versions of both the Mann-Whitney test and the Welch test are applied to test H1. This version was applied because the mean of the group of anonymous companies is in fact higher. Moreover, the distributions as shown by the histograms seem rather similar. Rejecting the null hypothesis would thus mean that the two distributions are significantly different. The results for the Mann-Whitney test are summed up in Table 4.2. As can be seen, the null hypothesis that the distribution of anonymous companies is identical to the group of comparators cannot be rejected based on the Mann-Whitney test. This result is not very surprising when one looks at the means of both samples.

A Welch test was run with a similar conclusion. The p-value of the Welch test is lower than in case of the Mann-Whitney nonparametric test, but not low enough to imply statistical significance. The precise results are summed up in Table 4.3. Thus, there is no evidence that the volume of tenders awarded to anonymous companies would drop after switching to a more transparent

Table 4.2: Results of the two-sided Mann-Whitney U test in the case of the change in volume of procurement.

	Anonymous	Comparator
Median change	$4.36 * 10^{-8}$	$2.58 * 10^{-7}$
Sample size	504	504
U statistic	132 060	
p-value	0.2741	

ownership structure based on the methods applied. In fact, both tests applied failed to find a significant difference in the two distributions.

Table 4.3: Results of the Welch test in the case of the change in volume of procurement.

	Anonymous	Comparator
Mean change	$3.10 * 10^{-5}$	$-1.16 * 10^{-5}$
Sample size	504	504
t statistic	1.2758	
df	934.18	
p-value	0.2024	

4.3 H2: The Expected Decrease in Profits of Formerly Anonymous Companies

This hypothesis draws from the work of Chvalkovská *et al.* (2012). The authors of the cited paper compare standardized return on equity (ROE) and return on investment (ROI) (but the latter metric is defined in the work as profits over assets, i.e. ROA) of anonymous companies and their peers to find that anonymous companies participating in public procurement have abnormally high profits.

4.3.1 Construction of the Metric

These “raw” indicators have been normalized similarly as by Chvalkovská *et al.* (2012) using the following equation for company i in year t for both ROE and

ROA:

$$\overline{ROE}_{i,t} = \frac{ROE_{i,t} - \overline{ROE}_{NACE,t}}{\overline{ROE}_{NACE,t}}. \quad (4.2)$$

The average indicator value used for normalization is the single digit NACE average for the given year. This work diverges from the normalization conducting by Chvalkovská *et al.* (2012) in two aspects: the original work used double digit NACE medians. Single digit NACE is used here because the remainder of this master's thesis (including the sample selection) only distinguishes single digit NACE nomenclature. Using medians certainly helps to eliminate the influence of outliers. The NACE averages for this master's thesis were calculated only within the sample, however, not from a larger number of companies from the given category. The number of companies in the same NACE for a given year may be rather low, especially if data is not available for some companies in the given year. Taken as an estimator of the population median, the median is biased for very small sample sizes, as explained by Burr & Cislak (1968). For that reason, the average was chosen as the preferred metric in this case.

Both ROE (profits after tax over company equity—*vlastní kapitál*) and ROA (profits after tax over total assets) were calculated for every company and every year in the selected sample of anonymous companies and their comparators. After that, the difference between average of the indicators before the change of form and the average of the value of the indicators after it was taken. This is a similar approach to the one taken in case of the change of volume of awarded tenders. As explained in the previous section, it should be able to detect long term changes in result of the change of ownership form but not e.g. a short transitory fall in profits. The idea being that formerly anonymous companies should be systematically worse off after changing their form of ownership.

4.3.2 Methods and Results

The same tests as the ones used to test H1 are used here with the same reasoning. Both tests are performed both for ROA and ROE. This time, the tests are single-tailed because there is a visible comparative drop in performance indicators on part of formerly anonymous companies. The null hypothesis therefore is that the values of changes to the performance indicators come from an identical or stochastically larger distribution in the case of anonymous companies in case of the Mann-Whitney test. Under the Welch test, the null hypothesis

states that the mean of the distribution of changes to performance indicators is larger or equal that the mean of comparators's distribution.

Table 4.4: Results of the single-tailed Mann-Whitney U test in the case of changes in performance indicators.

Indicator	ROE		ROA	
	Anonymous	Comparator	Anonymous	Comparator
Median change	0.1692	0.2880	0.1326	0.2036
Sample size	484	483	484	483
U statistic	113 110		111 660	
p-value	0.1923		0.1145	

Table 4.4 shows that the results for ROE and ROA are inconclusive, although the p-value approaches the 10% threshold in case of ROA. There are some missing observations in both data sets because of unavailable accounting data. Table 4.5 shows the results of the Welch test run on the same data. The results concerning the ROE are similarly inconclusive. The Welch test allows a rejection of the null hypothesis in the case of the decrease of ROA for $p < 0.1$, though. This shows the critical impact of the choice of test these scenarios. As argued above, the Welch test seems to be more suitable in this scenario. There is thus some evidence that the comparative profitability of formerly anonymous companies has dropped. Nonetheless, a high degree of caution is warranted, given the idiosyncratic results. The same result might not hold under the exact methodology applied by Chvalkovská *et al.* (2012). Moreover, the fact that the tendency can be seen only in ROA and not ROE deserves an explanation. As the sample was constructed on the basis of similarity in total assets, there can be expected a higher degree of variability in ROE stemming from the added variability in equity. ROA, on the other hand, has a more comparable benchmark by default, in this setting. To understand these discrepancies more fully though, further testing is desirable. In the meantime, it can be said that there is evidence in favor of H2 but the robustness of this finding is worth further ascertaining.

Table 4.5: Results of the single-tailed Welch t-test in the case of changes in performance indicators.

Indicator	ROE		ROA	
	Anonymous	Comparator	Anonymous	Comparator
Mean change	-0.4608	-0.0736	-0.5059	0.2828
Sample size	484	483	484	483
t statistic	-0.3963		-1.5139	
df	707.72		963.71	
p-value	0.346		0.0652	

4.4 H3: The Savings Achieved on Awarded Tenders

To test the second hypothesis, an OLS pooled regression setting has been implemented as a baseline for the model to be developed. Based on the data set of tenders awarded to the selected anonymous companies and their comparators between 2006 and 2019, the normalized savings (*SVG*) as defined in Equation 3.1 are regressed on a dummy for anonymous companies (*ano*), a dummy for formerly anonymous companies (*former*), as well as a number of control variables, namely the number of bids in the proceedings (*bids count*), whether the tender was awarded via open procedure or not (*open*), if the tender was EU funded (*is eu funded*), whether the lowest price (i.e. not MEAT) selection method was applied (*lowest*), if the tender's Common Procurement Vocabulary (CPV) category was construction works, or the company's size measured by its total assets.

The initial model for tender i has the specification described by Equation 4.3. This model will be further developed and corrected/improved where possible. Simultaneously with the full model, the results of the models without (1) the dummies relevant for the procurement procedure and (2) the company level accounting data will be reported in Table 4.6. These results are reported with robust errors because of heteroskedasticity issues discussed below. The ultimate focus of this exercise is to verify the sign and significance of the relevant dummies rather than to maximize the model's predictive power, though.

$$\begin{aligned}
SVG_i = & \alpha + \beta_1 * bids_count_i + \beta_2 * open_i + \\
& + \beta_3 * is_eu_funded_i + \beta_4 * lowest_i + \beta_5 * constr_i + \\
& + \beta_6 * size_i + \beta_7 * ano_i + \beta_8 * former_i + \epsilon_i. \quad (4.3)
\end{aligned}$$

4.4.1 Discussion of the Individual Variables

First of all, the usage of the savings metric should be addressed. As already mentioned above, the savings defined according to Equation 3.1 draw from the work of Nikolovová *et al.* (2012). This is not the only specification commonly used. Pavel (2010) uses a ratio of the final price and the estimated price, i.e. $SVG = \frac{P_{fin}}{P_{est}}$. The advantage of the former metric is an intuitive interpretation in terms of positive and negative results: zero savings are indicated by $SVG = 0$, $SVG < 0$ for negative savings etc. The cost of this decision is that some functional transformations of the dependent variable are not variable because they would lead to loss of information if applied to its negative values. Nonetheless, I would argue that this limitation is not particularly problematic based on the discussion below.

It should be added that some works also draw from models built plainly on the volume of savings, for example Man *et al.* (2014). Man *et al.* (2015) even regress the tender final price on the estimated price and other covariates. Such models tend to yield high performance measured in terms of R^2 but this seems to be caused mainly by the fact that the final and estimated price will usually be similar in magnitude, thus being rather well-correlated. If nothing else though, this model does not account for time value of money. The relationship between the final and estimated price further did not seem to be clear enough to me to rule out possible simultaneity issues. For this reason, I opted not to use this specification.

Regarding the choice of independent variables, the role of the number of bids has been documented quite well to increase savings, for example by Grega & Nemeč (2015). A higher number of bidders lowers the possibility to inflate prices by unlawful bid-rigging¹ (Pavel 2010). According to Pavel (2009), the higher number of agents interested in the issue coming with more bidders also makes corrupt behavior harder.

The usage of the open procedure is also presumed to increase savings, this

¹Bidders entering deals that determine the winner beforehand, generally speaking.

was already shown e.g. by Stehlík (2018). Apart from allowing a higher number of bidders to participate, the relative transparency of these proceedings allows a higher degree of potential competition that has been hypothesized to increase savings (see Pavel (2010)). Similarly, my hypothesis in case of EU funding of the tender is that it increases savings because of additional layers of protective rules and oversight, e.g. special criminal offenses linked to the misuse of EU funding. The application of the lowest price criterion should also yield higher savings—this is not a unambiguously positive thing, but a blunt application of the lowest price criterion should superficially maximize savings in individual cases. It should be noted, though, that Ochrana & Hrnčířová (2015) have found no effect of the choice of criterion based on a similarly specified model performed on a smaller sample ($N = 397$).

The construction works tenders are expected to have a negative impact on savings. First, the price such tenders may be harder to estimate because of the relative complexity of the project. Furthermore, there is evidence of illicit behavior in this kind of contracts specifically provided by Palguta & Pertold (2017). The size of the company, on the other hand, influences its ability to benefit from efficiencies from scope and scale, likely allowing it to offer lower unit prices. This advantage should be less pronounced in tenders awarded according to the MEAT criterion, although Stake (2017) disputes this finding.

Finally, the anonymity of the tender winner is expected to negatively influence savings along the lines of the basic hypotheses of this master's thesis. Similarly, former anonymity is not expected to significantly influence the tender-specific savings.

4.4.2 Application of the Baseline Model

The model was run on a data set of published tenders awarded to the selected sample of anonymous companies and their respective comparators after dropping observations with extreme cases of savings on the basis of the discussion in Subsection 3.2.2. This results in a data set comprising of 23 150 observations. Individual regressions may be further reduced because of missing data points.

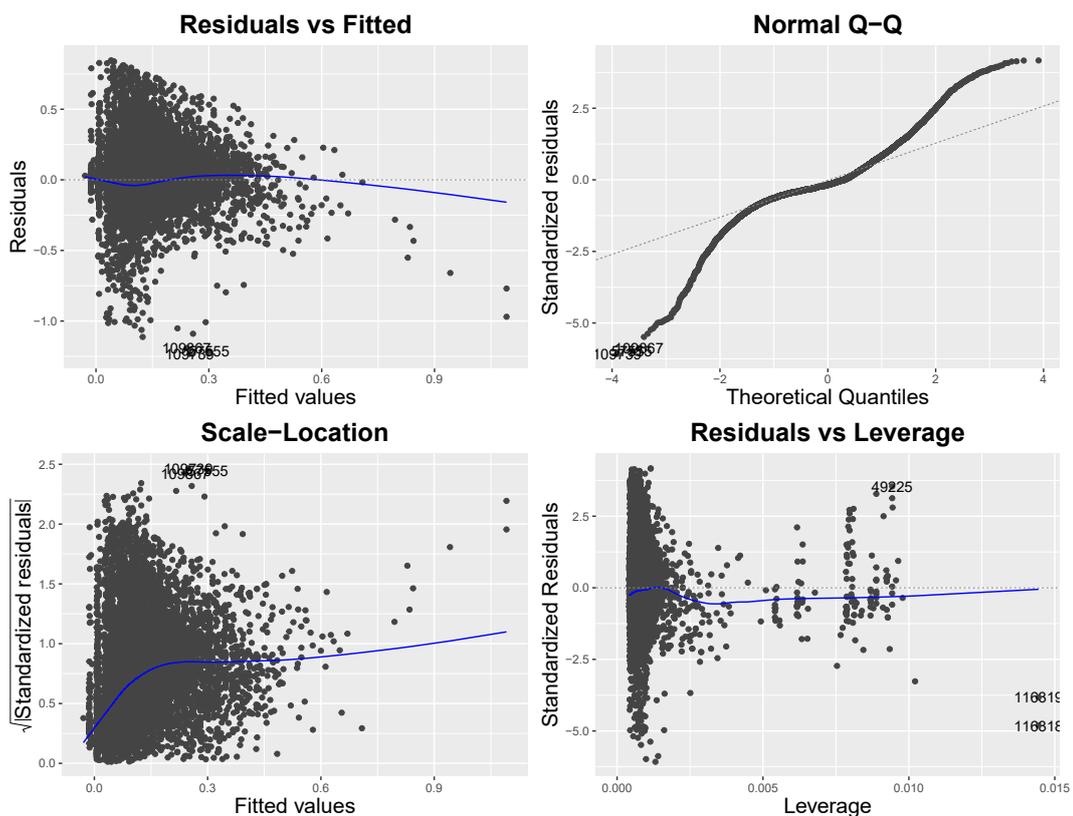
Discussion of Model Assumptions

First, it is necessary to verify the adherence of the model to the basic assumptions underlying the OLS model. These are linearity in parameters, random sampling, full rank of the matrix of independent variables, homoskedasticity,

exogeneity of the independent variables and normal distribution of the disturbances (Greene 2003, p. 10). The basic diagnostic graphs of the full model can be found in Figure 4.2.

To begin, should the full rank requirement not be fulfilled, the model would likely be impossible to compute in most statistical packages, this requirement is thus fulfilled. Similarly, the model is specified as linear. As regards the assumption of random sampling, the basic data set should theoretically encompass all the published tenders awarded to the examined set of joint stock companies between 2006 and 2019 (without attempting to infer on unpublished tenders). As described above, though, the sample was reduced by about 3% by eliminating its most extreme values of savings. I have argued above that most of these values seem result from unintentional clerical errors. A more impactful change to the data set is the reduction of the sample to the selected joint stock companies. This should bear on the interpretation of the model results.

Figure 4.2: Model diagnostics for the full baseline OLS model.



As regards possible endogeneity, there are certainly possibly relevant factors that would be worth exploring. For example, the expertise of the officials of the contracting authority may be a determinant of savings. The question

remains whether such an indicator would be a relevant determinant that is also correlated with some of the current covariates, thus introducing endogeneity into the model. However worth exploring this question might be, the data available do not allow me to pursue it further. It has to be further noted that the baseline model suffers from heteroskedasticity, as can be seen from the fitted values-standardized residuals plot in Figure 4.2. The *White test* for heteroskedasticity devised by White (1980) performed on the baseline model points to the same conclusion. For this reason, the model results are reported using robust errors based on the so-called HC3 estimator, that is defined as:

$$HC3 = (X'X)^{-1}X'diag\left[\frac{e_i^2}{1-h_{ii}}\right]X(X'X)^{-1}. \quad (4.4)$$

In Equation 4.4, X stands for the regression covariates matrix, e_i stands for the i^{th} residual, and $h_{ii} = x_i(X'X)^{-1}x_i'$. This is a somewhat more robust statistic than an earlier one proposed by White (1980) and is recommended by Long & Ervin (2000) especially for smaller samples on the basis of their Monte Carlo simulation of various scenarios. The HC3 robust errors do not paint a dramatically different picture, though, at least in the case of the full baseline model. None of the variables in the baseline specification lost their significance in comparison to their classical errors. This is a good sign, dramatic differences between the classical and robust errors would imply serious miss-specification issues, as explained by King & Roberts (2015).

Moreover, the residuals-leverage plot in Figure 4.2 shows that while there are some more extreme values in the data set, none of the points seem to exceed the Cook's distance of 1 (respective contour not visible in the plot) that can be described as a commonly used rule of thumb for observations needing attention (Cook & Weisberg 1982, p. 118).

Finally, the question of normality of the distribution of the disturbances remains to be addressed. The Q-Q plot in Figure 4.2 shows that the distribution has rather heavy tails. Indeed, while the skewness of the model residuals distribution is rather low with a skewness of about 0.22, a kurtosis of 6.86 makes the distribution quite clearly leptokurtic. It should thus be concluded that the model's residuals are not perfectly normally distributed. This fact alone does not introduce bias into the model but means that one may not rely on the model's efficiency (Greene 1993, p. 308).

	Full model	Basic	Total assets	Dummies
(Intercept)	−0.0056 (0.0065)	0.0267*** (0.0065)	0.0236*** (0.0065)	−0.0039 (0.0065)
bids	0.0214*** (0.0008)	0.0206*** (0.0008)	0.0219*** (0.0008)	0.0219*** (0.0008)
open	0.0217*** (0.0043)			0.0305*** (0.0043)
eu funded	0.0243*** (0.0042)			0.0110** (0.0041)
lowest	0.0195*** (0.0045)			0.0207*** (0.0045)
constr	−0.0000 (0.0045)			−0.0139** (0.0045)
former	0.0086 (0.0052)	0.0098 (0.0052)	0.0097 (0.0051)	0.0117* (0.0052)
ano	−0.0294*** (0.0058)	−0.0287*** (0.0058)	−0.0323*** (0.0058)	−0.0270*** (0.0058)
size	0.0000*** (0.0000)		0.0000 (0.0000)	
R ²	0.1563	0.1118	0.1371	0.1420
Adj. R ²	0.1556	0.1117	0.1368	0.1417
Num. obs.	10740	22649	12423	18511

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; $p < 0.1$

Table 4.6: The baseline OLS and its reduced variations with HC3 robust errors.

Immediate Results of the Baseline Regression

First of all, the effect of anonymity (the variable *ano*) is very significantly negative throughout all the tested specifications in line with previous research in this area. What is important, the same negative effect cannot be found in the case tenders awarded to formerly anonymous companies (the variable *former*). In some of the models, a significant positive effect could be found. This result strongly depends on the specification, however. It may be a result of model miss-specification in the cases, where it proves to have a significant positive effect. Thus, these two key results seem to be in line with H3.

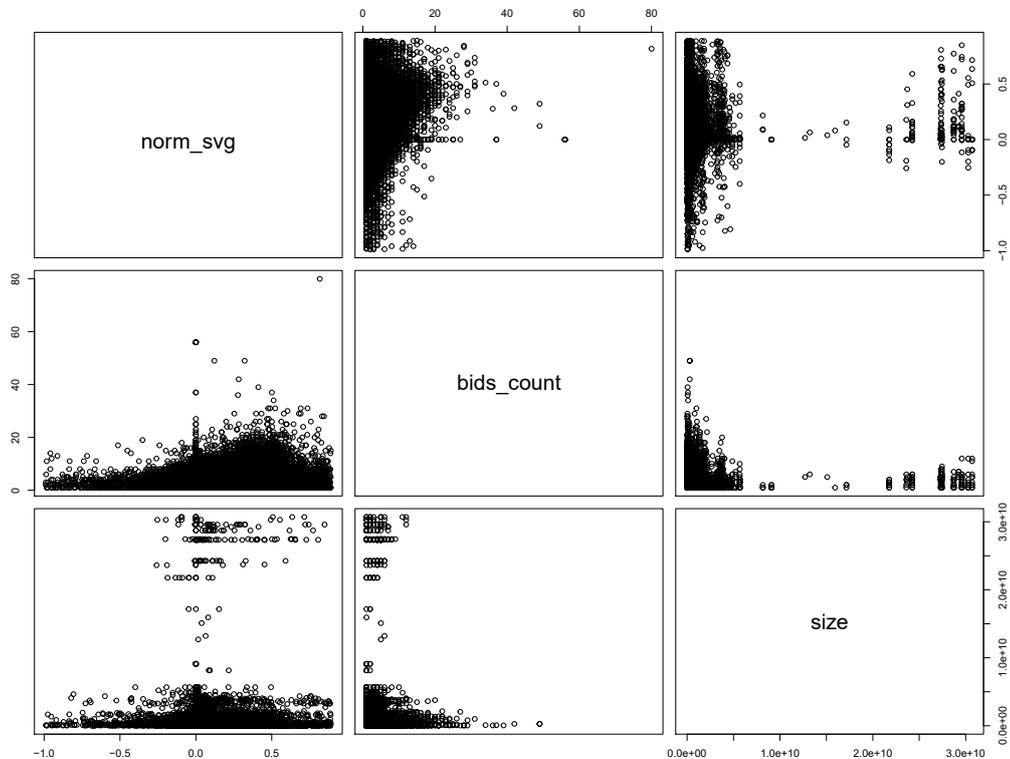
To briefly comment on other results of the model, the number of bids, open procedure, EU funding and application of the lowest price criterion all have a significant positive effect on savings, as was hypothesized. Similarly, company size seems to have a positive effect on savings, albeit negligible in volume. This may be the results of the economies of scope and scale as proposed in the discussion above. The economic interpretation of the dummy for construction works is negative, as expected. The significance of this variable is questionable, however. Below, interactions of this variable will be further explored.

4.4.3 Model Functional Specification

As can be seen from the residual-fitted value plot in Figure 4.2, the residuals tend to become systematically negative with the more extreme fitted values. Some changes in the functional specification were therefore made in attempt to improve the baseline model. Different functional specifications can be discussed in case of two dependent variables: the number of bidders and size-total assets. The remaining covariates are dummy variables. Figure 4.3 presents a matrix of scatterplots constructed between these three variables, i.e. normalized savings (*norm_svg*), the number of bids (*bids_count*) and total assets (*size*). Both the relationships between savings and the remaining two variables seem to indicate that they can be described by a growing concave function. A logarithmic or quadratic transformation may thus intuitively be a suitable transformation in a linear model setting.

For the reasons above, the quadratic and logarithmic transformations of the independent variables have been tested. The quadratic transformation specifically contains both the first and second power of the transformed variable to allow for the general form of the quadratic function: $ax^2 + bx + c$. Including only the quadratic term would effectively set $b = 0$. These transformations are

Figure 4.3: Matrix of scatterplots between the three variables that can be transformed.



not applied to the dependent variable as they would either not be defined in all of its instances or lead to loss of information stored in the dependent variable.

A White test was performed for all the newly specified models and the null hypothesis of homoskedasticity had to be rejected in all instances ($p < 0.01$). For that reason, the results are reported with robust errors. Should the newly specified models be judged by adjusted R^2 , squaring both independent variables yields the best results in terms of explained variance.

Once again, the dummy for anonymity is significantly negative throughout the model specifications, always at least for $p < 0.01$. The dummy for former anonymity remains positive, even significantly so. This result is somewhat surprising. Having accounted for bidder anonymity, it might reflect a relative change in case of the formerly anonymous companies that does not take place in case of the comparators. Nevertheless, the modified specification continues to yield similar results in terms of the answer to H3. Only the quadratic term in the case of size seems to yield curious results. It is negative, i.e. it was fitted as a convex decreasing function. Similarly, the effect of the logarithmic

	log/log	log/square	square/log	square/square
(Intercept)	0.1126*** (0.0293)	-0.0231*** (0.0066)	0.0913** (0.0296)	-0.0269*** (0.0067)
log(bids)	0.0955*** (0.0027)	0.0955*** (0.0027)		
open	0.0230*** (0.0043)	0.0227*** (0.0043)	0.0201*** (0.0041)	0.0196*** (0.0042)
EU funded	0.0185*** (0.0043)	0.0210*** (0.0042)	0.0213*** (0.0041)	0.0239*** (0.0041)
lowest	0.0228*** (0.0045)	0.0227*** (0.0045)	0.0200*** (0.0045)	0.0197*** (0.0045)
constr	0.0000 (0.0043)	0.0018 (0.0044)	-0.0081 (0.0044)	-0.0063 (0.0044)
former	0.0275*** (0.0061)	0.0166** (0.0054)	0.0253*** (0.0060)	0.0154** (0.0054)
ano	-0.0213*** (0.0062)	-0.0280*** (0.0059)	-0.0196** (0.0061)	-0.0256*** (0.0058)
log(size)	-0.0076*** (0.0016)		-0.0066*** (0.0016)	
size		-0.0000** (0.0000)		-0.0000** (0.0000)
size ²		0.0000*** (0.0000)		0.0000*** (0.0000)
bids			0.0317*** (0.0011)	0.0317*** (0.0011)
bids ²			-0.0006*** (0.0001)	-0.0006*** (0.0001)
R ²	0.1508	0.1506	0.1664	0.1668
Adj. R ²	0.1501	0.1499	0.1657	0.1660
Num. obs.	10737	10737	10737	10737
R ²	0.1508	0.1506	0.1664	0.1668
Adj. R ²	0.1501	0.1499	0.1657	0.1660
Num. obs.	10737	10737	10737	10737

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 4.7: Results for quadratic and logarithmic functional transformations. The first part of the model description describes the transformation of the bids variable, the second part describes the transformation of the size variable.

transformation of size on savings is negative. This invalidates my above hypothesis about economies of scope and scale. The effect of size in the baseline specification might have been influenced by the functional miss-specification of the number of bidders variable.

In case of the *constr* dummy, no significant effect can be seen even after the change in functional specification. Thus, on a sample of anonymous and joint stock companies, the fact that the tender concerns construction works did not have an individually significant effect on standardized savings. Of course, this does not rule out the possibility that this variable interacts interestingly with other variables in the model or that exploring such tenders as a subset would yield more results.

One could further e.g. train the model according to a given performance metric. The purpose of the above exercise was not to build a predictive model, however. Rather, the idea was to test a hypothesis concerning the relation between tender savings and company ownership structure transparency. The remarkable takeaway is that the anonymity dummy seems to be negative and significant across different specifications, while former anonymity seem to have either no significant effect on tender savings or even a somewhat positive effect.

4.4.4 Other Possible Treatments

The values of standard errors can be corrected for heteroskedasticity using robust errors as described above. Another possible treatment is the weighted least squares (WLS) approach that allows to deal with heteroskedasticity. Essentially, every variable in the i^{th} observation is divided by an estimate of the conditional standard deviation $\sqrt{\text{Var}(y_i|x_i)}$ for every i . Subsequently, an OLS regression is run on this weighted data set. In comparison to simply running an OLS regression with robust errors, this approach allows for efficiency gains, as explained by (Wooldridge 2001, p. 56). The WLS approach has been taken e.g. by Pavel *et al.* (2013).

Nonetheless, I have opted not to implement this model because of the inherent difficulty with estimating the conditional variance—the necessary condition for the model’s good performance. As (Wooldridge 2001, p. 56) points out, this approach is often not necessary, especially in the case of larger samples.

Chapter 5

Commentary on the Results

Out of the three hypotheses tested above, strong evidence in favor of H3 and weaker evidence in favor of H2 was found. In other words, while no evidence of a significant long-term decrease in volume of tenders awarded to anonymous companies was found, the savings on individual tenders were significantly lower in case of anonymous companies but no such negative effect was found in the case of formerly anonymous companies. Weak evidence of a long-term decrease of profitability was found in case of formerly anonymous companies. In this Chapter, I propose an interpretation of the results in a broader context. On a general level, I argue that the results presented in this master's thesis show a positive impact of abolishing anonymous shares in a follow up on relevant research concerning Czech public procurement transparency.

5.1 Why no Decrease in Tender Volume was Found?

The first hypothesis of this master's thesis was to verify whether formerly anonymous companies were awarded fewer tenders (in terms of lower volume). The idea was that if a non-negligible part of them was used as a vehicle to pursue illicit goals through public procurement, they should lose at least some of the motivation to participate in procurement proceedings after becoming more transparent. Similarly, officers of contracting authorities should lose the motivation to award a tender to an entity that cannot be further exploited.

No clear long-term effect was found, though. The overview of the data set in Chapter 3 also does not depict a clear drop in share in total volume of public procurement when data for former and current anonymous companies is combined. I believe that this has to do with two important points. First,

anonymous companies were quite abundant shortly after 2010, they formed more than half of all the joint stock companies in 2013, as already noted in Chapter 3. Second, the answer to H1 will likely depend on the specifics of the theory of anonymous companies exploitation. Can most of the irregularities found in previous research be ascribed to “shell” companies set up for that exclusive purpose or did they happen through abuse of otherwise well-established companies?

The first point might hint that a large proportion of anonymous companies was likely not abused for illicit reasons in connection to public procurement. The anonymity of the ownership structure is certainly convenient for hiding conflicts of interest, but there are also legitimate reasons for which one might opt for this form of shares. The structure seems to be linked to lower transaction costs, as explained in Chapter 2. This could explain why many formerly anonymous companies continued to win tenders even after the large shift away from anonymous companies in 2010. The question remains, can a specific subset of anonymous companies be found, where such a drop can be identified?¹

Here, the second point is pivotal. Should most of the exploited anonymous companies be mere shells that served illicit purposes, they would lose a reason to function further or at least to participate in public procurement. Should they be established businesses, the impact would likely not be that dramatic. In the former case, identifying the group of “failed” anonymous companies would likely be a question of finding the right distinguishing feature. In the latter case, a strong effect might just not be there.

There is also a third explanation, of course. Beneficial owners of anonymous companies in the first or the second case could have replaced the legislative veil of anonymity by a contract-based relationship with a nominee shareholder. Arguably, such a set up is riskier for the proper beneficial owner of the entity because of the necessary trust vested in their nominee. This does not render the set up impossible or implausible, though. It merely makes it costlier in terms of risk. The results pertinent to H1 cannot provide a definite answer to these outstanding questions but reading them in conjunction with the remaining results seems to provide better insight.

¹Admittedly, the construction of the sample aimed at comparability. If the effect tested in the case of H1 can only be observed in the case of extreme outliers, these would not appear in the sample. It can still be said that this is not a systematic and widespread phenomenon, unlike other results discussed below, though.

5.2 Why Did Savings Increase?

Unlike the case of anonymous companies, no significant negative effect on tender savings was found for formerly anonymous companies. On the contrary, they might have had a somewhat positive impact within the selected data set. The notion of savings expressed as the difference between estimated and final price should be interpreted cautiously—as already explained in Chapter 3. Keeping this in mind, it is the discrepancy that is interesting here. The relationship between ownership transparency and company efficiency can prove difficult to inform some of the irregularities observed in the case of anonymous companies as can be seen from the discussion in Chapter 2. But the savings are related to the efficiency and precision of the procurement procedure, not so directly connected to the efficiency of individual bidders.

I see no economically plausible explanation why a mere change in the bidder's share form should lead to an apparent change in the way the procurement procedure performs. Some of the formerly anonymous companies ceasing to be abused for illicit reasons could be a valid explanation, on the other hand. An optimistic interpretation would be that they ceased to be abused altogether, but the results presented in this master's thesis do not provide sufficient evidence for such a claim. The results can mean that the practice of corruption through inflating tender prices has been at least limited, though. For other possible ways of exploitation, the research on awarded tenders and donations to political parties conducted by Titl & Geys (2019) proves to be quite informative, for example.

The last finding also speaks against the hypothesis that most of the companies in the sample were set up as single purpose shells. Even if the companies found other ways of concealing their beneficial ownership, their continuing participation in procurement procedures speaks against the idea that a majority of them would be exploited for that purpose specifically.

5.3 Tender-Specific Savings and Company Profits

There should logically be a negative relation between the profits of tender winners and tender-specific savings. The confirmation of H3 indicates that while tenders awarded to anonymous companies registered lower savings in line with the findings of Chvalkovská *et al.* (2012), the same does not hold for former anonymous companies (as was predicted). Supportive evidence for H2

is present, albeit weaker. The formerly anonymous companies in the sample have achieved lower mean and median performance measured both by ROE and ROA. This discrepancy proves to be significant under the Welch test for ROA, but not under the Mann-Whitney U test. I argue that the Welch test is the preferred metric in this case, but further robustness checks are in place.

It should be noted here that different methods were used to test H2 and H3. Perhaps most importantly, H3 (as tested) does not ask explicitly about the class of comparators while the testing of H2 was based on a direct comparison. Therefore, the link between H2 and H3 is not quite straightforward. In my opinion, the trend observable in the profitability ratios of the formerly anonymous companies (or the absence thereof) further supports the findings concerning H3, but a dramatic drop would rather have to be linked to a decline in economic activity that should also be visible in the results concerning H1.

5.4 How Can the Results Inform Future Policy?

First of all, I believe that the above evidence points to the conclusion that effectively abolishing anonymous shares was a correct decision. The results show that anonymous companies were awarded tenders for hardly explainable higher prices and the same effect was not found for companies that switched their ownership structure.

This is not just a hypothetical or purely retrospective exercise. The safeguards of procurement transparency are multifaceted. A part of the change in the regulatory landscape was brought about by abolishing anonymous shares as such, another part is formed by transparency safeguards in the rules on public procurement. I have demonstrated in Chapter 2 that many of these rules are the initiative of the Czech national legislature that are not required by relevant EU law: they can be removed by an Act of Parliament without legal consequences for the Czech Republic. Indeed, a governmental legislative proposal introduced as recently as in the second quarter of 2020 loosens some of these rules.² This may be a justified effort. One may certainly imagine cases of utmost urgency, where some of the formal requirements are better to be dropped. The original purpose of transparency rules in procurement proceedings should be not be neglected in discussions of such restrictions, however. To borrow an open-ended statement used by lawyers, any restriction of rules and principles

²See Chamber of Deputies file No. 862 from the eight voting period. Available at <https://www.psp.cz/sqw/text/tiskt.sqw?O=8&CT=862&CT1=0>.

governing procurement transparency should be proportionate. Based on the results above, they seem to have a positive effect.

Chapter 6

Conclusion

This master's thesis undertook to examine the participation of formerly anonymous companies in Czech public procurement in an effort to follow up on earlier research in this area. Previous research has already shown that anonymous companies participating in public procurement seemed to have abnormally high profits, have tenders awarded for abnormally high prices and have a disproportionate share of tenders awarded valued just below regulatory thresholds for simpler proceedings. Because anonymous shares have been abolished since 2014 and a number of rules was established to enhance the transparency of procurement proceedings, this thesis looks at the story of anonymous companies after switching to a more transparent ownership structure.

Three specific hypotheses were tested. First, whether formerly anonymous companies participated on a lower share of tenders after switching to a more transparent setup (**H1**). Second, whether the profits of formerly anonymous companies participating in public procurement dropped after switching to a more transparent ownership structure (**H2**). Third, whether formerly anonymous companies continue to be awarded tenders for inflated prices (**H3**). The hypotheses were tested on a data set of joint stock companies, half of which used to be anonymous and the other half being comparators selected based on their similar traits to their anonymous peers.

H1 and H2 were tested by comparing (1) average share on total volume of public procurement and (2) averages of standardized ROE and ROA performance indicators before and after switching to a more transparent structure. The switching date was determined based on the nearest anonymous peer in case of the comparators. The populations of anonymous companies and the comparators were tested based on an unequal variances t-test (Welch's test).

There is some evidence of a drop in profitability, but the results do not show a conclusive difference between the two populations, though.

H3 was tested by regressing standardized savings on dummies for anonymous and formerly anonymous companies accompanied by a number of covariates in all tenders awarded to companies in the data set that were published between mid 2006 and 2019. Anonymity of the tender winner was found to have a highly significant negative effect on tender-specific savings that was robust throughout a number of different model specifications. The dummy for formerly anonymous companies, on the other hand, proved to have a positive effect, if any.

I interpret the above results as a possible shift away from a practice of inflating prices of tenders awarded to anonymous companies. This seems to go hand in hand with a slightly reduced profitability of these companies. There has not been a significant drop in the volume of tenders awarded to anonymous companies in comparison to their more transparent peers, though. The proposed reason for this finding lies in two points. First, joint stock companies with anonymous shares were a popular legal form shortly after 2010 and there might exist legitimate reasons to opt for issuing anonymous shares. Thus, many of the anonymous companies might have had nothing to do with the illegitimate pursuits identified in previous research. Second, the development of the share of formerly anonymous companies on total public procurement also depends on the way the company was abused. Should it be set up almost exclusively for the purposes of identity protection, it would either lose its purpose or have to employ a nominee shareholder after changing the form of its shares. Alternatively, the company may be a well-established business that is also abused for illicit purposes. Then, a dramatic drop in the volume of awarded tenders does not have to be warranted after a change in the form of shares. Because no significant negative effect on tender savings was found in case of the formerly anonymous companies, it is proposed that the latter explanation is more likely.

Thus, this master's thesis extends previous research on anonymous companies in public procurement by describing their behavior after ceasing to be anonymous. I believe that the changes in tender savings and performance of formerly anonymous companies further validate the previous suggestions about the problematic nature of anonymous shares. Of course, the results concerning former anonymous companies in public procurement can be certainly further elaborated upon. For example, future research may pursue to identify distinctive subgroups of formerly companies that have indeed been awarded a lower

volume of tenders after switching to another form of shares or study possible short term effects of share switching. Looking more closely on the effects of the duty to disclose information on beneficial owners may also be rather interesting.

The conclusion of this master's thesis is that the results concerning formerly anonymous companies point in the direction of a positive effect of abolishing anonymous shares in relation to public procurement. Inflating final tender prices is certainly not the only possible source of inefficiencies or possible state capture in public procurement. As long it is one of them, as previous research and this thesis indicate, there is a case to be made to attempt to limit it.

Bibliography

- BALAKRISHNAN, K., J. L. BLOUIN, & W. R. GUAY (2019): “Tax aggressiveness and corporate transparency.” *The Accounting Review* **94(1)**: pp. 45–69.
- BERGLÖF, E. & A. PAJUSTE (2005): “What do firms disclose and why? Enforcing corporate governance and transparency in Central and Eastern Europe.” *Oxford Review of Economic Policy* **21(2)**: pp. 178–197.
- BURR, I. W. & P. J. CISLAK (1968): “On a general system of distributions I. Its curve-shape characteristics II. The sample median.” *Journal of the American Statistical Association* **63(322)**: pp. 627–635.
- BUSHMAN, R. M., J. D. PIOTROSKI, & A. J. SMITH (2004): “What determines corporate transparency?” *Journal of accounting research* **42(2)**: pp. 207–252.
- ČERNÁ, S. (2006): *Obchodní právo: Akciová společnost*. Obchodní právo. ASPI.
- CHI, L.-C. (2009): “Do transparency and disclosure predict firm performance? Evidence from the Taiwan market.” *Expert Systems with Applications* **36(8)**: pp. 11198–11203.
- CHVALKOVSKÁ, J., P. JANSKÝ, & J. SKUHROVEC (2012): “Listinné akcie na majitele a veřejné zakázky.” *Politická ekonomie* **60(3)**: p. 349.
- CHVALKOVSKÁ, J. & J. SKUHROVEC (2010): “Measuring transparency in public spending: case of Czech public e-procurement information system.” *Technical report*, IES working paper.
- COOK, R. D. & S. WEISBERG (1982): *Residuals and influence in regression*. New York: Chapman and Hall.

- DEMSETZ, H. & K. LEHN (1985): “The structure of corporate ownership: Causes and consequences.” *Journal of political economy* **93(6)**: pp. 1155–1177.
- DERKOVÁ, R., J. PETROVÁ, & A. HAVLOVÁ (2017): “Prokazování skutečných majitelů v zadávacích řízeních.” *epravo.cz* .
- DVOŘÁK, D., T. MACHUREK, P. NOVOTNÝ, M. ŠEBESTA, D. KOSMÁKOVÁ, F. KRUMBHOLC, D. MAREŠ, H. BOROŠOVÁ, J. GALÁŘ, D. GULDOVÁ, J. JEŘÁBEK, M. LÁTAL, L. LELITOVSKÁ, M. MACHÁLKOVÁ, V. MÜLLER, & L. PODOLOVÁ (2017): *Zákon o zadávání veřejných zakázek*. Prague: C. H. Beck.
- ECCLESTON, R. & R. WOODWARD (2014): “Pathologies in international policy transfer: The case of the oecd tax transparency initiative.” *Journal of Comparative Policy Analysis: Research and Practice* **16(3)**: pp. 216–229.
- FATF (2019): *International Standards on Combating Money Laundering and the Financing of Terrorism & Proliferation*. Paris: FATF.
- FAY, M. P. & M. A. PROSCHAN (2010): “Wilcoxon-mann-whitney or t-test? on assumptions for hypothesis tests and multiple interpretations of decision rules.” *Statistics surveys* **4**: p. 1.
- G20/OECD (2015): *G20/OECD Principles of Corporate Governance*. OECD Publishing.
- GELDERMAN, C. J., W. T. PAUL, M. J. BRUGMAN *et al.* (2006): “Public procurement and EU tendering directives—explaining non-compliance.” *International Journal of Public Sector Management* .
- GOVERNMENT OF THE CZECH REPUBLIC (2016): “Důvodová zpráva k zákonu č. 134/2016 sb., o zadávání veřejných zakázek.” Online.
- GREENE, W. (1993): *Econometric Analysis*. Econometric Analysis. Prentice Hall.
- GREENE, W. (2003): *Econometric Analysis*. Prentice Hall.
- GREGA, M. & J. NEMEC (2015): “Factors influencing final price of public procurement: Evidence from slovakia.” *Procedia Economics and Finance* **25(7)**: pp. 543–551. S16th Annual Conference on Finance and Accounting, ACFA Prague 2015, 29th May 2015.

- HABIB, A. (2008): “Corporate transparency, financial development and the allocation of capital: empirical evidence.” *Abacus* **44(1)**: pp. 1–21.
- HINNEKENS, L. (2000): “European commission introduces beneficial ownership in latest tax directives proposals adding to the confusion with regard to its meaning.” *EC Tax Review* **9(1)**: pp. 43–44.
- JOSEF, J. (2013): *Finance v globální ekonomice I: Peníze a platební styk*. Grada Publishing a.s.
- JURČÍK, R. (2011): *Zákon o veřejných zakázkách*. C. H. Beck, second edition edition.
- KASUYA, E. (2001): “Mann-whitney u test when variances are unequal.” *Animal Behaviour* **61**: pp. 1247–1249.
- KIM, Y., J. LEE, & T. YANG (2013): “Corporate transparency and firm performance: Evidence from venture firms listed on the korean stock market.” *Asia-Pacific Journal of Financial Studies* **42(4)**: pp. 653–688.
- KING, G. & M. ROBERTS (2015): “How robust standard errors expose methodological problems they do not fix, and what to do about it.” *Political Analysis* pp. 159–179.
- KUHLMAN, J. M. & S. R. JOHNSON (1983): “The number of competitors and bid prices.” *Southern Economic Journal* pp. 213–220.
- LINDENBERG, E. & S. ROSS (1981): “Tobin’s q ratio and industrial organization.” *Journal of business* pp. 1–32.
- LONG, J. S. & L. H. ERVIN (2000): “Using heteroscedasticity consistent standard errors in the linear regression model.” *The American Statistician* **54(3)**: pp. 217–224.
- LUKOVIČ, R. (2018): “K rozdělení nejnižší nabídkové ceny jako hodnotícího kritéria.” *epravo.cz* .
- MALARA, M. & M. MAZURKIEWICZ (2012): “Modelling the determinants of winning in public tendering procedures based on the activity of a selected company.” *Operations research and decisions* **22(1)**: pp. 51–62.

- MAN, P., J. MATĚJKOVÁ, R. JURČÍK, & R. HEIDU (2014): “The key factors of transparency of the public procurement in the czech republic.” *Procedia Economics and Finance* **12**: pp. 379–386.
- MAN, P., M. VYKLIČKÝ, & R. HEIDU (2015): “Selected factors influencing public procurement in the czech republic.” *Theoretical and Practical Aspects of Public Finance* **2015**: pp. 137–142.
- MANN, H. B. & D. R. WHITNEY (1947): “On a test of whether one of two random variables is stochastically larger than the other.” *The annals of mathematical statistics* pp. 50–60.
- MEUNIER, D. (2018): “Hidden beneficial ownership and control: Canada as a pawn in the global game of money laundering.” *CD Howe Institute* **519**.
- MILLAR, C. C., T. I. ELDOMIATY, C. J. CHOI, & B. HILTON (2005): “Corporate governance and institutional transparency in emerging markets.” *Journal of business ethics* **59(1-2)**: pp. 163–174.
- MINISTRY OF LOCAL DEVELOPMENT (2019): “Výroční zpráva o stavu veřejných zakázek v České republice za rok 2018.” Online.
- MLÍČKO, D. (2011): “Změna v základních kvalifikačních předpokladech - novela zákona o veřejných zakázkách zákonem č. 423/2010 Sb.” *epravo.cz* .
- NEUHAUSER, M. (2002): “Two-sample tests when variances are unequal.” *Anim Behav* **63**: pp. 823–825.
- NIKOLOVOVÁ, P., J. PALGUTA, F. PERTOLD, & M. VOZÁR (2012): “Veřejné zakázky v ČR. Co říkají data o chování zadavatelů.” *Praha: CERGE-EI. Studie* **5**: p. 2012.
- OCHRANA, F., V. ABONYIOVÁ, M. PLAČEK, & M. J. PŮČEK (2015): “Competitive effect in public procurement.” *Theoretical and Practical Aspects of Public Finance 2015* p. 178.
- OCHRANA, F. & K. HRNČÍŘOVÁ (2015): “Does the lowest bid price evaluation criterion make for a more efficient public procurement selection criterion? (case of the czech republic).” *NISPAcee Journal of Public Administration and Policy* **8(1)**: pp. 41 – 59.

- OCHRANA, F. & J. PAVEL (2013): "Analysis of the impact of transparency, corruption, openness in competition and tender procedures on public procurement in the czech republic." *Central European Journal of Public Policy* **7(2)**: pp. 114–134.
- OECD (2010): *Tax Co-operation 2010 Towards a Level Playing Field: Towards a Level Playing Field*. Tax Co-operation. OECD Publishing.
- OECD (2018): "Tax transparency 2018: Report on progress." online.
- PALGUTA, J. & F. PERTOLD (2017): "Manipulation of procurement contracts: Evidence from the introduction of discretionary thresholds." *American Economic Journal: Economic Policy* **9(2)**: pp. 293–315.
- PAVEL, J. (2009): "Ako ovplyvňuje počet uchádzačov o verejnú zákazku cenu verejnej zákazky?" *Transparency International Slovensko*. .
- PAVEL, J. (2010): "Analýza vlivu míry konkurence na cenu rozsáhlých staveb dopravní infrastruktury." *Politická ekonomie* **58(3)**: pp. 343–356.
- PAVEL, J. (2014): "Factors affecting the value of compliance costs of public procurement." In "19th international expert conference "Theoretical and Practical Aspects of Public Finance", Vysoká škola ekonomická v Praze," pp. 11–12.
- PAVEL, J., E. SIČÁKOVÁ-BEBLAVÁ *et al.* (2013): "Do e-auctions really improve the efficiency of public procurement? the case of the slovak municipalities." *Prague Economic Papers* **22(1)**: pp. 111–124.
- POKORNÁ, J., Z. KOVAŘÍK, & Z. ČÁP (2009): *Obchodní zákoník, komentář - obchodní společnosti*, pp. 257 – 1079. Praha: Wolters Kluwer ČR, a. s., 1. edition.
- PŮČEK, M. & F. OCHRANA (2014): "Theory and practice of the public sector savings: the case of czech regions." *Transylvanian Review of Administrative Sciences* **10(42)**: pp. 203–224.
- REESE JR, W. A. & M. S. WEISBACH (2002): "Protection of minority shareholder interests, cross-listings in the united states, and subsequent equity offerings." *Journal of financial economics* **66(1)**: pp. 65–104.

- RUXTON, G. D. (2006): “The unequal variance t-test is an underused alternative to student’s t-test and the mann–whitney u test.” *Behavioral Ecology* **17(4)**: pp. 688–690.
- SAUSSIÉ, S. & J. TIROLE (2015): “Strengthening the efficiency of public procurement.” *Notes du conseil d’analyse économique* **22(3)**: pp. 1–12.
- SHARMAN, J. C. (2010): “Shopping for anonymous shell companies: An audit study of anonymity and crime in the international financial system.” *Journal of Economic Perspectives* **24(4)**: pp. 127–40.
- SIČÁKOVÁ-BEBLAVÁ, E. & J. PAVEL (2008): “Transparentnosť trhu verejného obstarávania v Českej republike a v slovenskej republike / transparency of public procurement market in the czech republic and slovakia.” *Ekonomický časopis / Journal of Economics* **56(2)**: pp. 168–181.
- SKUHROVEC, J. (2016): “Anonymní akcie žijí dál.” *aktualne.cz* Accessed: 2019-12-08.
- SKUHROVEC, J. (2017): *Three essays on public procurement*. Ph.D. thesis, Charles University.
- SOKAL, R. R. & F. J. ROHLF (1987): *Introduction to Biostatistics*. Dover Publications, 2 edition.
- STAKE, J. (2017): “Evaluating quality or lowest price: consequences for small and medium-sized enterprises in public procurement.” *The Journal of Technology Transfer* **42(5)**: pp. 1143–1169.
- STEHLÍK, P. (2018): “The competitive effect on public procurement for public service contracts: the case of the czech republic.” *Ekonomický časopis* **66(04)**: pp. 416–427.
- TITL, V. & B. GEYS (2019): “Political donations and the allocation of public procurement contracts.” *European Economic Review* **111**: pp. 443–458.
- TRYBUS, M. (2005): “Improving the efficiency of public procurement systems in the context of the european union enlargement process.” *Pub. Cont. LJ* **35**: p. 409.
- VONDRÁČEK, O. (2012): “Are paper shares harmful: A case for economic analysis of law in the perspective of behavioural economics.” *Common L. Rev.* **12**: p. 27.

- WELCH, B. L. (1938): “The significance of the difference between two means when the population variances are unequal.” *Biometrika* **29(3/4)**: pp. 350–362.
- WHITE, H. (1980): “A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity.” *Econometrica: journal of the Econometric Society* pp. 817–838.
- WILCOXON, F. (1945): “Individual comparisons by ranking methods. biometrics bulletin 1, 6 (1945), 80–83.” URL <http://www.jstor.org/stable/3001968>
- WOOLDRIDGE, J. M. (2001): *Econometric Analysis of Cross Section and Panel Data*. The MIT Press, 1 edition.
- ZUCMAN, G. (2014): “Taxing across borders: Tracking personal wealth and corporate profits.” *Journal of economic perspectives* **28(4)**: pp. 121–48.