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MASTER THESIS

**State capture as market distortion:
Effect of political connections
in the Czech Republic**

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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 a different or the same degree.

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Prague, May 19 2017

Martin Špolc

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Abstract

Politically connected firms may extract rent which significantly improves their financial performance, but with social costs to others in form of market distortions. The thesis presents the first empirical analysis of personal political connections to government ministers in the Czech Republic. We estimated value of political connections and inspected subsidies and public procurements allocation as channels of rent extraction on firm-level data set of 1993-2015 period. For both approaches, cross-section regressions and dynamic matching on covariates and propensity score, we found that connected firms significantly underperform their similar rivals, but slightly improve their performance over the time of connection to minister in office. Connected firms gain significantly more subsidies which confirms subsidy allocation as a channel of rent extraction. We interpret our results that firms may seek political connections as the last option how to improve their bad financial results and remain on the market. Biased subsidy allocation to connected firms in sectors where firms are dependent on subsidies like agriculture creates market distortions and could lead to significant consumer harm.

JEL Classification D72, D22, H25, H57

Keywords state capture, political connections, firms performance, rent-seeking, conflict of interests, economic effects

Firmy s politickými konexemi mohou čerpat rentu, která jim významně zlepší finanční výsledky, ale toto jednání přináší celospolečenské náklady ve formě deformací trhu. Tato diplomová práce představuje první empirickou analýzu personálních politických konexí na ministry ve vládě v České republice. V práci odhadujeme hodnotu politických konexí a zkoumáme přidělování dotací a veřejných zakázek jako formy získávání renty s využitím firemních dat od roku 1993 do roku 2015. Firmy s politickými konexemi mají signifikantně horší výsledky než jejich obdobní konkurenti, ale v průběhu napojení na ministra ve funkci své výsledky lehce zlepšují. Napojené firmy též získávají signifikantně větší objem dotací, což potvrzuje přidělování dotací jako jednu z forem získávání renty. Výsledky jsou robustní pro obě metody, jak pro regrese na průřezových datech, tak pro párování na základě pozorovaných proměnných a propensity skóre. Firmy nejspíše usilují o politické konexe, když se nacházejí ve špatné finanční situaci a vidí dobývání renty skrze konexe jako jediný způsob setrvání na trhu. Přidělování dotací vychýlené směrem k firmám s politickými konexemi vytváří značné deformace na trhu zvláště v odvětvích, kde jsou firmy na dotacích závislé, jako je například zemědělství, a v těchto oblastech může vést k významnému poškození spotřebitelů.

JEL Klasifikace D72, D22, H25, H57

Klíčová slova ovládnutí státu, politické konexe, výkonnost firem, dobývání renty, střet zájmů, ekonomické dopady

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Abbreviations

NACE	Nomenclature of Economic Activities (in original Nomenclature des Activités Économiques dans la Communauté Européenne)
OLS	Ordinary Least Squares
PPOA	Public Procurements on Assets
PPOE	Public Procurements on Equity
ROA	Return on Assets
ROE	Return on Equity
SOA	Subsidies on Assets
SOE	Subsidies on Equity
VAT	Value Added Tax

Master's Thesis Proposal

Author	Bc. Martin Špolc
Supervisor	PhDr. Pavel Vacek, Ph.D.
Proposed topic	State capture as market distortion: Effect of political connections in the Czech Republic

Motivation Connections and relationships between state and business are crucial characteristic for overall performance of the economy. State capture, a situation in which private firms influence a state's policy in favor of their private interests, shapes the affected markets into inefficient state where captors exploits monopolistic powers. Such practice then leads not only to wasting of public resources in form of subsidizing captors directly, via favorable public procurements, through fitting legislature or cheap and accessible credit but it creates market distortions which harm consumer welfare in form of higher prices and lower quality of goods.

Recent development in the Czech Republic shows the question of state capture as an actual topic. Political connections between firms and political parties in form of donations seen as an investment were inspected by Palanský (2016) and Skuhrovec (2015). Such practices could lead to state capture, but there exists a more direct approach for captors with possibly more severe consequences - when businessman or his/her puppet wins the political office and exploits the power to increase economic performance of his/her business enterprise or reversely politician in office starts business supported by the public funds under his/her control. To author's knowledge such connections and their consequences have never been analyzed in the Czech republic.

Political connections in the personal overlap between business owners and politicians in office were analyzed in the foreign literature mainly using data from stock exchange market (for example Faccio 2006, Goldman 2009, Niessen and Ruenzi 2010). Alternative approach using data about firms from MagnusWeb database must be applied, because Czech stock market plays minor role in the Czech economy. More importantly politicians often cover their ownership of connected companies by usage of anonymized shares of firms in offshore tax havens. This issue could be partly solved by using revealed information from leaked Panama Papers and newspaper ar-

ticles analysis. Analysis of all available data would hopefully detect unknown harmful relationships between politicians and firms.

Hypotheses

1. Hypothesis # 1: Firms owned by politicians or connected to politicians in power are more profitable, win more public procurements and gain more resources from subsidies than their similar rivals.
2. Hypothesis # 2: The effect of owner being in political office (political rent) would be lagged.
3. Hypothesis # 3: These connections (firm owner in political office) cause harm to consumers.

Methodology I will use data from MagnusWeb database about all firms registered in the Czech Republic and the dataset of politicians in office (mainly ministers of the government, possible extension to regional governors) to inspect the value of rent gathered by captors (politicians and factual business owners in one person as first direct type of connection, newspaper discussed connection as second indirect type). The first step of the analysis would be the data collection, datasets merging using the name and date of birth of the minister as the merging criterion and preparing for statistical analysis.

I would like to use simplified OLS model on data averaged over time estimating the relationship between variable of firm performance (profit, ROA, ROE, volume of public procurements won, volume of subsidies gained, leverage and cost of credit and so on if the data would be accesible) and explanatory variables - the crucial dummy variable indicating owner in political office and other variables with firm characteristics. Then I will try to use more sophisticated methods for panel data regression as random or fixed effects estimation. In this model specification I will be able to test hypothesis about lagged effect of the political rent. To compare firms owned by politicians with their similar rivals (but not owned by politician) I would like to use dynamic matching procedure or another algorithm based way of comparison.

In the case of data accessibility I would like to test hypothesis that market distortions created by political connections lead to loss of consumer welfare. For example that highways built by politically connected firm have higher percentage of reclamation and early reconstructions (quality loss). Another example could be that after firm gains political rent some competitors leave the market (loss of variability) or the price of goods will rise (lower competition). I expect that firms connected to politicians would gain political rent in form of increased profit or other measures (as

another type of political connections in Palanský (2016)), that this effect would be lagged and would lead to loss of consumer welfare.

Expected Contribution I will conduct a comprehensive analysis combining accessible data resources to inspect actual and crucial economic topic of connection between business and politics. To author's knowledge personal connections (firm owner in political office) and their consequences have never been analyzed using Czech data. Results would be relevant for policy analysis. Possible uncovering of existing political connections can increase awareness of journalists and authorities, results could also serve as a complementary material for change of conflict of interest legislature.

Outline

1. Introduction
2. State capture theory and literature overview
3. Data description
4. Methodology
5. Results and discussion of the results
6. Conclusion

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Author

Supervisor

Chapter 1

Introduction

„The essence of Government is power; and power, lodged as it must be in human hands, will ever be liable to abuse.“

James Madison,
Father of the U.S. Constitution

Throughout history, economic and political power was often concentrated in hands of the same people. Mutual interaction of powers, use of political power backed by military force for economic gains and use of economic wealth to shape politics and pay loyal military force, tended to the equilibrium of one merged political-economic elite. We have seen despotism, slavery, economic stagnation and military aggression as a consequences of power concentration. Empires and countries with separated power (at first between the church and the state, later within the state to a legislature, an executive, and a judiciary) evolved faster over centuries and gained economic dominance. Separation of power including economic and political power enabled economic growth and human dignity.

Political connections of big corporations to politicians in power could endanger power separation with possible reoccurrence of negative consequences known from the history. Private firm may gain abnormal profit from political connection, but at the costs of others. Concentration of political and economic power in form of connection between firms and politicians leads in many cases to market distortions by favoring connected firms and violation of the *rules of the game* on the market. Firms have extraordinary incentives to seek rent from political connections in modern economies with sophisticated legislature and regulations, redistributive public sector offering possibility of rent at one hand and competitive market with low margins on the other.

The Czech Republic faces serious concentration of political and economic power since 2013 when the second richest businessman, Andrej Babiš, gained as a leader

of his political movement the second highest number of votes and became Minister of finance in the new established government (Lopatka [2017]). His success was mainly motivated by long term struggles of traditional political parties with scandals of corruption and business and politics penetration. Despite such economic and political environment, no one has analyzed effects of personal connections between firms and governmental ministers (later also Ministers) in office. We¹ conducted the first empirical analysis based on the Czech firm level data to investigate topic of personal connections.

We identified personal connections between firms and all Ministers in office between 1993 and 2015 to estimate value of political connections and to identify channels of rent extraction. We expected that political connections would have positive value as measured in financial results with lagged effect. As a major sources of rent extraction we supposed subsidy allocation and public procurement contracts therefore we expected higher volume of subsidies and public procurement contracts for connected firms. For both methodologies, cross-section models and dynamic matching on covariates and propensity score, we found significant effect of connections and identified subsidy allocation as a channel of rent extraction.

The thesis is structured as follows. Chapter 2 presents economic theory background, review of academic literature, and legal background of the Czech Republic. Chapter 3 explains data sources used for the analysis and data set characteristics. Chapter 4 follows with explanation of methodology and definition of personal connections between firms and Ministers. Chapter 5 provides and discusses the results of the analysis and offers interpretation with policy implications. Chapter 6 states main conclusions and suggests possible future research.

¹I use plural term *we* instead singular *I* in the thesis. Plural is more common in economic academic literature and in my opinion increase text readability.

Chapter 2

State capture theory and literature overview

Chapter 2 presents summary of different approaches to analysis of rent-seeking behavior and topic of political connections leading to state capture. In section 2.1 we describe how economic theory explains rent-seeking and how applied antitrust economics deals with proving rent extraction causing harm to consumers. Section 2.2 provides overview of empirical academic literature analyzing political connections and their impacts. We follow with overview of literature analyzing political connections in the Czech Republic and briefly describe historical and legal framework of the country.

2.1 State capture: Theory and practice

This section presents how the economic theory of state capture and rent-seeking via political connections evolved over the time and how the practical antitrust policies tried to reduce its harm. Although economic theory formed models evaluating substantial impacts of rent-seeking and state capture behavior, practical regulation and jurisdiction does not offer many cases preventing others from rent extraction.

2.1.1 Economics of state capture and rent-seeking

Modern economists started to be interested in the area of rent-seeking, state capture and its welfare losses few decades ago, start of this field of economics is traditionally dated back to 70's. Krueger (1974) showed welfare loss caused by rent-seeking investments of firms to get import license in basic theoretical model. She claimed that the issue of rent-seeking and welfare loss is more general. In society with perfect restrictions and regulations the incentive to innovate does not exist and agents invest all their effort only to rent-seeking, because it is the only source of gain (Krueger

1974). Such situation could have fatal consequences for the whole economy and overall welfare.

Traditional rent-seeking theory evolved over time, but pointed out mainly to transfer costs in form of administration and prosecution of regulations connected to taxes, quotas and tariffs or subsidies as a source of welfare loss. Buchanan (1980) divided firms behavior into two different ways how to maximize profit. He labeled the classical way of profit maximization as described in the economic theory as profit-seeking behavior. In comparison to this welfare optimizing strategy he labeled rent-seeking behavior, where firms try to gain rent in form of state favors. Rent-seeking consists of "the interaction between the state and private parties, where the state has the monopoly on allocating property rights, be it by certain laws, regulations, subsidies, taxes, tariffs, import quotas or by awarding contracts in public procurement" (Lambsdorff 2002, p. 101). Rent-seeking theory saw the marketplace between firms and state as a cost to society and as a possible source of monopolies favored by state (Lambsdorff 2002).

Comparing corruption with lobbying and other rent-seeking activities rent-seeking theory preferred corruption as an evil that creates less welfare losses than competitive lobbying (Lambsdorff 2002). Classical theory described corruption such as welfare neutral transfer and in competitive lobbying the costs connected with such competition for rent were seen as a main issue of welfare loss. Lambsdorff (2002) criticizes this narrow view and points out that corruption is greater evil which is "particularly harmful because the expenses for rent-seeking are large and incentives for creating market distortions are strong" (Lambsdorff 2002, p. 119). On the other hand, competitive lobbying results in decisions that do not favor single firm and in situation of active lobbying of all sectors the final decision could be close to the first-best solution.

In other words, interests of broader lobby are more in favor of less arbitrary regulation which creates less market distortions than decisions of corrupted official who favors single firm. Corruption leads to monopolization of rent-seeking market and monopolized state captor has greater incentives to maximize his rent reducing overall welfare and creating more market distortions.

2.1.2 Political connections and consumer harm: Brief view of Antitrust Economics

Political connections as a form of state capture have clear consequences to welfare loss and consumer harm in the theory. In contrast to the theory, economic reality is much more complicated and the same holds for proving the consumer harm by the court. Consumer harm created by political connections fits into the category of antitrust literature. Antitrust economists apply economics to estimate and prove

consumer harm from cartels, misuse of dominant position and other illegal business practices.

Antitrust literature aims at identification of anticompetitive effects on the market. There exists universal agreement that the relevant criterion for identifying anticompetitive conducts is consumer harm (O'Donoghue & Padilla 2006). Definition, what exactly is specified by the consumer harm and how to measure it, creates greater challenge. One of well established and comprehensive definitions of consumer harm, stated by O'Donoghue & Padilla (2006), claims that it is a practice having "material effect on output and prices, i.e., reducing the former or increasing the latter. Output in this context does not only mean quantity, but should also include reductions in quality or innovation (where these can be measured)" (O'Donoghue & Padilla 2006, p. 222).

Such definition of consumer harm also includes a situation when politically connected monopolistic firm establishes non-innovative environment and survives on the market with old fashioned good or technology just because of state aid. Another example of consumer harm could be public procurements fitted for particular politically connected firm which prevent new entrants to the market, increases price and lowers quality. Gains of the politically connected firms in such situations are at cost of consumer welfare.

Private enforcement of state aid, which could be one channel of the rent from political connections, does not work properly at national courts (Metselaar [2016]). Complainant has the burden of proof and must prove that state aid or other policy caused harm to consumers or created losses, but he has no rights to get access to data of sued firm as the European Commission (Metselaar [2016]). This burden enormously increases cost of private enforcement and lowers the chance to win the court close to zero - in the Netherlands, "there are hardly any cases where a complaint actually leads to the decision that illegal State aid has been granted" (Metselaar [2016]). In practice the enforcement of illegal state aid to politically connected firms faces many obstacles which makes from political connections a potentially valuable asset and source of abnormal rent.

Investigations led by the European Commission have higher chance to collect evidence against beneficiary, but the amount of cases is rather limited. State aid exists in a form of selective tax advantages as the European Commission decided in recent cases (European Commission [2016]). For example case in which Dutch authorities granted Starbucks tax advantages which lowered its tax burden by EUR 20 - 30 million Commission decided as unlawful state aid (European Commission [2016]). Similar case happened with Fiat and selective tax advantages from Luxembourg (European Commission [2016]). Current dispute about selective tax advantages for Apple from Ireland represents similar case but with the aid in billions rather than millions of Euro (Houlder *et al.* [2016]). Commission concentrates on big issues with

multinationals where dozens of millions or even billions are in stake, but cases with smaller firms enjoying preferential treatment from the state do not appear very frequently.

At the level of the Czech Republic, the Office for the Protection of Competition (later Office) works as the supervising authority of anticompetitive conducts, biased public procurements and improper state aid. Unfortunately, the Office does not have good reputation in the public for its long waiting periods for decision and little predictability of the outcome (Sůra [2017]; Skuhrovec [2017]). Average waiting period for decision is 166 days, for decisions solved at second level it raises to 329 days (Nedvěd *et al.* 2017). Moreover, final decision of the Office could be challenged at court which regularly happens and prolongs the period even more. These long periods until final decision were often misused by unsuccessful firms in public procurements to postpone or even cancel the whole process. The Office introduced a significant fee for challenging firms to minimize the negative outcomes of unjustified challenges (Office for the Protection of Competition [2017]). Policy change reduced the number of complaints but even more demotivated justified firms to challenge anticompetitive conducts (Nedvěd *et al.* 2017). In such environment the probability that a political rent transmitted through state aid or public procurements would be challenged and a politically connected firm would face a penalty by the Office does not balance the potential gains and does not distract connected firms.

To sum up, economic theory shows incentives to create political connections and to capture the state, which leads to rent extraction from favorable state policies. Political rent reduces overall welfare and harm consumers, but enforcement of the rules regulating the threat of state capture faces obstacles in practice and in many cases it is impossible to prove illegal practices. Next section presents overview of academic empirical literature on the value of political connections and a brief description of the situation in the Czech Republic.

2.2 Literature overview and situation in the Czech Republic

This section describes literature about political connections and estimations of their value. The relevant empirical literature analyzes political connections in various definitions with different types of data from countries across the world, but interestingly vast majority finds some positive value of political connections. Majority of connected firms enjoy the rent through different channels such as government contracts or cheap and available credit. Rather limited empirical literature about the situation in the Czech Republic offers possibilities to investigate value and effects of political connections which is the goal of this thesis. To understand properly Czech envi-

ronment and its characteristics, we present short description about Czech transition period and legal framework of political connections.

2.2.1 Brief evolution of political connections literature

Economists have been interested in estimating the value of political connections for some time. Topic of political connections viewed as market distortions was firstly investigated by Krueger (1974). Krueger (1974) analyzed the costs of rent-seeking both from the empirical and theoretical way and showed that environment where firms compete for rent creates dead weight loss. However, literature based on empirical data analysis did not occur very often before era of massive collection and digitization of data.

Empirical studies of political connections face several serious difficulties. First thing which must be solved by the researcher is to define political connections in a measurable and reasonable way. Fisman (2001) mentioned that this could be almost impossible in decentralized countries such as India where lot of local governments have partial impact on business environment and firms operating on national or international levels have complicated and interconnected relationships with each of local government. This problem does not exist in the case of the Czech Republic, which is centralized country and the government has power over the whole country.

The second possible obstacle for empirical research is the data availability (Fisman 2001). Researchers need micro-level data about firms for the proper analysis of political connections which do not exist in many emerging countries or they are unreliable, incomplete or inaccessible for academic use. This creates serious mismatch because emerging economies usually suffer from weak institutions, so they are more vulnerable to rent-seeking of firms connected to politicians, but do not have data to analyze, and developed countries with strong institutions offers accessible data, but the harm of political connections could be seen as relatively limited.¹

Lack of data could be the main reason why the empirical literature evolves mostly in period of last years when the digitization of firm data developed also in emerging countries. Researchers are mostly interested in emerging countries in Asia with leading position of China (Fisman 2001; Fu *et al.* 2015; Sun *et al.* 2012; Qin 2012; Zhang *et al.* 2012). Transition economies from former communist block in central and eastern Europe motivates to inspect creation of political connections but data is less available (Dombrovsky 2008; Hellman *et al.* 2000; Jackowicz *et al.* 2014; Koudelková *et al.* 2015). New approaches using more advanced techniques make it possible to analyze historical data from developed countries (Eggers & Hainmueller 2009; Ferguson & Voth 2008) or political connections on local level (Amore & Bennedsen 2013). Still

¹For example Fisman *et al.* (2012) did not find any value of connection to US vice-president Cheney.

the main focus on transitional or emerging countries does not mean that developed countries are fully left out. For example Goldman *et al.* (2009a) analyzed their value in the United States and Niessen & Ruenzi (2009) in Germany.

Two main forms of political connections are mainly analyzed in the empirical literature. Political connections could be observed in the form of financial relationship or personal relationship. In the case of financial relationship researchers mostly analyze donations to political parties (Goldman *et al.* 2009a; Palanský 2016) or contributions to election campaigns (Akey 2015; Bandeira-de Mello *et al.* 2012) as a form of investment and try to evaluate its profitability or use it as a proxy showing the connection between firm and a politician. Political contributions are likely to affect elections and the motivation of the contribution could be to affect future economic policy rather than create a connection to a politician (Goldman *et al.* 2009a). This ambiguity creates limitations to analysis of financial political connections. In majority of papers political connections are analyzed in form of personal relationship which better suits for core meaning of the word connection and creates relationship with possible favors for the firm (Acker & Simpson 2010; Ang *et al.* 2013; Fu *et al.* 2015; Qin 2012; Fafchamps & Labonne 2014).

2.2.2 Estimating value of political connections

Faccio (2006) investigated personal connections in 47 countries of more than 20 thousand publicly traded companies and her paper belongs to foundations of modern empirical analysis of personal connections. Interestingly she did not identify any political connection in the Czech Republic. The reason could be in the overall low market capitalization of firms in the Czech Republic. Results do not show significant increase of value after politician appointment to corporate board, but show abnormal return when the businessman enters politics and when the firm operates in a highly corrupted country.

Majority of following literature supported main findings in Faccio (2006). There is a relatively stable consensus in the literature that political connections create rent which is most evident in countries with weaker institutions (Akey 2015; Amore & Bennedsen 2013; Bandeira-de Mello *et al.* 2012; Boubakri *et al.* 2012a;b; Faccio 2006; Faccio *et al.* 2006; Fu *et al.* 2015; Goldman *et al.* 2009a; Li *et al.* 2008; Niessen & Ruenzi 2009; Ovtchinnikov & Pantaleoni 2012). The rent could be in the form of abnormal equity returns after establishing a connection (Akey 2015; Bandeira-de Mello *et al.* 2012; Faccio 2006; Goldman *et al.* 2009a; Niessen & Ruenzi 2009), profitable contracts with government (Amore & Bennedsen 2013; Goldman *et al.* 2009b), easier access to loans (Boubakri *et al.* 2012a; Fu *et al.* 2015; Khwaja & Mian 2005; Li *et al.* 2008), loans with lower interest rate (Boubakri *et al.* 2012b) and higher probability of bailout during financial crisis (Faccio *et al.* 2006), gaining

higher amount of subsidies (Wu *et al.* 2012), paying less taxes (Faccio 2006), and even lower probability of prosecution by regulators (Correia 2014).

We can find papers which show negative outcomes of political connections on firms performances (Aggarwal *et al.* 2012; Bliss & Gul 2012; Fan *et al.* 2007; Jackowicz *et al.* 2014), but the rent could be present not only captured by the data, extracted by the managers, or the connected politicians. Eggers & Hainmueller (2009) found out that politicians serving in Parliament as Conservatives in the United Kingdom almost doubled their wealth mainly due to favorable outside jobs in firms connected to the party and Ding *et al.* (2015) showed that politically connected managers in China gain the rent and not the firm owners if the owners lack political connections.

To summarize, literature about political connections provides evidence of their value in various forms. This rent is extracted and divided between firm owners, managers and politicians. Division depends on their negotiation powers and institution quality and design, but literature mainly focuses and shows evidence of benefits for connected firms.

2.2.3 Political connections and rent extraction in the Czech Republic

Transition of the Czech Republic from centrally planned and state owned economy to liberalized market economy with private businesses created lots of challenges. Wealth redistribution during massive voucher privatization represents an original natural experiment but with significant consequences for decades (Kouba *et al.* 2005). Relatively short history of the Czech Republic offers to researchers a lot of empirical material to analyze: rule of law degradation, moral hazard and principal-agent problem issues, role of institutions in transition, rot in trust of people in political representatives and institutions, or corporate state capture via political connections.

Transitional economies in the central Europe often suffer from the corrupted systems characterized by policies favoring extraction of the rent. Czech Republic unfortunately represents an example of this phenomena with the same level of corporate state capture as in Ukraine before the Maidan revolution (Innes 2014). Perceived corruption is considered widespread by majority of people (Koudelková *et al.* 2015), but we can see slight improvement in last years (Transparency International 2017). Also firms see corruption as an obstacle to their business (Koudelková *et al.* 2015) and report possibility to influence politics to gain rent (Hellman *et al.* 2000). People saw main reasons of widespread corruption as a combination of the communist regime legacy and the era of massive privatization and market liberalization without a proper regulation and functioning institutions (Lízal & Kočenda 2001). Innes (2014) describes Czech political elites as non-integrated by any framework of modern political ideology and mainly motivated by short-term personal self-interest. Political

connections in such environment could be very valuable creating a significant rent for favored firms and their policy makers at the cost of the whole society.

Interestingly, the relevant literature on these topics belongs rather to scarce by resources. Researchers faced lack of empirical data till recent times and substituted them using soft data gathered via surveys (Hellman *et al.* 2000; Koudelková *et al.* 2015) or relied on political analysis and international data (Evanson 2008; Gallina 2013; Innes 2014; Lízal & Kočenda 2001). Recently available data enabled also an empirical investigation. Literature aims mainly on the issue of public procurements (Chvalkovská & Skuhrovec 2010; Nikolovová *et al.* 2012; Palanský 2014; Palguta 2014) or donations to political parties (Palanský 2016; Palguta 2016; Skuhrovec *et al.* 2015). To our knowledge, no empirical analysis of political connections in the form of personal ties has been done using Czech data yet.

Attempts to estimate value of the political connections in the Czech Republic were limited mainly to public procurements and party donations analysis. Chvalkovská & Skuhrovec (2010) rated public procurements according to transparency, Palguta (2014) showed manipulation with their value to fit less transparent options and to award firms with anonymous owners and Palanský (2014) estimated that firms donating political parties gain procurements worth over 50% more than their non-donating rivals. Similar findings showing links between donors and public procurement winners presented Skuhrovec *et al.* (2015). Palguta (2016) points out that donors won more often in less transparent types of the procurements. Palanský (2016) also found that firms donating political parties have significantly higher return on equity and return on assets, which he estimated at 1 percentage point premium for equity measure and 0.3 percentage point for assets measure. Current evidence shows positive value of party donations as a proxy for political connection and suggests that public procurement contracts serve as a rent extraction channel.

2.2.4 Legal framework of political connections in the Czech Republic

The thesis analyzes political connection of government Ministers with firms. For that reason we presents legal regulations for Ministers in this short description about legal framework development of conflict of interest laws in the Czech Republic.

The aim to regulate possible connections between the politicians and firms started right at the beginning of the transitional process. In 1992, first law defining conflict of interest for members of Parliament and government Ministers was passed. Politicians were forbidden to misuse their power and information from the office for private gains and had to report their business activities or memberships in functions of enterprises (Czech National Council 1992). Unfortunately, no sanctions for the violation of these rules were stated except reporting the violation to premier or head of the Parliament (Czech National Council 1992).

This law practically only defined conflict of interest in relatively narrow form. Ministers were allowed to do business and to have paid functions in enterprises and even if they did not declare it or were suspected from misuse of their power or information the penalty for such behavior was missing. Regulation of conflict of interests was later in 1995 revised and the conditions for Ministers were sharpened. Ministers were forbidden to do business, to have a function in the enterprise or to earn money from other activities with only few exceptions (Czech National Council 1995). This prohibition made illegal personal political connections where one person was simultaneously Minister and in any business positions. On the other hand, effective enforcement of the law practically did not exist because no penalties were added in the 1995 novelization. Opinion that such law worked only as formality without any practical effect is supported by no evidence of any investigation of Minister according to the law.

Broadening of public notion about corruption cases of high ranked politicians created pressure to revise the law again and to add sanctions in the case of violations. New law had broadened the functions of politicians who have to obey the conflict of interest rules also to regional and community representatives and added sanctions in case of violation in form of penalty fee up to 30 000 CZK (Parliament of the Czech Republic 2005). But political opposition against broadening and sharpening the law used formal flaws in proceeding to contest it by the Constitutional court which canceled the law (Constitutional court of the Czech Republic 2005). Finally, new law was adopted in 2006.

The law had similar characteristics like the older one canceled a year before with even more functions included and increased the fee limit to 50 000 CZK (Parliament of the Czech Republic 2006). It also prohibited Ministers who organized public procurements above the certain limit to get functions or work for winner firm 1 year after leaving Minister office (Parliament of the Czech Republic 2006). Ministers and other politicians had to declare detailed information about their profits, newly gained properties, received gifts and their loans during the function period to make possible transparent controls according to the law. To avoid a suspicion from corruption, Ministers hid their true incomes and shares in firms in some cases (Aktuálně.cz [2016]; Hlaváč [2016]). It suggests that information stated in statutory declarations did not include all wealth gains of Ministers every time.

After 10 years of use and society and technology development the law was again considered as not up to date. In 2013 political movement ANO 2011 led by Andrej Babiš, the second richest businessman in the Czech Republic, gained over 18% votes and Babiš became the Minister of finance (Czech Statistical Office [2016]). He is the owner of conglomerate Agrofert² which operates in many areas such as "chemical

²Andrej Babiš was factual owner of Agrofert till February 2017. Then he was forced by the new conflict of interest law to move Agrofert in new established trust funds (Czech Television 24 2017a).

industry, agriculture, food processing, forestry and timbering, ground-technologies, technology and transportation, renewable energy sources and media” (AGROFERT [2016]). Such situation created continuing issue of conflict of interest when Babiš is making decisions about public money allocation for example to agriculture as the finance Minister and receives them as the owner of Agrofert. Babiš voluntarily reported the possibility of conflict of interest in more than 20 times and abstained from voting in the government (Malecký [2016]). Moreover, he has a possibility to influence public view on politics and his business using his own media which recently occurred to be true. On released audio recordings Babiš discussed when to publish compromising materials about his political rivals with one of the journalists from MAFRA, media house owned by Agrofert (Czech News Agency 2017a).

Other political parties considered such concentration of power as a potential threat to democracy and promoted novelization of the conflict of interest law. The new law was supported by vast majority of members of parliament. Only members of parliament from ANO voted against the proposal (Parliament of the Czech Republic [2016]). But the hot discussion about the law called by some media ”Lex Babiš” (Kopecký 2016) still continues. Babiš called the law unconstitutional and aimed against his political movement (Czech News Agency [2016]). President vetoed the law after meeting with Babiš (Kopecký 2016) and he also mentioned his intention to contest the law by Constitutional law when his veto would be outvoted by Parliament (Kopecký 2016). Parliament had the Presidential veto outvoted in January 2017, but the ruling of the Constitutional court about constitutionality of the law is still in process (Czech Television 24 2017b). The law is in force (as of May 2017) and forced Babiš to leave his firms in new established trust funds (Czech Television 24 2017a), but the future of the law is still uncertain.

Previous findings about economic impacts of political connections in the Czech Republic found that firms can gain advantages from connections. Previous analyses, however, were focused on financial connections or public procurements as a channel of rent extraction. In this chapter we presented incentives to establish personal connections to Ministers both from view of economic theory and institutional view of insufficient legal framework which enabled connections till recent change of law. Therefore we see the need to analyze personal political connections at governmental level in the Czech Republic. In the next chapter we present our data used for such analysis and definition of personal connection to Minister.

Chapter 3

Data description

Primary data for the analysis were obtained from *Bisnode Czech Republic's* private database Magnus. The Magnus database incorporates the most comprehensive information about Czech firms including their financial data on yearly basis. Additionally to this data source, information about personal connections of Ministers were obtained using Business Registry and data from various sources were merged with the main database of Czech firms. In this chapter we present definition of personal connections, descriptive statistics of the data used in the analysis, and discuss their possible advantages and drawbacks for the further analysis.

3.1 Magnus database - financial firm level data

Bisnode Czech Republic's private database Magnus consists of most detailed financial information about Czech firms. Database includes most notably hand-collected data from annual financial reports of every Czech legal person operating after the establishment of the Czech Republic in 1993. Besides data from financial reports *Bisnode* collects information about type of operating business, number of employees, location of business, etc. For the purpose of the analysis of political connections only data about Czech firms were gathered.

We obtained data from 482,790 firms operating on the Czech market in the period between 1993 and 2015. All operating firms have the duty to report their financial results, but this obligation is ignored by substantial share of firms. Table 3.1 depicts the scale of missing financial data by firms. Almost half of the sample, 233,322 firms did not report any financial data in any year of their existence. Such high proportion of missing data could possibly bias the analysis and we have to take it into account when choosing appropriate estimation methods. At least lower share of missing data among Connected firms does not reduce the already modest sample size by the same amount as the rest of the data set.

Table 3.1: Availability of financial data on firm level

	Connected	Non Connected
Obs. total	536	482,254
Obs. with financial data	452	249,016
Proportion with fin. data	0.84	0.52

Notes: Firms without financial data did not report any financial results during their existence.

For the purpose of the analysis we transformed the data set with firms that reported their financial results at least once to the panel structure. Even firms which reported financial data have not fulfilled the obligation for every year of their existence. Table 3.2 depicts this trend in detail. Firms reported their financial results only in every second year of their existence on average. For the Connected firms the share of missing data is lower, but still reduces the sample size by almost one third.

Table 3.2: Availability of financial data in panel structure

	Connected	Non Connected
Obs. total	6,912	3,135,434
Obs. with financial data	4,928	1,512,992
Proportion with fin. data	0.71	0.48

Notes: Only firms reporting financial data for one year of operation at least are analyzed.

After dropping the missing data and excluding observations with negative assets (mistake in data collection or accounting) we have got a panel structure data set containing 1,466,988 unique observations of 245,093 firms. Table 3.3 depicts average number of observations per firm which is about 6 years per firm. Average firm exists for slightly more than 12 years, which means we have financial data for one half of its operational period (see Table A.1 in Appendix A). Average number of observations per Connected firm has reduced by one third from above 15 to less than 11 observations per firm. The proportion of missing data by Connected firms is lower, but not negligible. For example motivation to hide higher profits due to connection could lead to intentional avoidance of reporting financial data in years of rent extraction. If such behavior was common the estimated effect of political connections would be underestimated.

3.2 Other data sources

Data about firm's connection to Ministers were obtained by hand collecting personal data about all Ministers in office during existence of the Czech Republic and their use in search of Business Registry for their engagements in firms. We also collected

Table 3.3: **Average number of observations per firm in panel structure**

	Connected	NonConnected	Total
Obs. total	4,866	1,462,122	1,466,988
Num. of firms	449	244,644	245,093
Average num. of obs. per firm	10.84	5.98	5.99

Notes: Only observations with financial data are analyzed.

data which firms are fully or partially state owned to differentiate between possible effects of Ministers engagement in private and state owned firms.

To identify the possible channels of rent extraction of Connected firms we collected data about obtained subsidies and public procurements from Ministries. We limited both subsidies and public procurements to only those directly influenced by the Ministry where the possibility of manipulation by the Minister in office is the highest and easily possible. Data sets were merged by the time and the identification number of the firm, which obtained subsidy or the public procurement contract.

3.2.1 Data about personal connections to Ministers

We collected data about all Ministers serving in office between 1993 and 2015. Data about their names, date and year of birth and time served in office was gathered from the official descriptions of personal composition of governments (Government of the Czech Republic [2017]). We looked for birth data on personal web pages of Ministers or Wikipedia articles about them for those Ministers with no information of date and year of birth on government pages. Due to common name patterns in the Czech population and also among Ministers it was necessary to gather their date and year of birth to avoid false connections. We excluded Ministers serving as Ministers without office and Minister Karolína Peck serving for 8 days only as Minister of Defense from the analysis.

We used personal data about Ministers (first name, last name, date and year of birth) to search their engagement in firms recorded in Business Register (Public Register and Collection of Documents [2017]). We gathered identification numbers of firms where Ministers were engaged. Firms found in Business Register as connected to Ministers were labeled as *Connected* in the firm panel data set. We used data about Ministers time served in the office to create variable *Connectedyear* signaling whether Ministers were in the office in the current year of Connected¹ firm observation.

Ministers could be connected to companies in different ways. As common in the literature we follow Faccio (2006) to separate connections into several categories: di-

¹Term Connected with uppercase *C* refers to defined personal connection in the thesis. Term connected with lowercase *c* refers to general political connection.

rect formal political connections (later also Connections) and indirect formal political connections.

If the Minister owns a company or its share or has powerful function in the company as executive director or member of board he is recognized as a directly connected to the company. It also depends on the timing of Minister's direct connection to firm and his political function. The direct connection established after Ministers role in the government could be seen as irrelevant, but we should take into account possibility that the role in the firm could function as a reward for policies favoring this firm when the Minister was in the office. Therefore we considered Minister as directly formally connected (Connected) to the firm when his engagement in the firm was before, during or no more than 5 years after his time in the office.

For the analysis of indirect formal political connections we had to gather personal information about Ministers spouses, family members and publicly known close friends. Unfortunately dates and years of birth of Ministers' relatives could not be obtained using internet, because they are not persons of public interest (no personal web pages or Wikipedia articles). We found full personal information only in few cases which we decided not to include in the analysis because of a possible bias (we found no relatives full personal information for majority of Ministers). For the reason of data unavailability we had to omit these type of connections from the analysis.

3.2.2 State owned firms

The effect of political connection on performance of private and state owned firm could differ significantly. Minister engaged as a member of board or an executive director in firm fully or partially owned by state could gain his position as a "reward" or "compensation" for his services as Minister. Such connection could have no or even negative effect on state owned firm performance depending on managerial skills of ex-Minister and his motivation. We should differentiate between Connected private and state owned firm to measure the effect of connections without avoidable bias.

List of firms partially or fully owned by state was recently reported public in *Strategy of state ownership policy* report (Ministry of Finance 2017). Report included a list of firms partially or fully owned by state in year 2014. It consists of 302 firms and offices ranging from National park offices and hospitals to strategic firms such as CEZ or the Czech Export Bank. Majority of state owned companies, however, were privatized during 90's and first few years after 2000. Present list strongly underestimates the extent of state ownership till the end of the major privatization era with the beginning of the new century. This means that firms labeled as private could be partially or fully owned by state during 90's. If we assume that ex-Ministers behavior in state owned firms would be rather self-interested than firm-interested and thus reducing performance of the company we would underestimate the positive

value of private company Connections. Still by taking into account present state ownership we should avoid the bias at least in the more recent years. We connected the information about state ownership using identification numbers of companies to firm panel data set.

3.2.3 Central Register of Subsidies

Data about subsidies was gathered from open data database of the Central Register of Subsidies (General Financial Directorate [2017]). Database contains data about all subsidies financed from the state budget (including EU funded projects) from the year 1999. We selected subsidies administered or funded by Ministries between 1999 and 2015 and summarized them by subsidized firm and year of decision about subsidy allocation. We were interested in the total amount of subsidy in CZK obtained by the firm in a given year and the number of subsidies obtained. We connected these data to firm panel data set by the year and the firm identification number. We were able to connect subsidy statistics to 143,984 observations in our panel.

3.2.4 Information system on Public Contracts

We collected data about public procurements allocation from open data of the Information system on Public Contracts (Ministry of Regional Development [2017]). It collects information about public procurements from the year 2006. We selected data about public procurements administered by Ministries or their subordinated organizations, more precisely the volume of public procurement in CZK including VAT, year of allocation and identification number of the winning firm. We summarized these data according to the year and identification number of the winning firm to get total volume and number of public procurements won in the current year. We were able to match public procurements statistics only to 4,137 observations in our panel.

We explain the low number of matched firms by multiple factors. First, the Information system on Public Contracts suffers from low quality of data, where in majority of cases either final volume of public procurement or identification number of the winning firm was missing or unreadable. Second, only public procurements above certain threshold must be listed in the System which decrease the amount of low volume procurements data substantially (Palanský 2014). Third, fraction of firms able to win high volume public procurements is minor in the pool of all Czech firms. Still we gathered 6,755 observations about winners by identification number and the year of decision and matched only 4,137. The drop of observations in matching could be caused by the fact that public procurements winners are also other units than Czech firms (consortiums of multiple firms, foreign firms, Czech non-firm legal persons, etc.) and identification number errors either in the Information system on Public Contracts or in the Magnus database.

3.2.5 Measures of firm performance

To estimate the value of political connections we have to set reliable variables capturing firm performance or rent extraction. We obtained data about firm's assets, capital and profit before tax for every year and firm from Magnus database. We followed common practice in measuring the value of political connections and measured the performance of the firm as return on assets (ROA) and return on equity (ROE); in recent literature used for example by Acemoglu *et al.* (2016); Ang *et al.* (2013); Boubakri *et al.* (2012a); Liu *et al.* (2016); Muttakin *et al.* (2015); Niessen & Ruenzi (2009); Wu *et al.* (2012). Moreover, Palanský (2016) used these measures working with Czech data from Magnus database when estimating value of political connection using data about donations to political parties. ROA and ROE measures are defined as follows:

$$ROA = \frac{\text{profit before tax}}{\text{total assets}} \quad (3.1)$$

$$ROE = \frac{\text{profit before tax}}{\text{total capital}} \quad (3.2)$$

We followed Palanský (2016) also in dealing with negative values of capital stated financial results by significant proportion of the firms which we replaced by "Registered capital" (initial capital of the firm).

As a measures of rent extraction we continued in similar logic in definition of subsidies on assets (SOA) and subsidies on equity (SOE) measures and public procurements on assets (PPOA) and public procurements on equity (PPOE) measures. More formally we get:

$$SOA = \frac{\text{volume of subsidies}}{\text{total assets}} \quad (3.3)$$

$$SOE = \frac{\text{volume of subsidies}}{\text{total capital}} \quad (3.4)$$

$$PPOA = \frac{\text{volume of public procurements}}{\text{total assets}} \quad (3.5)$$

$$PPOE = \frac{\text{volume of public procurements}}{\text{total capital}} \quad (3.6)$$

Above stated measures can contrary to ROA or ROE acquire only non negative values, but the interpretation is similar to ROA or ROE measures. We constructed the measures in the way to reflect changes in the firm performance and level of money obtained from public resources managed by Ministers either in form of subsidy or public procurement contract.

3.2.6 Outliers and high leverage points in the data set

Since Magnus database contains hand-collected data from self-reported statistics of the firms the possibility for human errors is high which leads to creation of outlier and high leverage observations. Such observations could substantially bias the estimation and could lead to unreliable results.

Two basic approaches to elimination of outliers are trimming and winsorization. Trimming removes the observations in highest and lowest percentiles of the trimmed variable and winsorization will replace extreme values with maximal and minimal allowed value defined by user. We decided to winsorize data at interval $(-1, 1)$ in the case of ROA and ROE measures and interval $(0, 1)$ for rent extraction measures. We see advantage in this approach compared to trimming, because we do not have to exclude any observation from the data set. For example observations describing effect of Connection leading to allocation of huge subsidy or public procurement compared to assets or equity of the firm would lead to elimination of such observation in the case of trimming.

We used Mahalanobis distance as a measure for identifying high leverage points caused by typos or errors in accounting or hand processing. Mahalanobis distance measures the distance in standard deviations from centroid which is defined as mean of analyzed variables. We considered assets, capital and profit before tax as a input variables for Mahalanobis distance computation. Observations with Mahalanobis distance higher than 4 are labeled as outliers.

3.2.7 Final data set

After construction of firm performance measures and rent extraction measures followed by winsorization we have firm panel data set prepared for the analysis. We present basic summary statistics in the Table 3.4. We can clearly see that data contains errors looking at unrealistic maximal values of assets and capital. These values are same as reported by Palanský (2016). Table 3.5 depicts the final data set after Mahalanobis distance procedure of outliers elimination which successfully removed unrealistic maximal values of assets and capital. For the purpose of regression models estimation we used data set reduced by Mahalanobis procedure to avoid a possible bias caused by outliers and high leverage points. We used data set described in Table 3.4 for the matching procedures, however, to be sure that the firm which best matches the Connected firm is not excluded from the data set.

Table 3.4: Summary table of firm panel data set

Statistic	N	Mean	St. Dev.	Min	Max
assets	1,466,988	96,391,962	2,831,851,622	1	2,401,129,043,000
equity	1,466,988	47,356,954	1,247,349,187	1	814,121,557,000
ROA	1,466,988	66.023	28,294.600	-703,645.900	30,076,094
ROE	1,466,988	-6.401	22,942.070	-13,925,000	14,617,395
ROA_11	1,466,988	-0.0002	0.294	-1	1
ROE_11	1,466,988	0.017	0.531	-1	1
SOA	1,466,988	0.012	1.113	0	851.206
SOE	1,466,988	0.581	206.097	0	168,000
SOA_1	1,466,988	0.005	0.049	0	1
SOE_1	1,466,988	0.012	0.090	0	1
PPOA	1,466,988	0.002	0.339	0	258.663
PPOE	1,466,988	0.016	3.592	0	3,500
PPOA_1	1,466,988	0.001	0.024	0	1
PPOE_1	1,466,988	0.001	0.033	0	1

Notes: Summary statistics for dummy and factor variables are not presented.

Table 3.5: Summary table of firm panel data set after Mahalanobis distance procedure of outliers elimination

Statistic	N	Mean	St. Dev.	Min	Max
assets	1,459,829	47,729,334	208,896,605	1	5,746,445,000
equity	1,459,829	21,158,198	104,447,431	1	10,002,000,000
ROA	1,459,829	25.572	9,946.967	-372,545	7,945,000
ROE	1,459,829	-34.591	16,438.960	-13,925,000	8,456,111
ROA_11	1,459,829	-0.001	0.293	-1	1
ROE_11	1,459,829	0.016	0.531	-1	1
SOA	1,459,829	0.012	1.115	0	851.206
SOE	1,459,829	0.584	206.601	0	168,000
SOA_1	1,459,829	0.005	0.049	0	1
SOE_1	1,459,829	0.012	0.090	0	1
PPOA	1,459,829	0.002	0.339	0	258.663
PPOE	1,459,829	0.016	3.600	0	3,500
PPOA_1	1,459,829	0.001	0.024	0	1
PPOE_1	1,459,829	0.001	0.032	0	1

Notes: Summary statistics for dummy and factor variables are not presented.

3.2.8 Unbalanced panel data

As we can see from the process of preparation, data suffers from various shortcomings. We have to take into account high proportion of missing data or errors in financial data caused by bad accounting or human error. More importantly, some firms may decide to not report data in some years for economic reasons. This means that data suffers from non randomly missing values which combined with strong unbalance of the panel rejects assumptions of most widely used panel estimation methods (Wooldridge 2010). More precisely in case when particular firms do not report results because they operates in a shadow part of the economy in a given year we face situation where the probability of missing value correlates with the idiosyncratic errors and even fixed effect estimation is not suitable (Wooldridge 2010). We have to confirm the conclusion of Palanský (2016) that standard panel data approach such as fixed effect analysis is inappropriate given the quality of the data.

Chapter 4

Methodology

With the goal of analyzing political connections in the Czech Republic and their economic consequences we should aim at the institution with greatest influence in the Czech Republic. The decision to choose government body in the form of analyzing personal connections of the Ministers clearly satisfy this requirement. The government of the Czech Republic is the main executive power in the country by the constitution (Parliament of the Czech Republic 1992) and Ministers could shape the executive policies to support their private interest or interest of connected firms. We have to admit that political connections to Ministers do not explain the potential gain of all kinds of political rents that exist in the country. Although the Czech Republic is the centrist state with the power concentrated in hands of the government, many other institutions or political functions offer the possibility of political rent extraction. Members of the Parliament could influence the legislation to provide benefits to particular firms and also the potential of political rent has increased for regional representatives as they can influence the allocation of European funds. These examples are with the potential impact on the country level, representatives such as mayors could influence rents in a smaller scale but with significant local impact. Still given the constitutional order in the Czech Republic government concentrates majority of power in the country and the analysis of connections to Ministers could reveal the dominant impacts of political connections.

First, we estimate the effect of political connections using cross-section regression models. Using same model specification we estimate the effect of political connections on return on assets, return on equity, allocation of subsidies and public procurements. To test hypothesis about lagged effect of connection we also estimate the effect of lagged connections by one and two periods. Second, we try to overcome drawbacks of basic cross-section models by dynamic matching of Connected firms to similar non Connected firms. We matched firms based on covariates and covariates with propensity score. Propensity score tries to estimate the probability for a given firm to be Connected and then firms with similar propensity scores are matched. Such

procedure should eliminate self selection bias of the results. At the end of the section we discuss drawbacks and advantages of presented approaches.

4.1 Cross-section models

In the cross-section models we summarized all time changing variables by firm identification numbers and Connection status into cross-section data set. We averaged firm data over time that non Connected firms are represented by one observation and Connected firms are represented by two observations - first in time of Connection and second for other time periods. In the cross-section model we will test whether firms in time of Connection have on average better results than firms without Connection. According to the hypothesis we predict higher return on assets (ROA) and return on equity (ROE), higher subsidies on assets and equity and higher volume of public procurement contracts on assets and equity when firms are Connected.

For the analysis of time effect of Connection we formed models with lagged variable in the case of return on assets and return on equity. We do not inspect lagged effects on subsidies or public procurement allocation, because there is relatively short delay between Minister decision to influence policy in favor of Connected firm and decision about subsidy or public procurement allocation. On the other hand in the case of financial results captured by ROA and ROE we hypothesize that the effect of Connection would be lagged (Aggarwal *et al.* 2012; Dombrovsky 2008). There is a substantial delay between gained advantage in form of profit from investment financed by subsidy or public procurement contract and rise in financial results caused by it. We suppose that the effect could be lagged by one or two years which are needed to fully affect ROA and ROE by extra profits from investments or public procurement contracts.

4.1.1 Return on assets and return on equity models

We specified equations for return on equity and return on assets as below:

$$ROA_{11} = \beta_0 + \beta_1 Connected_{year} + \beta_2 Connected + \beta_3 State + \beta_4 ConnectedState_{year} + \beta_5 \log(assets) + NACE_section\beta_6 + \epsilon, \quad (4.1)$$

and

$$ROE_{11} = \beta_0 + \beta_1 Connected_{year} + \beta_2 Connected + \beta_3 State + \beta_4 ConnectedState_{year} + \beta_5 \log(assets) + NACE_section\beta_6 + \epsilon, \quad (4.2)$$

where ROA_{11} and ROE_{11} are dependent variables representing average returns on assets and returns on equity bounded on interval $(-1, 1)$, $Connected_{year}$ is binary variable signaling whether firm is connected to the Minister in office, $Connected$ is binary variable signaling whether firm was in any year connected to the Minister, $State$ is binary variable signaling whether firm is owned partially or in full by state, $ConnectedState_{year}$ is binary variable signaling whether state firm is connected to the Minister in office, $\log(assets)$ is continuous variable with logarithm of firm's assets and $NACE_section$ is matrix using binary variables to sort firms into sections of Nomenclature of Economic Activities, and ϵ is the error term.

We included assets variables capturing the size of the firm in logarithmic form following Acemoglu *et al.* (2016) and Muttakin *et al.* (2015). We followed Muttakin *et al.* (2015) also by including binary variables sorting firms into industry sectors. For the hypothesis testing we are interested in the coefficient magnitude and significance of $Connected_{year}$ variable. We included variables $Connected$ and $State$ to capture possible differences between connected and other firms and state owned and other firms. Supplementary hypothesis about Connection of state owned firms to Ministers could be tested by inspecting coefficient and significance of variable $ConnectedState_{year}$.

For estimating the lagged effect of Connection we summarized panel data by identification number of firm and lagged Connection status. We specified same equations only replacing $Connected_{year}$ for $Connected_{yearLag1}$ or $Connected_{yearLag2}$, respectively, and $ConnectedState_{year}$ for $ConnectedState_{yearLag1}$ or $ConnectedState_{yearLag2}$, respectively. $Connected_{yearLag1}$ is binary variable signaling whether firm was connected to the Minister in office in previous year and $Connected_{yearLag2}$ signals Connection two years ago, analogues explanation holds for $ConnectedState_{yearLag1}$ and $ConnectedState_{yearLag2}$.

We used Ordinary least squares (OLS) estimation with heteroscedasticity robust clustered errors at the level of NACE section.

4.1.2 Subsidy and Public Procurements allocations models

We used same model specification as in Equation 4.1 and in Equation 4.2 for Subsidy on assets and Subsidy on equity models only replacing ROA_{11} for SOA_1 and ROE_{11} for SOE_1 , where SOA_1 and SOE_1 represent average volume of subsidies on assets and subsidies on equity bounded on interval $(0, 1)$. To compare similar firms in the model we restricted data set to firms which obtained at least one subsidy during their existence.

We followed same pattern also in specification of Public Procurement on assets and Public Procurement on equity models. We excluded variable $ConnectedState_{year}$ from models because no observation signaling Connection of state owned firm was left

after restriction of data set to firms which have won at least one public procurement during their existence. More precisely, equations were specified as below:

$$\begin{aligned} PPOA_1 = & \beta_0 + \beta_1 Connectedyear + \beta_2 Connected + \beta_3 State \\ & + \beta_4 \log(assets) + NACE_section\beta_5 + \epsilon, \end{aligned} \quad (4.3)$$

and

$$\begin{aligned} PPOE_1 = & \beta_0 + \beta_1 Connectedyear + \beta_2 Connected + \beta_3 State \\ & + \beta_4 \log(assets) + NACE_section\beta_5 + \epsilon, \end{aligned} \quad (4.4)$$

where $PPOA_1$ and $PPOE_1$ represent average value of public procurements won on assets and public procurements on equity bounded on interval $(0, 1)$. Rest of the variables are same as in Equation 4.1 and in Equation 4.2.

Similarly to return on assets and return on equity models we used Ordinary least squares (OLS) estimation with heteroscedasticity robust clustered errors at the level of NACE section.

4.2 Matching

Estimation of the effect of political connections using matching procedures becomes more and more common in the literature (Acemoglu *et al.* 2016; Aggarwal *et al.* 2012; Boubakri *et al.* 2012c;a; Dombrovsky 2008; Faccio *et al.* 2006; Liu *et al.* 2016). We used both two most common approaches to matching which could be characterized as matching on observables or covariates matching, and propensity score matching.

We used full data set for matching analysis, however, we still had to restrict the data for which we had no missing values in variables we matched on. Matching methods are widely used in many fields of science to reduce self selection bias and therefore be able to better estimate the true causal effect of the treatment (Stuart 2010). Moreover, in the case of large data set and relatively small proportion of treated observations (in our case Connected firms) we can use the large reservoir of data to match Connected firms to very similar non Connected firms.

We used package *Matching* in R (Sekhon 2011) to process both covariates and propensity score matching. We used function *Matchby* which was programmed for large data sets analysis. We performed one to one matching, but in case that treated observation matches more than one control observation, we included all multiple matched control observations and weighted them to reflect the multiple matches. As a method of measuring the fit of the match we used Mahalanobis distance measure

(Wooldridge 2010) with caliper set to 0.25 standard deviation as an acceptable distance for the match. We estimated sample average treatment effect for the treated to evaluate political connections. For the purpose of testing the balance between treated (Connected firms) and matched control group (non Connected firms) we used *MatchBalance* function. The change of approaches to matching did not lead to dramatically different results, but the final setting fulfilled the balance tests after estimation better.

4.2.1 Matching on covariates

We matched Connected firms to non Connected according to multiple criteria. We have used the panel structure of the data to match firms dynamically, i. e. in each year the firm is matched to the most similar firm which could differ year by year given a different development as in Palanský (2016), but we choose different strategy of dynamic matching to avoid possible drawbacks of method in Palanský (2016). First, we matched observations to those from the same year, the same firm's industry as specified by NACE section and the same ownership structure (state vs. private). In such specified 827 groups we matched firms similar in size (Acemoglu *et al.* 2016; Dombrovsky 2008), more precisely we matched firms on $\log(\text{assets})$, $\log(\text{equity})$ and number of employees. To avoid a possible bias of different effect of Connections on state owned firms we labeled as treated only Connected private firms.

We estimated the difference between the Connected and non Connected firm for same variables as in the cross-section models with addition of two variables counting numbers of obtained subsidies or won public procurements, which means return on assets and equity bounded on interval $\langle -1, 1 \rangle$ (*ROA_11* and *ROE_11*), subsidy on assets and equity bounded on interval $\langle 0, 1 \rangle$ (*SOA_1* and *SOE_1*), public procurements on assets and equity bounded on interval $\langle 0, 1 \rangle$ (*PPOA_1* and *PPOE_1*) and number of obtained subsidies (*N_Subsidy*) and won public procurements (*N_PP*).

4.2.2 Matching on covariates and propensity score

To get more robust results and to follow recent literature we matched firms also by estimated propensity score (Acemoglu *et al.* 2016; Aggarwal *et al.* 2012; Liu *et al.* 2016). Same as in the case of covariates matching we match observations from the same year, the same firm's industry and the same ownership structure. Then we matched firms within these groups by estimated propensity score and by propensity score combined with covariates.

We estimated the propensity score by logistics regression specified as bellow:

$$\begin{aligned} \text{logit}(\text{ConnectedyearPrivate}) = & \beta_0 + \beta_1 \log(\text{assets}) + \beta_2 \log(\text{equity}) + \beta_3 N_Employees \\ & + \mathbf{NACE_section} \beta_4 + \mathbf{Year} \beta_5 + \epsilon, \end{aligned} \quad (4.5)$$

where *ConnectedyearPrivate* is binary variable signaling whether the private firm is Connected, $\log(\text{assets})$ and $\log(\text{equity})$ are continuous variables with logarithm of firm's assets and equity, *N_Employees* is number of employees in the firm, matrix *NACE_section* sorts firms into industries and matrix *Year* in the time period.

Then we used predicted linear probabilities on logistic scale as an estimated propensity score for matching. Matching based solely on propensity score did not fulfilled balance tests and we do not report results here, but estimated coefficients were similar both in size and significance as in covariates and covariates with propensity score approaches to matching. Matching based on covariates and based on covariates with propensity score fulfilled balance test of the match (see Table A.4 and Table A.5 in Appendix A).

4.2.3 Matching on subsamples

For the estimation of the effect on subsidy and public procurement variables we also performed matching only on subsample of firms. In the case of subsidies we restricted the data set to firms which obtained at least one subsidy in the given year and in the case of public procurements we restricted the data set to firms which have won at least one public procurement in a given year. We matched firms on subsamples both by covariates matching and propensity score combined with covariates matching.

4.3 Methodology limitation

When we summarized panel data into cross-section we should consider possible drawbacks covered in this approach. Data summarized at the level of firm offers averaged information about firm's profit and size during its existence, which could be non appropriate simplification. As already discussed in chapter 3 the panel data are strongly unbalanced with non-random missing values which makes panel estimation hardly possible. In this case averaging data to cross section could possibly at least decrease bias from non random missing values.

Major bias in estimating effect of political connections using averaged cross-section model could arise in case when firms would tend to be Connected in years of economic boom or, vice versa, in years of economic recession. Cross-section estimation then would lead to estimates with upward bias in the first case and downward bias in the latter. We compared distributions of Connected and non Connected firms

in time to inspect possibility of such bias. Distributions of Connected and non Connected firms follow similar patterns only distribution of Connected firms show higher variance due to election cycles and government changes. We present distributions in Figure A.1 in Appendix A where only major difference is in year 2013. We can conclude that we found no evidence of major bias caused by different distribution in time.

OLS estimation relies on assumptions which are unrealistic in presented setting. We should mention at least an issue of endogeneity of political connections. Minister could be abnormally successful in both politics and business because of his or her ability. For example Minister Babiš presents himself in such way (Koutník [2017]; Gottwald [2017]). Another possibility is that either large firms in problems or firms with advantageous position on market would seek Connection to decrease losses or avoid bankruptcy in the first case or secure their advantageous situation in the second case. From mentioned scenarios we can see that even estimation of the direction of the bias due to endogeneity is not possible.

Matching as presented in this chapter should eliminate majority of drawbacks common to cross-section models. We can imagine a situation that Connected firm was created just as a by-product of political power of the Minister and works only as a "black box" for transmitting rent in form of bribes, subsidies or public procurement contracts to the Minister. Then the firm does not have any similar non Connected firm to be matched with, but we do not expect that such behavior would occur on regular basis. In any other case matching would provide most precise estimates given the quality of the data.

Chapter 5

Results and discussion

We present results about effects of personal political connections to Ministers in the Czech Republic and discuss their possible implications.

First, in section 5.1 we present results of cross-section models and matching on covariates and covariates with propensity score. We estimated difference between Connected and non Connected firms in returns on assets and returns on equity with estimating both actual effect and postponed effect by either one or two years. Two possible channels of rent extraction were analyzed; we present results for difference in subsidy allocation and public procurement contracts won between Connected and non Connected firms.

Second, section 5.2 interprets these results in context of recent literature in the Czech Republic and similar countries on the effect of political connections and discuss possible implications of results in the Czech political and business environment.

5.1 Results

We present results of cross-section models as a first insight into estimation of political connections effects followed with more reliable estimates by matching. We decided to present results for both covariates matching and covariates with propensity score matching to enable reader comparison of estimates and inspect their robustness.

5.1.1 Results of cross-section models

Table 5.1 presents estimated effects of Connections on return on assets (ROA) and return on equity (ROE) performance measures. Insignificant coefficient of *Connect-edyear* means that politically connected firms in years of connection do not significantly outperform or underperform non connected firms. The estimated insignificant effect is negative which is in opposite direction than expected by our hypothesis. Negative significant coefficient of variable *Connected* signals that firms, which were

Connected to Ministers in some year of their existence, on average significantly underperformed other firms. The same holds for state owned firms where the negative effect is doubled. Connected firms has on average lower returns on assets and equity by 7-8 percentage points and state owned firms by 14-16 percentage points. We also did not find any significant effect on performance of state owned firms in years when connected to the Minister. The model estimates significant and positive effect of firm size (measured as logarithm of assets) on performance. Coefficients are similar in sign and size for both ROA and ROE measures.

Table 5.2 shows same estimation only with Connection lagged by one period to detect postponed effect of Connection on ROA and ROE. Coefficients of *ConnectedyearLag1* signaling lagged Connections are similar in sign and size as in previous model in Table 5.1. Same holds for coefficient of *ConnectedStateyearLag1*. As expected other variables have coefficients similar to previous model because change of Connections to lagged Connections should not affect their size much. No major changes are visible either in Table 5.3 presenting models with Connections lagged by two periods. Effect of Connection lagged by two years is still negative and insignificant but diminished slightly for ROA and almost entirely for ROE. We cannot find any support for hypothesis of positive effect of political connection which increases with lag, but diminishing negative effect over time partially supports hypothesis on improvement of firms' performance after establishment of Connection.

Table 5.4 presents estimated effects of Connections on subsidy on assets (SOA) and subsidy on equity (SOE). Politically connected firms in years of connection gain significantly more subsidies both by SOA and SOE measure. Results are in favor of hypothesis that subsidy allocation is one of the channels used to extract the rent. Positive coefficient of *Connected* signals that firms which were Connected to Minister in some year of their existence gain significantly more subsidies than other firms. In the years of Connection (captured by variable *Connectedyear*) is the subsidy allocation further increased by 2 percentage points in the case of SOA and 5 percentage points in the case of SOE. Significantly more subsidies gain also state owned firms and smaller firms as measured by logarithm of assets, however no significant difference was estimated between Connected state owned and private firms.

Table 5.5 shows results for public procurements as a possible channel of rent extraction. Positive and significant effect on volume of won public procurements both on assets (PPOA) and on equity (PPOE) was estimated for Connected firms in years of Connection by the model. Results supports the hypothesis that favorable public procurement contracts serve as a channel of rent extraction. Coefficients of variable *Connectedyear* estimate the effect as 4 percentage points in PPOA measure

Table 5.1: Firm performance cross-section results: ROA and ROE

	<i>Dependent variable:</i>	
	ROA_11	ROE_11
	Clustered errors	Clustered errors
	(1)	(2)
Connectedyear	-0.015 (0.012)	-0.013 (0.031)
Connected	-0.075*** (0.016)	-0.078*** (0.023)
State	-0.137*** (0.025)	-0.156*** (0.051)
ConnectedStateyear	0.003 (0.060)	-0.006 (0.075)
log(assets)	0.030*** (0.002)	0.034*** (0.006)
Constant	-0.493*** (0.038)	-0.539*** (0.093)
Observations	242,063	242,063
R ²	0.109	0.075
Adjusted R ²	0.109	0.075

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Robust standard errors are shown in parentheses and clustered at the NACE section level. ROA_11 and ROE_11 are ROA and ROE winsorized at interval $(-1, 1)$. Connectedyear is binary variable signaling active personal connection of firm to Minister, Connected is binary variable signaling whether firm was anytime during its existence Connected, State is binary variable signaling whether firm is owned by state, ConnectedStateyear is binary variable with interaction of Connectedyear and State, log(assets) is natural logarithm of firm's assets. Estimates of binary variables sorting firms into NACE sections are not reported.

Table 5.2: Firm performance cross-section results: ROA and ROE Lag1

	<i>Dependent variable:</i>	
	ROA_11	ROE_11
	Clustered errors	Clustered errors
	(1)	(2)
ConnectedyearLag1	-0.023* (0.013)	-0.014 (0.013)
Connected	-0.071*** (0.018)	-0.081*** (0.018)
State	-0.144*** (0.028)	-0.164*** (0.028)
ConnectedStateyearLag1	-0.0004 (0.059)	-0.027 (0.059)
log(assets)	0.028*** (0.002)	0.032*** (0.002)
Constant	-0.456*** (0.036)	-0.492*** (0.036)
Observations	228,649	228,649
R ²	0.104	0.073
Adjusted R ²	0.104	0.073

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Robust standard errors are shown in parentheses and clustered at the NACE section level. ROA_11 and ROE_11 are ROA and ROE winsorized at interval $(-1, 1)$. Connectedyear is binary variable signaling active personal connection of firm to Minister, Connected is binary variable signaling whether firm was anytime during its existence Connected, State is binary variable signaling whether firm is owned by state, ConnectedStateyear is binary variable with interaction of Connectedyear and State, log(assets) is natural logarithm of firm's assets. Estimates of binary variables sorting firms into NACE sections are not reported.

Table 5.3: Firm performance cross-section results:
ROA and ROE Lag2

	<i>Dependent variable:</i>	
	ROA_11	ROE_11
	Clustered errors	Clustered errors
	(1)	(2)
ConnectedyearLag2	−0.010 (0.017)	−0.001 (0.017)
Connected	−0.076*** (0.018)	−0.074*** (0.018)
State	−0.132*** (0.025)	−0.144*** (0.025)
ConnectedStateyearLag2	0.031 (0.047)	−0.026 (0.047)
log(assets)	0.027*** (0.002)	0.029*** (0.002)
Constant	−0.442*** (0.034)	−0.474*** (0.034)
Observations	208,195	208,195
R ²	0.097	0.064
Adjusted R ²	0.097	0.064

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Robust standard errors are shown in parentheses and clustered at the NACE section level. ROA_11 and ROE_11 are ROA and ROE winsorized at interval $(-1, 1)$. Connectedyear is binary variable signaling active personal connection of firm to Minister, Connected is binary variable signaling whether firm was anytime during its existence Connected, State is binary variable signaling whether firm is owned by state, ConnectedStateyear is binary variable with interaction of Connectedyear and State, log(assets) is natural logarithm of firm's assets. Estimates of binary variables sorting firms into NACE sections are not reported.

Table 5.4: Subsidy allocation cross-section results: SOA and SOE

	<i>Dependent variable:</i>	
	SOA_1	SOE_1
	Clustered errors	Clustered errors
	(1)	(2)
Connectedyear	0.023* (0.012)	0.051** (0.023)
Connected	0.028*** (0.010)	0.022** (0.010)
State	0.053*** (0.019)	0.081*** (0.026)
ConnectedStateyear	0.055 (0.093)	0.141 (0.193)
log(assets)	-0.016*** (0.002)	-0.028*** (0.002)
Constant	0.302*** (0.027)	0.558*** (0.027)
Observations	32,727	32,727
R ²	0.188	0.171
Adjusted R ²	0.187	0.170

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Robust standard errors are shown in parentheses and clustered at the NACE section level. SOA_1 and SOE_1 are SOA and SOE winsorized at interval (0, 1). Connectedyear is binary variable signaling active personal connection of firm to Minister, Connected is binary variable signaling whether firm was anytime during its existence Connected, State is binary variable signaling whether firm is owned by state, ConnectedStateyear is binary variable with interaction of Connectedyear and State, log(assets) is natural logarithm of firm's assets. Estimates of binary variables sorting firms into NACE sections are not reported.

and 16 percentage points in the case of PPOE. No significant difference in volume of public procurement contracts was estimated between Connected firms in years without active Connection and other firms. Similar results hold for state owned firm where only weakly significant and positive effect was found in the case of PPOA but no effect for PPOE measure. Interestingly the model estimated higher share of public procurement contract volumes both on assets and on equity for smaller firms signaled by significant negative coefficient of $\log(\text{assets})$.

Table 5.5: **Public Procurement cross-section results: PPOA and PPOE**

	<i>Dependent variable:</i>	
	PPOA_1	PPOE_1
	Clustered errors	Clustered errors
	(1)	(2)
Connectedyear	0.038*** (0.012)	0.163*** (0.052)
Connected	0.018 (0.022)	0.009 (0.037)
State	0.021* (0.013)	0.002 (0.018)
$\log(\text{assets})$	-0.021*** (0.003)	-0.021*** (0.003)
Constant	0.431*** (0.052)	0.476*** (0.059)
Observations	1,722	1,722
R ²	0.173	0.124
Adjusted R ²	0.163	0.112

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Robust standard errors are shown in parentheses and clustered at the NACE section level. PPOA_1 and PPOE_1 are PPOA and PPOE winsorized at interval (0,1). Connectedyear is binary variable signaling active personal connection of firm to Minister, Connected is binary variable signaling whether firm was anytime during its existence Connected, State is binary variable signaling whether firm is owned by state, $\log(\text{assets})$ is natural logarithm of firm's assets. Estimates of binary variables sorting firms into NACE sections are not reported.

To sum up results of cross-section models, we did not find any significant effect of actual or lagged Connection in a given year on returns on assets (ROA) and returns on equity (ROE) as measures of firm performance. More interestingly firms

Connected to Ministers on average underperform other firms by ROA and ROE measures not considering whether their Connection is active or not. Such results reject our hypothesis of significant positive effect of active Connection on firm's performance measured by ROA and ROE. Hypothesis about lag of the effect was supported only partially by insignificantly diminishing of the negative effect.

In analysis of possible channels of rent extraction we found positive and significant effect that both subsidies and public procurement contracts are used in years of active Connection. Results support hypotheses that allocation of subsidies and decisions about public procurement contracts are used to transform political power into economic rent of Connected firms in years of active Connection.

5.1.2 Results of matching

Table 5.6 presents results of matching on covariates for returns on assets (ROA) and returns on equity (ROE). Negative significant effect of active Connection was established both for ROA and ROE measures and for all cases of actual Connection or Connection lagged by one or two years. Size of the effect declines with the lag similarly in ROA and ROE. Results are in opposite of hypothesized positive effect of Connection and rejects the hypotheses.

Results similar in sign and size were found in the case of matching on covariates and propensity score. Table 5.7 shows slightly smaller effects which persists when Connections lagged by one year but decline for lag of two years. Results are highly significant and robust in matching approach. Firm in the year of active Connection to Minister is estimated to earn by 5 percentage points less than similar non Connected firm for ROA measure and by 6-8 percentage points less in ROE measure (histograms comparing ROA and ROE for Connected and Non Connected firms in Appendix A: Figure A.2 and Figure A.3). These effects decline to 3 percentage points negative effect for ROA and 4-5 percentage for ROE when Connection lagged by two years.

Table 5.8 presents estimates of matching on covariates for subsidy and public procurement variables. Positive and significant estimates of active Connection effect on subsidy allocation was found. Subsidies on assets (SOA) are estimated to rise by 0.8 percentage points on average in the year of active Connection and subsidies on equity (SOE) are estimated to rise by 1.3 percentage points on average compared to similar non Connected firm (histograms comparing positive SOA and SOE values for Connected and Non Connected firms in Appendix A: Figure A.4 and Figure A.5). Also count of allocated subsidies (N_Subsidy) rises by 1.7 on average for actively Connected firm. Results are consistent with the hypothesis of subsidy allocation as a source of rent extraction.

Results about public procurement contracts are less convincing. The volume of public procurement contracts won on assets (PPOA) in a year of Connection do

Table 5.6: Effect of Connection on ROA and ROE: Matching on covariates

Connection	Returns on Assets ROA ₁₁			Returns on Equity ROE ₁₁		
	Actual	LAG1	LAG2	Actual	LAG1	LAG2
Estimate	-0.059*** (0.010)	-0.048*** (0.010)	-0.033*** (0.010)	-0.078*** (0.017)	-0.062*** (0.016)	-0.044*** (0.017)
T-stat.	-6.015	-4.914	-3.263	-4.668	-3.948	-2.599
P-value	0	0	0.001	0	0.0001	0.009
N Total	1, 154, 544	1, 088, 468	1, 012, 749	1, 154, 544	1, 088, 468	1, 012, 749
N Treated	623	616	533	623	616	533
N Matched	528	482	407	528	482	407

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Estimate of difference in ROA₁₁ ROE₁₁ is between matched private Connected firm and non Connected in a given year for Actual, for LAG 1 in previous year and for LAG2 Connected 2 years ago. Abadie-Imbens standard errors are reported in parentheses, which were used for T-statistics and P-value computations. By number of treated observations we mean number of private Connected firm in particular year.

Table 5.7: Effect of Connection on ROA and ROE: Matching on covariates and propensity score

Connection	Return on Assets ROA ₁₁			Return on Equity ROE ₁₁		
	Actual	LAG1	LAG2	Actual	LAG1	LAG2
Estimate	-0.046*** (0.010)	-0.045*** (0.009)	-0.031*** (0.010)	-0.057*** (0.017)	-0.056*** (0.016)	-0.047*** (0.016)
T-stat.	-4.766	-4.809	-3.199	-3.304	-3.561	-2.834
P-value	0	0	0.001	0.001	0.0004	0.005
N Total	1, 154, 544	1, 088, 468	1, 012, 749	1, 154, 544	1, 088, 468	1, 012, 749
N Treated	623	616	533	623	616	533
N Matched	528	482	407	528	482	407

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Estimate of difference in ROA₁₁ ROE₁₁ is between matched private Connected firm and non Connected in a given year for Actual, for LAG 1 in previous year and for LAG2 Connected 2 years ago. Abadie-Imbens standard errors are reported in parentheses, which were used for T-statistics and P-value computations. By number of treated observations we mean number of private Connected firm in particular year.

not significantly differ for Connected and similar non Connected firms. For measure scaled by equity (PPOE), however we found significant positive effect of 0.7 percentage points. Also effect on count of won public procurement contracts (N_PP) significantly differ between actively Connected and similar non Connected firms. Connected firms in the year of connection won on average 0.4-0.5 percentage points more public procurement contracts than their similar non Connected firms.

We can compare results based on covariates matching to results of covariates and propensity score matching presented in Table 5.9. Estimates of subsidy allocation difference between Connected and similar non Connected firms are similar to those of solely covariate matching. Histograms comparing Connected and Non Connected firms were similar to covariate matching as we do not publish them. SOA coefficient is estimated to exactly same 0.8 percentage points and SOE coefficient slightly decreased to 0.9 percentage points, but remains significant. Estimate of number of subsidy grants (N_Subsidy) even increased to 1.8.

Public procurement results based on covariate and propensity score matching differ from covariates matching results. Any of public procurement measures reached significance. PPOA coefficient was estimated practically to zero, PPOE decreased to insignificant 0.4 percentage points effect and difference in public procurement contracts also decreased practically to zero. Positive effect of active Connection on public procurement channel of rent extraction does not proved to be robust across matching methods.

Table 5.8: Effect of Connection on Subsidy and Public Procurement allocation: Matching on covariates

	SOA_1	SOE_1	N_Subsidy	PPOA_1	PPOE_1	N_PP
Estimate	0.008** (0.003)	0.013*** (0.005)	1.665*** (0.551)	0.001 (0.002)	0.007* (0.004)	0.044** (0.017)
T-stat.	2.333	2.751	3.020	0.425	1.727	2.555
P-value	0.020	0.006	0.003	0.671	0.084	0.011
N Total	1, 154, 544	1, 154, 544	1, 154, 544	1, 154, 544	1, 154, 544	1, 154, 544
N Treated	623	623	623	623	623	623
N Matched	528	528	528	528	528	528

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Abadie-Imbens standard errors are reported in parentheses, which were used for T-statistics and P-value computations. By number of treated observations we mean number of private Connected firm in particular year.

Results of matching approaches present robust results that Connected firms in years of Connection significantly underperform their similar non Connected rivals by

Table 5.9: **Effect of Connection on Subsidy and Public Procurement allocation: Matching on covariates and propensity score**

	SOA_1	SOE_1	N_Subsidy	PPOA_1	PPOE_1	N_PP
Estimate	0.008** (0.003)	0.009* (0.005)	1.804*** (0.545)	-0.001 (0.003)	0.004 (0.005)	0.009 (0.015)
T-stat.	2.337	1.847	3.308	-0.458	0.910	0.631
P-value	0.019	0.065	0.001	0.647	0.363	0.528
N Total	1, 154, 544	1, 154, 544	1, 154, 544	1, 154, 544	1, 154, 544	1, 154, 544
N Treated	623	623	623	623	623	623
N Matched	528	528	528	528	528	528

Significance: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: Abadie-Imbens standard errors are reported in parentheses, which were used for T-statistics and P-value computations. By number of treated observations we mean number of private Connected firm in particular year.

both ROA and ROE measures. This effect remains but slowly shrinks for lagged Connection by one year and two years, respectively. These results reject our hypothesis that Connection would lead to increase in performance measured by ROA and ROE and only partially supports hypothesis about lagged effect by shrinking of negative estimates.

We found robust results about positive effect of Connections on subsidy allocation. Results are in favor of hypothesis that subsidy allocation serves as one of the rent extraction channels. For the channel of public procurements we found non robust results suggesting possibility that it serves as rent extraction channel by covariates matching, but no evidence when covariates and propensity score matching was applied. Therefore we cannot neither reject neither support hypothesis that public procurement contracts serve as a rent extraction channel for connected firms.

We also tried to match firms on subsamples of data set. For subsidy analysis we choose only firms obtaining at least one subsidy in a given year and for public procurement analysis only firms which have won at least one public procurement contract in a given year. Results are reported in Table A.2 and Table A.3 in Appendix A. Results suffer from small sample size, but we still found significant and positive effect for SOA and number of subsidies (N_Subsidy). We found positive significant effect of PPOE and number of public procurements contracts (N_PP) but results are unreliable due to extremely low sample size.

To test matching results reliability we performed balance tests. We cannot reject hypothesis that sample of Connected firms is the same as their matched non Connected peers based on firms characteristics. We present balance tables in Ap-

pendix A for both covariates matching and covariates and propensity score matching (Table A.4 and Table A.5). Overall, results of matching provide us with relatively robust and coherent estimates of political Connections effect on firm's performance and subsidy allocation.

5.2 Discussion

We estimated negative effect of political connections on firm performance measured by returns on assets and returns on equity. In this section we discuss possible explanations of our findings. Then we follow with interpretation of finding that connected firms are favored in subsidy allocation and discuss possible implications and policy improvements to the status quo.

5.2.1 Do really connections to Ministers decrease firm's performance?

We found out robust results suggesting negative value linked with personal connections to Ministers. In cross-section models we estimated that Connected firms underperform other firms both in times of Minister in office and out of office. By matching we estimated that private firms in time of connection underperform similar but non-connected rivals. Such results reject our hypothesis that connected firms should gain extra rent from connections increasing their profitability in comparison to similar rivals. We approach our results in context of similar findings in the literature and offer possible explanations.

Some authors working with different data, definitions of political connections and in different countries also estimated negative value of political connections (Aggarwal *et al.* 2012; Bliss & Gul 2012; Fan *et al.* 2007; Jackowicz *et al.* 2014). Unfortunately comparison with our results is hardly possible. Aggarwal *et al.* (2012) used donations to candidates as proxy of political connection in the United States, Bliss & Gul (2012) analyzed costs of debt and not the profitability itself in Malaysia, and Fan *et al.* (2007) measured profitability of political connections in sample of only partially privatized firms in China. Closer to our analysis is paper by Jackowicz *et al.* (2014) who estimated negative value of political connections in Poland. However, Jackowicz *et al.* (2014) used only sample of publicly traded companies and as a consequence different methodological approach which may influence the comparison of the results.

Jackowicz *et al.* (2014) mentioned two main explanations of their evidence. First, they suggested that political instability could eliminate any possible profits from political connections and firms did not anticipated the instability. As a result they made unprofitable investment into political connection. In support of the explanation they did not find any negative effect of political connections in years after 2007 when

relative political stability was established in the Poland; still no positive effect was estimated despite the stability.

The Czech Republic also suffered from substantial political instability during history. In the examined period between 1993 and 2015 the average time of Minister in the office was lower than two years. It means that Ministers spent less than half of the regular period of one election cycle in the office. Such high volatility when not anticipated by Ministers themselves or their connected company managers could explain negative value of investment into political connections. We think that rational agents, however, should anticipate the volatility of Ministry offices because the pattern is rather long term in the Czech politics. We see long term errors in expectations of time spend by Minister in the office as improbable major explanation.

The Second explanation offered by Jackowicz *et al.* (2014) changes the motivation of political connections. Jackowicz *et al.* (2014) supposed that firms may seek connections as an insurance against possible negative external shocks. Unfortunately, authors did not explain their interpretation in more details. For rational agent, insurance should increase his expected value of the outcome. We estimated the negative value of political connection around 5 percentage points in returns on assets and returns on equity measure which could be hardly explained as an acceptable "political insurance" costs for rational firms.

In next few paragraphs we offer alternative explanations of our findings. We consider the specificity of used data set and the nature of Czech environment. We try to explain results by accounting for data drawbacks and combination of economic and political reasoning.

Data does not capture hidden connections and gray economy

If we want to interpret the results, we should consider the limitation of data used for the analysis as first. We already discussed the high share of very probably non-randomly missing values and errors in the data in chapter 3. Here we would like to stress that even complete data does not capture the whole phenomena of political connections.

We analyzed only direct connections of Ministers to firms which means that all more discreet ways of connections like use of anonymity or intermediary hide the connection from the analysis. Typical examples popular for hiding conflict of interest are Czech firms owned by foreign firms with anonymous owners (Palguta 2014) or use of relatives, friends or strawpersons to hide real economic structure (Válková & Jiříčka 2011). If we suppose that Ministers and connected firms used these vehicles to hide their rent extraction, then the analysis of only direct connections could significantly underestimate the effect.

The second issue is the high share of gray or unofficial economy. The gap in value

added tax (VAT), which means an estimate between theoretical and real collected volume, is estimated above 25 % (Supreme Audit Office 2014). Deliberately misrepresented financial results form 40 % of missing VAT. Directly connected firms very probably simply do not report the extracted rents in the financial reports to avoid taxation. At last we should also mention black market transactions like bribery, blackmailing or frauds also used for rent extraction which also cannot be analyzed.

We believe that significant share of extracted rent was not captured in our data which cause our estimate to be biased downwards. However, data about hidden connections and gray economy are not analyzed in vast majority of papers and still positive value of connections is in most cases estimated. We propose alternative explanation of negative estimates in next paragraphs.

Politics and business do not fit together

Politicians could follow different economic goals than ordinary businessmen. Ministers could influence their connected firms to support their political career rather than firm performance and prefer short-term goals such as elections to long-term business vision. Also, when in office, Ministers have less time to manage connected firms and oversee their decisions. This explanation is weakly supported by slight improvements in performance when we lag connection by one and two years. Extreme possibility could be that Ministers manage their connected firms as a special purpose vehicles to increase their political power and firms do not have any reasonable economic activity at all.

In this explanation we assume that Ministers influence connected firms and not vice versa. In many cases when Minister owns the firm or its significant share it is reasonable, but in other situations when ex-Minister gets well paid post in the board of the firm as a reward for his favorable politics the situation is reversed and presented explanation does not hold. For the latter situation we offer another possible explanation in few next paragraph.

Political connection as the last firm-saving option

Firms can seek political connection to Ministers as a last option how to improve their financial performance. In this possible explanation we assume that mainly firms with financial problems establish connections which explains the negative coefficients in return of assets and return of equity of connection.

Financial results improving over time of connection after one and two years are in line with the explanation. Endogeneity of connections can explain also contradicting results of lower performance of connected firms despite a higher subsidy allocation in years of active connection.

We see limitation of the explanation that we cannot argue why only underperforming firms seek political connections when it improves their financial results. Firms may be afraid of long term effects of the connection in form of additional costs, but the analysis of long term effect of connections goes beyond the scope of the thesis.

The explanation of our findings could be in the reality a combination of suggested explanations with other factors. We have to admit that significant share of rent extraction is not captured in the data, but this cannot explain our results in full. Other presented explanations should be considered to understand our findings. As probable explanation we consider combination of two factors. First, firms managed by Ministers suffer from their preference of political career to firm management, and second, firms seeking political connections to Ministers are mainly in bad shape and see political connection as the last option how to survive.

5.2.2 Subsidy allocation: How much political connections matter?

We estimated that connected firm gains by 0.8 percentage points more in subsidy on assets measure than similar non-connected firm in each year of connection. To illustrate the real economic impact of our results we present simple example of representative firms.

Suppose a firm with 50 million CZK assets which is set close to average of our corrected data and connection to Minister who served two years in the office which is close to average time spent in the office. We estimated that the firm will gain 800,000 CZK more on subsidies during 2 years than similar non-connected rival. If we use a median observation in the subsample of connected private firms for the computation of the economic effect we get even higher absolute numbers. Median firm with assets worth 276,089,000 CZK would gain 4,417,424 CZK more on subsidies in two years of active connection.

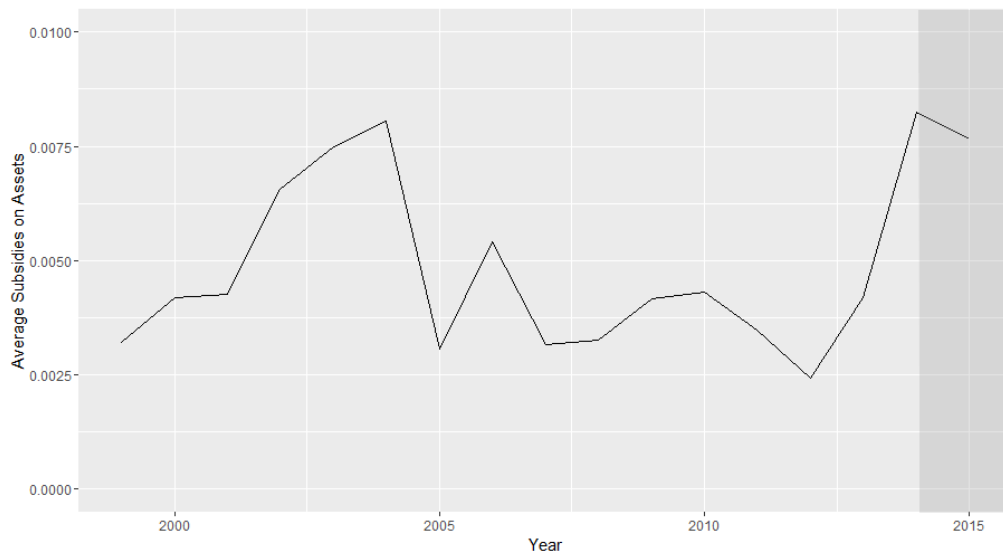
Estimated effect has significant economic impact which can help the firm to survive on the market or gain extra profit from allocated subsidy. We believe that estimated effect is sufficient to distort some markets for example by survival of inefficient but politically connected firm or possibility of misuse of allocated subsidies to finance dump prices or other aggressive market strategy to eliminate rivals.

Agriculture is an example of market seriously endangered by biased allocation of subsidies. Subsidies for agriculture firms were higher than overall profit from agriculture in 2016 although the profit was the second highest from the year 2000 (Czech News Agency 2017b). Overall profit was above 20 billion CZK, but subsidies to agriculture were above 30 billion CZK. Firms in agriculture essentially depends on subsidies therefore any bias in subsidy allocation towards connected firms distort market competition and potentially harm consumers. Agrofert, a holding which

operates the largest agricultural land and is major beneficiary from agriculture subsidies in the Czech Republic (Králová 2016) is connected to Minister of finance and the second richest businessman in the Czech Republic, Andrej Babiš.¹

Figure 5.1 depicts the development of average subsidies on assets (SOA) for firms owned by Agrofert.² Sharp upturn between years 2013 and 2014 precisely follows gain of political power for Andrej Babiš. Babiš became the Minister of finance in January 2014 and average SOA increased by 0.4 percentage points between 2013 and 2014. Although we cannot show any evidence for causality between Minister office for Babiš and increase in subsidies, we should be at least aware of possible misuse of political power for private economic benefits. In next few paragraphs we offer policy implications which should decrease the occurrence of rent extraction.

Figure 5.1: **Average Subsidies on Assets for Agrofert firms over time**



Source: Analysis of firm data from database Magnus and additional sources. Average Subsidies on Assets (SOA) were computed as mean of SOA_1 (winsorized SOA at $\langle 0, 1 \rangle$) for all firms owned by Agrofert in a given year. Firms of holding Agrofert identified from its official page (as of the beginning of May 2017) (AGROFERT [2016]). Area marked by dark gray is the time of Andrej Babiš in office of Finance Minister.

5.2.3 Political connections to Ministers: Czech reality and possible policy improvements

We should distinguish between at least two different relationships in personal connections of firms and Ministers. First, Ministers could manage connected firms as a

¹Andrej Babiš was the owner of Agrofert till February 2017. Then he was forced by the new conflict of interest law to move Agrofert in new established trust funds (Czech Television 24 2017a).

²Figure similar in shape and values holds also for SOE measure which is not reported in the thesis.

side business to transform part of their political power into economic benefits. Second, firm initiates political connection to extract rent and offers well paid job or a minor share of the firm as a reward for the Minister. Each type of connection creates different issues and each of them should be regulated in different manner.

Some politicians including Ministers would always try to misuse their political power for private benefits. Ministers' behavior is regulated by the law as described in the section 2.2 to avoid conflict of interests; however, law or any other regulation with threat of possible punishments cannot eliminate all types of behavior which misuses political power to private gains. Only well working investigative journalism and voters sensitive to misuse of power will limit the occurrence of such behavior to rare exemptions. Improvement is at best evolutionary as the independent press and active civic society develops.

Firms may seek political connections with more complex motivations than just rent extraction. For example, use of political connection to obtain subsidy could be a rational firm strategy how to solve financial distress caused by unanticipated policy. Predictable market regulations and governmental policies including governmental investments should significantly decrease the value of political connection as a firm's tool how to influence or survive unanticipated policy.

Political connections substitute law enforcement and secured property rights in countries with weak institutions (Faccio 2006). In such environments demand for connections is mainly due to non functioning market institutions and not the desire to extract the rent. Decision to seek political connection is rational at the firm level but leads to even more discrete policies of the government distorting further the market competition.

Predictability about tax policies, energy and environmental regulations and publicly planned investments would decrease the demand for political connections. Czech firms faced regularly uncertainty about future tax policies, last example was VAT change passed in late December 2014 and enforced from the beginning of January 2015 (Aktualne.cz 2014). Better predictability of governmental policies is one improvement which could be implemented to reduce demand for political connections.

As the second step development of transparent and ruled based spending of public sources will reduce the value and motivation for political connections. Simple availability of open data about subsidy allocation and public procurement contracts as used in this thesis increases the probability of public money misuse identification and possible negative consequences for both the Minister and the connected firm. Data is publicly available but sometimes in poor quality, for example in the case of public procurement data, or in user unfriendly formats which holds for subsidy data.

We see improvements in data availability as a new law about publishing all new contracts of public institutions in the Contracts Register accessible by public (Ministry of the Interior [2017]). On the other hand, the law faces political pressure

to exclude contracts of state or municipality firms and its future is still uncertain (Kopecký 2017). Accessible information about contracts and other forms of spending public sources will make use of rent extraction channels such as favorable contracts or biased subsidy allocation more difficult.

Another big step forward decreasing motivation for political connections would be improved functioning of the Office for the Protection of Competition. Better predictability of results, transparent decisions in shorter time and proper punishment for biased public procurements and improper state aid offenses should eliminate interpretation of political connections as a profitable asset. In our view discussion about the purpose of antitrust institutions should follow. For example Petersen (2013) claims that aim to prevent economic concentration, rather than just misuse of it, should promote and stabilize democratic development of the society. Such policy could eliminate situations of serious conflict of interest and concentration of economic and political power as described on example of the Minister Andrej Babiš and Agrofert, although judicious discussion of economists and politicians about cost and benefits should precede.

We interpret our results as a partial explanation in complex reality rather than a general finding in support of negative value of political connections. We explain negative effect of political connection on return on assets and return on equity as a possible combination of multiple factors such as specificity of data used, poor performance of politicians in business, and endogeneity of political connection that mostly underperforming firms seek connections as a form of last surviving option. We identified a channel of rent extraction in favorable allocation of subsidies to connected firms and believe that estimated effect have in some cases significant effect on market outcomes, in other words creates market distortions with possible impacts on consumer welfare. To decrease the importance of political connections we should focus on policies leading to more predictable and transparent environment.

Chapter 6

Conclusion

We investigated value of personal political connections to Ministers in the first empirical analysis on Czech firm level data. By averaged cross-section regressions and dynamic covariate and propensity score matching we estimated value of political connections and possible channels of rent extraction.

Firms personally connected to Ministers of the Czech government in examined period between 1993 and 2015 significantly underperform their rivals in years of connection on average by 5 percentage points in return on assets and return on equity measure. We interpret our surprising results as a combination of imperfect quality and completeness of used data, conflict between political and economical goals of connected firms and endogeneity of firms seeking political connections. Mainly firms in a bad shape may seek political connections as a last strategy to survive and stay on the market. Our explanation is supported by finding that financial results of connected firms improves over time when we lag the connection by one and two years.

We identified subsidy allocation as a channel of rent extraction for connected firms. Firms connected to Ministers get significantly more subsidies managed at the Ministry than their non connected rivals. Connected firms gain on average by 0.8 percentage points more in subsidies on assets and subsidies on equity measures. For median firm connected to a Minister in office for two years we estimated volume of extra subsidies to almost 4.5 million CZK. Such economically significant amount could shape the market in a way that inefficient firms remains on the market solely due to favorable subsidy allocation and distort the market competition. If it happens in large scale for some markets, such distortion could substantially affect market outcomes and cause harm to consumers. For example agriculture sector, where allocated subsidies create significant source of firm's total income, could be seriously endangered. Moreover, holding Agrofert of Andrej Babiš,¹ the second richest businessman

¹Andrej Babiš was the owner of Agrofert till February 2017. Then he was forced by the new conflict of interest law to move Agrofert in new established trust funds (Czech Television 24 2017a).

in the Czech Republic and the Minister of finance (as of the beginning of May 2017), is the crucial player in agriculture and major beneficiary of subsidies. Subsidies for Agrofert jumped when Andrej Babiš took the office of finance Minister which shows that the danger of consumer harm may not be only hypothetical.

We offer several policy implications how to improve present situation for consideration. Policies which reduce the value of political connections and complicates the extraction of rent could start at principles of transparency and predictability. More publicly available data in good quality about public spending increases the control of channels of rent extraction and predictable tax policies and regulations reduce motivation for firms to seek political connection as a safeguard for unpredictable policies harming their business. Improved efficiency of the Office for the Protection of Competition will further increase costs for politically connected firms in form of punishment for biased public procurements and improper state aid.

We conducted the first major step into analysis of personal political connection in the Czech Republic. To estimate value of political connections more precisely and identify more channels of extraction, further research should investigate the topic of political connections. One possible direction of research could extend our analysis to regional politicians who are less motivated to hide connections because of lower interest of media and regulators at the small scale. Future authors have to solve challenge of gathering personal data such as date of birth to reliably match politicians to firms in the Business Register. Another future approach could use new available data in the Contract Register (Ministry of the Interior [2017]) where are publicized all contracts (not only public procurement contracts) of public institutions, municipalities and even of firms owned by them to identify new channels of rent extraction. Further challenging step would be identification of hidden connections and unofficial or illegal payments. Possible solution how to partially find out rent extraction channels in form of bribery could be use of data from the Land Register. Higher bribes are often invested in land or estates. As stated in the thesis, political connections, concentration of political and economic power, and rent seeking followed by market distortions and consumer harm seem to be important economic topic in the present and near future of the Czech Republic.

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Appendix A

Additional Tables and Figures

Table A.1: Average years of firm's existence

	Connected	Non Connected	Total
Obs. total	6,912	3,135,434	3,142,346
Num. of firms	451	249,016	249,467
Average num. of obs. per firm	15.33	12.59	12.60

Notes: All firms existing in the Czech Republic are analyzed.

Figure A.1: Distribution of Connected and non Connected firms in data by years



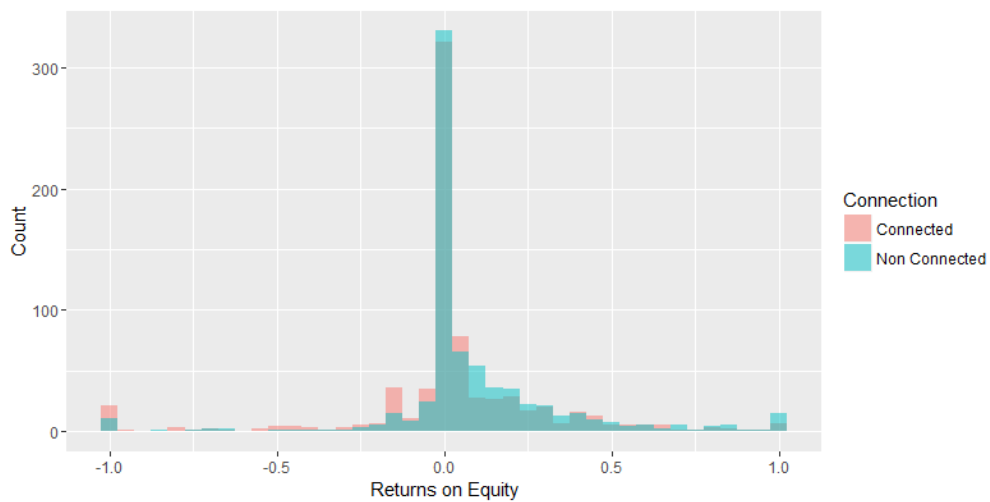
Source: Analysis of firm data from database Magnus.

Figure A.2: **Histogram of matched Connected and non Connected firms: ROA**



Source: Analysis of firm data from database Magnus and additional sources. Firms are matched on covariates. Figure presents histogram of ROA_11 values.

Figure A.3: **Histogram of matched Connected and non Connected firms: ROE**



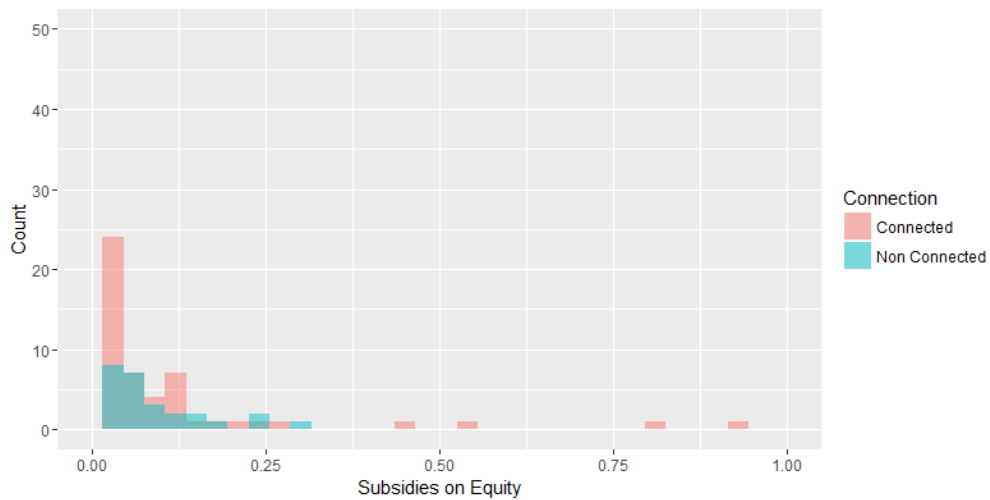
Source: Analysis of firm data from database Magnus and additional sources. Firms are matched on covariates. Figure presents histogram of ROE_11 values.

Figure A.4: **Histogram of matched Connected and non Connected firms: SOA**



Source: Analysis of firm data from database Magnus and additional sources. Firms are matched on covariates. Figure presents histogram of positive SOA_1 values.

Figure A.5: **Histogram of matched Connected and non Connected firms: SOE**



Source: Analysis of firm data from database Magnus and additional sources. Firms are matched on covariates. Figure presents histogram of positive SOE_1 values.

Table A.2: **Effect of Connection on Subsidy and Public Procurement allocation - matching on covariates on subsample of firms**

	SOA_1	SOE_1	N_Subsidy	PPOA_1	PPOE_1	N_PP
Estimate	0.027** (0.012)	0.013 (0.014)	7.142*** (2.084)	0.078 (0.071)	0.388*** (0.128)	0.778*** (0.302)
T-stat.	2.208	0.941	3.427	1.101	3.029	2.574
P-value	0.027	0.347	0.001	0.271	0.002	0.010
N Total	79,681	79,681	79,683	3,890	3,890	4,008
N Treated	153	153	153	17	17	17
N Matched	106	106	106	9	9	9

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Matching was processed on subsample of firms - for subsidy analysis only firms obtaining subsidy in a given year were analyzed and for public procurement analysis only firms winning at least one public procurement in a given year were analyzed. Results in public procurement analysis should not be considered reliable due to extremely low sample size. Abadie-Imbens standard errors are reported in parentheses, which were used for T-statistics and P-value computations. By number of treated observations we mean number of private Connected firm in particular year. Balance tests do not reject hypothesis that treated and control group are different in covariates (not reported).

Table A.3: **Effect of Connection on Subsidy and Public Procurement allocation - matching on covariates and propensity score on subsample of firms**

	SOA_1	SOE_1	N_Subsidy	PPOA_1	PPOE_1	N_PP
Estimate	0.023* (0.012)	0.004 (0.014)	6.906*** (2.096)	0.097 (0.072)	0.427*** (0.129)	0.778*** (0.291)
T-stat.	1.936	0.277	3.295	1.353	3.312	2.677
P-value	0.053	0.782	0.001	0.176	0.001	0.007
N Total	79,681	79,681	79,683	3,890	3,890	4,008
N Treated	153	153	153	17	17	17
N Matched	106	106	106	9	9	9

Significance: *p<0.1; **p<0.05; ***p<0.01

Notes: Matching was processed on subsample of firms - for subsidy analysis only firms obtaining subsidy in a given year were analyzed and for public procurement analysis only firms winning at least one public procurement in a given year were analyzed. Results in public procurement analysis should not be considered reliable due to extremely low sample size. Abadie-Imbens standard errors are reported in parentheses, which were used for T-statistics and P-value computations. By number of treated observations we mean number of private Connected firm in particular year.

Table A.4: Balance test for matching on covariates

	log(assets)		log(equity)		Employees	
	Before	After	Before	After	Before	After
Mean ConnectedYear	19.127	18.598	18.380	17.858	385.700	289.773
Mean Other	15.355	18.583	14.144	17.849	466,802	273.260
Variance ratio	1.473	1.009	1.570	1.009	0	1.083
T-test p-value	0	0.009	0	0.133	0	0.476
KS Bootstrap p-value	0	0.314	0	0.196	0	0.230
KS Naive p-value	0	0.308	0	0.180	0	0.308

Notes: Variance ratio of ConnectedYear over Other firms, Kolmogorov-Smirnov test for the hypothesis that the probability densities for both the treated and control groups are the same was performed on 500 bootstraps.

Table A.5: Balance test for matching on covariates and propensity score

	log(assets)		log(equity)		Employees	
	Before	After	Before	After	Before	After
Mean ConnectedYear	19.127	18.598	18.380	17.858	385.700	289.773
Mean Other	15.355	18.595	14.144	17.857	466,801.700	257.723
Variance ratio	1.473	1.000	1.570	1.004	0	1.366
T-test p-value	0	0.633	0	0.837	0	0.130
KS Bootstrap p-value	0	0.308	0	0.118	0	0.392
KS Naive p-value	0	0.317	0	0.128	0	0.503

Notes: Variance ratio of ConnectedYear over Other firms, Kolmogorov-Smirnov test for the hypothesis that the probability densities for both the treated and control groups are the same was performed on 500 bootstraps.