Norwegian School of Economics
Bergen, Fall 2016

Trade in Regulatory Decisions

A study of market regulation and corruption in OECD countries

Lena Ryde Nord and Marie Løkeland Lerøy

Supervisor: Tina Søreide

Master thesis, MSc in Economics and Business Administration,
Business Analysis and Performance Management, and
Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

Abstract

Corruption and its harmful consequences is often described as a developing country problem, but there are reasons to believe that corruption risk is present in developed countries as well. This thesis aims to study the association between corruption risk and the extents of market regulation in OECD countries. We argue that expected government intervention may create an arena for political corruption due to the discretionary authority of politicians and regulators, and the insufficient mechanisms to monitor their decisions. When profit or market power is at stake, firms in regulated markets also have incentives to unduly influence regulatory decisions by colluding with politicians or regulators.

We find that the risk of corruption in OECD countries seems to be higher when markets are more heavily regulated. To measure the extent of market regulation, we use new data from the OECD called the Services Trade Restrictiveness Index (STRI). Our findings are robust to two different corruption indicators, and a complementary analysis using data from the World Bank's Doing Business surveys. We also discuss and control for the effects of several market and institutional characteristics related to regulatory environments.

Our findings underline the need for a better understanding of the full consequences of market regulation in the presence of corruption risk, and support the need for more international collaboration to combat corruption. Furthermore, our findings suggest that extending the mandates of competition authorities could strengthen law enforcement at the national level.

Acknowledgements

This thesis is written as a final part of our Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH).

The both of us wanted to write about a meaningful topic relevant to the many ethical issues facing firms and societies. Choosing to write about corruption strongly fulfilled this desire, and the process has both challenged and rewarded us.

We wish to thank our supervisor Professor Tina Søreide for being so engaged in our work, and for giving us constructive feedback throughout the process. Our thesis is written with support from the Norwegian Tax Authorities (Skatteetaten) and the Norwegian Center for Taxation at NHH, which we are very grateful for.

We further wish to thank Hildegunn Kyvig Nordås, Senior Trade Policy Analyst at the OECD, for taking the time to discuss the use of the STRI data. We are also highly grateful to her for providing us with the opportunity to visit the OECD Headquarters in Paris, and to her team for listening to the presentation of our preliminary results. In this regard, we express our gratitude to the Center for Ethics and Economics (Etikkfondet) at NHH, for granting us financial support to carry out the excursion.

Last, but not least, we thank our family and friends for valuable support and for having confidence in us these last months.

Oslo, December 2016

Marie Løkeland Lerøy

Lena Ryde Nord

Acronyms

CCI	Control of Corruption Index
CPI	Corruption Perception Index
COE	Council of Europe
GDP	Gross Domestic Product
IEF	Index of Economic Freedom
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
OVB	Omitted Variable Bias
STRI	Services Trade Restrictiveness Index
TI	Transparency International
UN	United Nations
UNCAC	United Nations Convention Against Corruption
VIF	Variance Inflation Factor
WGI	World Governance Indicators
WLS	Weighted Least Squares

Contents

1. Introduction

1.1 Motivation and purpose

Corruption is often considered a developing country problem, while many OECD countries are seen as more or less corruption free. These general perceptions are reflected by indices such as the Corruption Perception Index (CPI) by Transparency International, where many OECD countries are associated with reasonably low levels of corruption. However, there are reasons to believe that corruption risk is also present in OECD countries. Daily media coverage of extensive corruption scandals involving large companies, politicians and other state actors, paints a somewhat different picture. Looking closer at the available data, there is also significant variation in the perceived levels of corruption within this group of countries.

While the cases uncovered until recently have not been manifold, they reveal large-scale bribes and gains from corrupt deals and its proceeds. A recent example is the case of the telecommunication company VimpelCom, which was fined more than $795m after admitting to bribing a high-ranking government official in order to surpass entry regulation in Uzbekistan, gain access to the market, and win licenses that generated more than $2,5bn in revenue (U.S. Department of Justice, 2016). Other recent cases such as the ones involving Yara or Petrobras, illustrate how markets can be distorted by corruption involving large firms and entrusted public officials, and highlight the challenges of prosecuting firms and individuals for corrupt acts.

Firms often navigate in complex regulatory environments, and certain regulatory decisions can be decisive for their success in the market, be it price controls, subsidies, or market entry regulations. Currently, markets in many highly modernized countries are prone to quite large extents of market regulation, and the trend leans toward more extensive and more complex market regulation rather than the opposite. At the same time, politicians and regulators have wide discretionary authority over these regulatory decisions. Despite well-established procedures for checks and balances in most OECD countries, the many complex goals and concerns embedded in regulatory decision-making processes may simplify hiding corrupt transactions, and leave general monitoring systems inadequate to detect corruption. Barriers against corruption further seem to be especially weak at the top political level, and despite significant harmonization efforts country evaluations reveal serious shortcomings to law enforcement in many OECD countries (Søreide, 2016b).

The purpose of this thesis is therefore to understand the risks related to corruption in regulatory processes. In this regard, we review rationales for market regulation and theories of regulatory capture to understand whether discretionary authority may create an arena for political corruption, where market failures are allowed to continue in exchange for benefits. Furthermore, we investigate the association between the extent of market regulation and corruption empirically, in the context of OECD countries and the largest emerging economies. We primarily utilize a de jure measurement of the extent of market regulation, based on the OECD Services Trade Restrictiveness Index (STRI). The STRI is a new data set consisting of comprehensive information about countries' regulatory environments in the service sector, and to our knowledge this data has not been used in any resembling research.

1.2 Research question

This thesis aims at answering the following research question:

> *What are the implications of different extents of market regulation on the risk of collusive corruption in OECD countries?*

The rest of this thesis is organized as follows: The first few chapters are devoted to relevant concepts and literature review. In Chapter 2 we clarify the formal definition of corruption used in the thesis, as well as our conceptual understanding of the phenomenon. Chapter 3 gives an introduction to market regulation and the traditional rationales for intervening in markets. Chapter 4 describes the risk of regulatory capture, and how this can be explained by asymmetric information and imperfect monitoring. Chapter 5 reviews empirical literature relevant to how the interaction between corruption and market regulation is previously studied. The next part of our thesis presents our empirical method and analysis. Chapter 6 describes our data and variables, and outlines the empirical strategy we have employed. Chapter 7 presents the results of the empirical analysis, while Chapter 8 discusses potential explanations and normative implications of the results. Chapter 9 concludes the thesis.

2. Corruption in an OECD context

Corruption is by no means a new phenomenon and has been subject to literary, academic, and political debate for decades. It is commonly argued that corruption impedes development, distorts markets, undermines governance, and reinforces poverty. On the other hand, corruption has also been argued to "grease the wheels" of growth, and allow for efficiency gains by providing a way around red tape.[1] Today we have overwhelming evidence showing that corruption is harmful to societies, causing distortions such as misallocation or loss of state revenues, inadequate or inflated prices, lower quality, wasted resources, scarcity or unfair allocation of resources, reduced access to information, and fueling other forms of crime (Søreide, 2016a).

Internationally, substantial progress has been achieved in anti-corruption over the last decades, and governments increasingly acknowledge the damage caused by corruption. In 2014, the political leaders of the world's twenty largest economies, the G20, agreed on seven principles recognizing the severe consequences of corruption in markets, and the importance of acting collectively to combat corruption. One of the principles are:

> Corruption distorts decision making at the highest level and can cause severe economic damage through the ineffective allocation of public resources, particularly when diverted to benefit private and not public interests. The laundering of corruption proceeds can impact the national economy and the integrity of the international financial system. (G20, 2014)

In order to combat corruption effectively, there is a need to continuously seek more knowledge about the causes of corruption. In this respect, researchers have focused on a variety of causes of corruption ranging from legal traditions and cultural determinants, to different characteristics of business environments. However, when studying corruption, a very important question concerning causality arises, in which the causes and consequences of corruption might be two sides of the same coin.

[1] Red tape generally refers to excessive bureaucracy or adherence to official rules and formalities, contributing to inefficiencies in both governance and business conduct. Elaborated from a definition in the Online Oxford English Dictionary.

Researching corruption also requires careful navigation in the large span of relevant vocabulary. Ranging from the single act of an illegal payment to the complete malfunction of a political and economic system, the definitions of the phenomenon of corruption span accordingly wide. According to Transparency International corruption refers to the "abuse of entrusted power for private gain", a commonly known and widely used working definition. Such a definition encompasses all types of economic and political corruption – bribery, cronyism, embezzlement, fraud, nepotism, and so forth (Rose-Ackerman & Palifka, 2016). However, there is no universal definition of corruption. The rest of this chapter are therefore dedicated to distinguish between different forms of corruption and explain the definition and conceptual understanding of corruption we have applied in this thesis.

2.1 Corruption in criminal law

At the national level corruption is regulated by criminal law, rendering it strict legal definitions. This implies that prosecuting an individual or a firm for a corrupt act requires very high standards of evidence. It requires the identification of a corrupt act, a person responsible, determining guilt beyond reasonable doubt, as well as the absence of legitimate excuse. With corruption, the deal is the crime, and evidence can easily be hidden as legitimate transactions. While criminal law regulation establishes the severity of corrupt acts and makes available wide competence for investigation, having to duly prove that corruption took place represents a challenge to prosecution (Hjelmeng & Søreide, 2016).

To recognize the high standards required by criminal law to define an act as corrupt in our discussions, we first and foremost define corruption according to the Council of Europe's (COE) Criminal Law Convention on Corruption from 1999.[2] This convention is an instrument aiming at coordinating the criminalization of a corrupt practices, and has greatly influenced the criminal law regulation of corruption in most European countries. In a similar manner as the United Nations Convention Against Corruption (UNCAC) and the OECD Anti-Bribery Convention, the COE Convention does not *define* corruption. Rather, it establishes the offences for a range of corrupt behaviors.

[2] The COE Convention entered into force in 2002, and has been ratified by 46 countries by 2016.

The corrupt behaviors covered by the COE Convention includes "when committed intentionally, the promising, offering or giving by any person, directly or indirectly, of any undue advantage to any of its public officials, for himself or herself or for anyone else, for him or her to act or refrain from acting in the exercise of his or her functions". Additionally, it lists the request or receipt of such an undue advantage by a public official, as well as bribery of members of domestic public assemblies, foreign public officials, and officials of international organizations. The COE Convention furthermore promotes the criminalization of passive and active bribery in the private sector, as well as trading in influence.[3]

However, the convention allows space for countries to adapt the definition of these offenses into their criminal justice systems, thus resulting in cross-country variations in the legal definitions of corruption. For example, the legal details of the convention often become more complicated when translated into legislation at the national level, making the law more difficult to enforce. Many countries have stricter demands for evidence in foreign bribery cases than in purely domestic cases and often insist on additional conditions that must be met for evidence to be admissible (Søreide, 2016b). Similarly, words and phrases found in international conventions, such as *undue advantage, third party* and *civil public official* acquire different meanings in different jurisdictions, despite efforts by for example the OECD and the United Nations to streamline interpretation and harmonize enforcement.

2.2 Forms of corruption

At a more conceptual level corruption may refer to a form of *trade in decisions that should not be for sale* (Søreide, 2016a). By such a definition corruption requires at least one individual with delegated authority who is prepared to sell a decision. According to Søreide (2016a), there are three criteria for corruption to happen:

[3] We do not adopt the distinction between *active* and *passive* bribery made in the COE Convention. Active bribery refers to the part that is offering a bribe, and passive bribery refers to the recipient. However, the part receiving the bribe may in fact actively have suggested, or even extorted, the bribe to be transferred. This distinction is thus not very precise.

i) decision-makers have control over monetary or non-monetary values;
ii) decision-makers have discretionary authority, and;
iii) there are counterparts with the moral capacity to (illegally) offer and pay for a decision

When combined, these factors create an environment in which corruption can occur, and the more that these factors are present the higher the risk of corruption. The greater the value at stake, the higher the willingness there is to pay for the decisions, and the more likely it is that corruption will in fact occur (Søreide, 2016a).

Defining corruption as trade in decisions that should not be for sale is quite suitable to describe what is called collusive forms of corruption, where both parties involved are motivated for the corrupt deal and conspire to keep the crime secret. Extortive corruption on the other hand refers to a form of corruption where the party giving the bribe feels forced to do so. The bribe in such cases often represent an additional price, or tax, paid to receive something the bribe payer is entitled to. Collusive forms of corruption are on the other hand often initiated by those who benefit from a certain government decision, whether this is market players or individuals, and the bribe may be offered to facilitate a service, alter a decision or influence a government strategy, for example on subsidies, taxation or protectionist policies (OECD, 2015).

Furthermore, it is helpful to distinguish between forms of corruption based on the level of the public sphere involved (Boehm, 2007a). Political corruption refers to corrupt acts at a political level, often with high-level civil servants involved as well. Political corruption may affect budget allocations across sectors, the direction of industry regulation or foreign entry to markets. In the other end, bureaucratic corruption usually refers to lower levels of authority, such as state administration at central and local levels. A similar distinction is made between grand and petty corruption. This distinction is also characterized by the value of the transaction concerned. Grand corruption usually involves large values and the higher decision-making levels in a country, and benefits a few at the expense of the many. Petty corruption on the other hand refers to relatively small bribes or minor favors, often collected by a low-paid public official in their interaction with ordinary citizens. In effect, grand corruption frequently involves changing rather than breaking rules and institutional structures, as opposed to petty corruption (Kenny & Søreide, 2008).

According to Auriol and Lassebie (2013), corruption in OECD countries may involve large amounts of money and high profile actors. Several scholars have also pointed out how corruption may take subtler forms in societies with better-performing integrity systems, which tend to be in higher-income countries. Hence, the true extent of the problem in the wealthier countries may be underestimated (Søreide, 2016a). The most visible problems of corruption such as bribe demands by custom officers or traffic police are largely associated with poor developing countries. According to a study by Auriol and Lassebie (2013), extortive corruption is higher in countries with lower income levels, but the relationship with income levels is more uncertain when it comes to collusive corruption.

2.3 Related concepts

While the forms of corruption discussed above are important to better understand the relevant forms of risk in different contexts, all of them represent simplifications of reality. Various forms of corruption will often be interlinked both with other forms of corruption and with other forms of crime such as tax evasion or cartel collaboration (Kenny & Søreide, 2008). Furthermore, it is also important to give an account of what is related, but not considered as corruption by criminal law. According to Benitez, Estache and Søreide (2012) other political dysfunctions that are often mistaken for corruption may also explain challenges. For example, *populism* means an overly strong focus by politicians on being reelected. *Patronage* means making the effort to reinforce power for an elite group, while *industry-friendliness* or *revolving door* problems may involve beneficial industry regulation combined with party revenues or future personal job opportunities in the industry. In such cases it is often difficult to distinguish between corruption and legal forms of influence (Benitez et al, 2012).

For our purpose of exploring corruption in relation to market regulation, the distinction between corruption and concepts such as lobbyism and campaign finance is especially important. As opposed to corruption, lobbying is a legal way of exercising influence on governments. However, if the outcomes desired by lobbyists are achieved through illegal payments or benefits granted to decision-makers, then lobbyism evolves into corruption. Similarly, campaign finance in the form of payments to political parties is also a legal channel of influence. Campaign finance may nevertheless come close to acquisition of decisions that should not be for sale, especially when the identity of the contributor is kept confidential and voters are left unable to consider the potential impact on regulatory decisions (Søreide, 2016a).

Furthermore, *crony capitalism* is another relevant concept in our discussions, and refers to a situation where success in business depends on close relationships between business people and politicians. This occupy a grey zone of corruption both conceptually and from a criminal law perspective (Søreide, 2016a). However, the term crony capitalism is generally used when these practices more or less dominate important industries or the economy as a whole.

While we recognize the criminal law definition of corruption and the implications of such regulation, we also acknowledge the difficulty of determining the legal status of many corruption resembling acts. As exemplified in the above discussions there is a large specter of legal grey zones between what is defined as legal and illegal influence. The consequences of any *undue* influence on regulatory decisions are however largely the same regardless of legal status – benefits are diverted away from the many and into the hands of the few. In our further analysis and discussions, we therefore allow for a broader view of corruption that includes all forms of *undue* influence.

3. Rationales for market regulation

In this chapter we give an introduction to market regulation and the traditional rationales for intervening in markets. The regulation of industries, trade and investment has been subject to both political and academic debate for as long as there have been competitive markets, and is a common feature of government control. The most traditional rationale for government regulation of private markets is the need for fixing market failure, but non-economic rationales also prevail. Additionally, this chapter will discuss whether the effects of regulation always correspond to the intentions of policy-makers, as well as the trade-off between market failure and government failure.

3.1 Types of market regulation

Following Julia Black (2001), as quoted by Baldwin, Cave, and Lodge (2010, p. 12), regulation means "the intentional use of authority to affect behavior of a different party according to set standards, involving instruments of information-gathering and behavior modification". It generally denotes the active influence of governments on one or several competition criteria in a particular market. In this thesis, market regulation refers primarily to government oversight and interference in markets that affect the profitability of firms. In a similar manner as Molinuevo and Sáez (2014), we further define market regulation broadly, to include both discriminatory and non-discriminatory regulations.[4]

Traditionally, a relevant government ministry was responsible for the regulation of the firms in a market subject to state intervention. However, regulatory reform in most modern economies has implied moving away from regulation through the government and to the creation of independent regulatory agencies which are set up to exercise autonomous authority over some area of the economy (Baldwin, Cave & Lodge, 2012). The creation of such agencies is generally justified by the complexity and need for expertise of some regulatory assignments, as well as the potential drawbacks of direct political interference in markets.[5] Regulatory

[4] Discriminatory measures refer to market regulation aimed at protecting incumbent firms from outside entrants, either domestic or international.

[5] We discuss the potential drawbacks of political interference in Chapter 3.3 and in Chapter 4.

agencies are hence given discretionary authority to oversee the regulation of markets on behalf of the government.

Typical market regulations imposed by governments or regulatory agencies include price controls, quality standards, different types of taxation or subsidies, or the regulation of entry into markets (Viscusi, Harrington, & Vernon, 2005). At a general level, we can distinguish between four different types of market regulation, each with different strengths and weaknesses, and each representing different degrees of state intervention and regulatory discretion. The first type is command and control regulation, which typically refers to the imposition of standards, backed by criminal sanctions (Baldwin et al, 2012). The force of law can thus be used to define and prohibit certain forms of conduct, to demand positive actions, or to establish conditions for entry into a specific market. However, command and control regulation can create challenges to effective enforcement, especially in terms of the need for close collaboration between firms and a regulator, which we will return to in the next chapter.

A second type of market regulation is self-regulation, which takes place when a group of firms or individuals exerts control over its own peers and their behavior (Baldwin et al, 2012). Self-regulation often involves a business or a trade association that is developing its own rules of performance, which it also monitors and enforces. There can be some government oversight of self-regulation, but as a rule, it is seen as a way of avoiding overly intrusive government intervention. While self-regulation may be more flexible than command and control regulation, it is sometimes regarded as undemocratic, closed to outside inspection, and open to abuse by the same interests who make the rules (Baldwin et al, 2012).

In one way or another, most market regulation is based on incentives and functions through the basic concept of penalties for unwanted behavior and rewards for desired behavior (Baldwin et al, 2012). Pure incentive-based regulation mechanisms aims to modify the behavior of individuals or firms by changing the marginal costs or benefits associated with particular activities, through, for example, the imposition of negative or positive taxes, or the allocation of grants and subsidies (Baldwin et al, 2012). Compared to command and control regulation, incentive-based regulation usually involve relatively low levels of regulatory discretion in the hands of governments or regulatory agencies. However, the rules can be complex and inflexible, and it may be difficult to predict their impact.

Lastly, a range of market-based mechanisms can be applied to regulate the activities of firms, including for example competition laws, regulation by contract, franchising, tradeable permits, and disclosure regulation. These mechanisms can prove cost effective and minimize regulatory interference in the day-to-day operation of companies. However, market-based mechanisms can also create barriers to entry, involve uncertainties and transaction costs, and depend on the reliability of information (Baldwin et al, 2012).

The above discussed types of regulation largely differ due to the degree of state intervention involved, as well as their strengths and weaknesses. Command and control regulation is associated with the most intrusive government involvement in markets, while self-regulation or market-based mechanisms reduce the extent of regulatory discretion.

3.2 Market failure and other rationales for regulation

As well as differences in types of regulation, we furthermore distinguish between different rationales for intervening in markets. By this we mean the motivation or intention behind a certain regulatory decision. Many of the economic rationales for market regulation can be described as instances of *market failure*. Market failure generally means a situation in which the equilibrium allocation of goods and services is not efficient (Baldwin et al, 2012). When markets fail, this typically involves monopolies or natural monopolies, economic rents, positive or negative externalities, inadequate information, or unequal bargaining power. Where monopoly occurs, the market fails because competition is inadequate leading to suboptimal prices, and in the case of externalities the product price does not reflect the true production cost. In some sectors there can also be *market absence*, which means that there simply is no effective market (Baldwin et al, 2012).

In cases of market failure, regulation is often argued to be justified because the uncontrolled marketplace, for some reason, will fail to produce behavior or results that are in accordance with the public interest (Francis, 1993). More specifically, regulation of market failure may involve constraining the pricing options of sellers in markets characterized by monopoly, to ensure incentives to produce adequate information, to protect rights of workers, or to mitigate undesired benefits or costs imposed on a third party in a market through obliging the internalization of externalities (Baldwin et al, 2012). Market regulation can also be a means to

implement collective action in order to be able to provide public goods, as the provision of public goods often fails due to free-rider problems (Baldwin et al, 2012).[6]

Apart from market failure motivations for regulation, governments also regulate to achieve non-economic goals. Ogus (1994) defined three such non-economic goals for regulation, namely achieving distributional justice, reflecting community values, or supporting individual well-being. A pure market economy does not necessarily lead to socially just outcomes, and hence governments may regulate to promote the market dynamics that produce equitable outcomes. Furthermore, governments can choose to promote community values by regulating in a manner that preserves certain goods and services, such as subsidizing public libraries. Lastly, public policies sometimes restrict individual liberties in the pursuit of benefiting that same individual, in which obligations to wear seat belts is a common example (Molinuevo & Sáez, 2014). Similarly, Prosser (2006) points to the relevance of protecting human rights and to promote social solidarity as rationales for regulating. In doing so, he challenges the assumptions that market solutions are always best suited to deal with decisions concerning the allocation of goods and services and that non-economic rationales for regulating are arbitrary (Baldwin et al, 2012).

3.3 Risks associated with market regulation

Market regulation sometimes have effects that differ from the ones intended by decision-makers, which leads to regulatory failure. For example, the tendency to spread regulation across layers of government and types of organization produces regulatory effects that are not consistent with the original regulatory intentions. The complexity of the regulatory environment can lead to uncertain effects, and the same applies to the diverse assumptions and resources associated with different actors (Baldwin et al, 2012). Furthermore, there can be side-effects of any regulatory policy. Interventions based on predictable inspections might encourage strategic gaming, while surprise inspections might reduce overall trust in the system. Interventions based on mutuality and peer review can further lack outside monitoring. Similarly, systems relying on market-based mechanisms of regulation may suffer from an

[6] Free-rider problems refer to the challenge of preventing non-payers from enjoying the benefits of a service. As a result, the market may fail to encourage the production of such commodities, and regulation may be required (Baldwin et al, 2012).

inherent lack of overall control, and excessive individualism. According to such arguments, any regulatory policy invites counter-effects (Baldwin et al, 2012).

Another example of unintentional regulatory effects may be found in the regulation of entry. While each domestic regulation in a market does not directly discriminate against new market entrants, the sum of all the regulations can have discriminatory effects. The extent to which a market is regulated can in fact prove a significant barrier to outside entrants, due to both the number and complexity of procedures. Critics of regulation have in this regard sustained concerns about the excessive bureaucratization of economies, suggesting that regulation creates major barriers to competitiveness and economic growth (Baldwin et al, 2012).

Furthermore, while government interventions may correct market failures or promote distributional justice, it must always be traded off against the inherent risk of *government failure*. Government failure means situations where regulatory activity leads to the incurrence of high opportunity costs that outweigh the intended benefits of government regulation (Baldwin et al, 2012). In other words, government failure refers to the risk that government interventions in the economy leads to inefficiencies or a misallocation of scarce resources. Wolf (1979) suggested that government failure may be of the same order of importance as market failure. However, the question is what explains the prevalence of government failure when policymakers presumably are trying to mitigate market failures. According to Winston (2006), government failure may in some situations arise because government intervention is simply unnecessary, meaning that markets can adequately address their potential failures. Furthermore, government intervention can be counterproductive because market failure policies are short-sighted, inflexible, or poorly implemented (Winston, 2006).

However, another explanation speaks to the potential for political forces that allow certain interest groups to influence policy-makers, regardless of their intentions, to initiate and maintain inefficient regulations that enable the interest groups to benefit at the expense of the public (Winston, 2006). This explanation of government failure is commonly referred to as *regulatory capture*, which will be the topic of the next chapter of our literature review, when we begin to explore the association between market regulation and corruption.

4. Regulatory capture

Against the backdrop of the previous chapter of our literature review, in which we have outlined different forms of corruption, rationales for market regulation, and the trade-offs with the risk of government failure, we proceed to literature considering the risk of corruption in relation with market regulation. This association has been studied from several theoretical and empirical angles, and we devote this chapter to presenting theory that shed light on our research question. We first introduce the different strings of theoretical literature connecting corruption with government failure, starting from theories of regulatory capture. Further, we emphasize the possible risks of collusive corruption associated with informational asymmetries and imperfect monitoring in regulatory processes.

4.1 The risk of regulatory capture

Regulatory capture is often referred to as the source of government failure, and is generally defined as different groups using pressure, influence or bribery to protect their interests and subvert the objectives of the regulator (Baldwin et al, 2012). When regulatory capture occurs the interests of firms or political groups are prioritized over the interests of the broader society, leading to a net loss to society at large. While regulatory capture is often a result of corruption it does not necessarily involve corruption. We will return to these distinctions as we concentrate on the overlap between regulatory capture and corruption, and provide a general approach to the association between market regulation and corruption.

Theories of regulation and regulatory capture are broadly divided into *public interest* and *public choice* perspectives. On one hand, public interest theory argues that a government that pursues social efficiency counters market failures and protects the public through regulation (Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2002). This represents a highly positive view of government intervention as exclusively motivated by increased public welfare. On the other hand, public choice theory more or less represents its counterpart, and views the government as less benign and regulation as socially inefficient. On the public choice side, Stigler (1971) developed a theory of the supply and demand for market regulation, and introduced the concept of regulatory capture. His main hypothesis argued that, "as a rule, regulation is acquired by an industry and is designed and operated primarily for its benefits"

(Stigler, 1971, p. 3). In Stigler's view, regulation only came about to serve private interests, thus representing a direct opposite to the public interest view of regulation.

Inspired by the above described view of Stigler, other economists from the Chicago School of thought later developed his theory from focusing only on the industry as the active part in regulatory capture.[7] They also included other interest groups into the competition for benefits in addition to the industry. These theories are often called interest-group theories of regulation, and places great weight on the competition between different interest-groups when they lobby to influence government decisions in their favor. For example, Becker (1983) argued that the influence, and ultimately the result of the policy, depends upon the strength of the respective pressure group (as cited in Boehm, 2007a).

Another version of the interest-group approach to regulatory capture was developed by scholars from the University of Virginia, who focused on the social costs issuing from lobbying activities. As argued by Tullock (1967) and Krueger (1974), *rent-seeking* impose further social costs beyond the competition for influence among interest-groups due to the resources spent to maintain a favorable position.[8] While these strings of literature clearly open up for influence on regulatory decisions that deviates from social welfare maximization, it leaves the role of the government relatively passive. This, however, does not coincide well with collusive forms of corruption where both parties to the deal are motivated by the consequent benefits. Furthermore, as we have underlined, lobbying, as opposed to corruption, is a legal way of exercising influence on governments.

Compared to the interest-group theories, the so-called Tollbooth theories come closer in describing corruption as the cause of regulatory capture. Tollbooth theories point towards the benefits of politicians and bureaucrats holding a monopoly position and therefore being able to create inefficient regulations, with a view to extracting bribes from the regulated industry (Boehm, 2007a). The problem of corruption is also more explicitly mentioned, as a way for

[7] In this section we refer to the Chicago, Virginia, and Toulouse Schools. These are schools of thought originating from the University of Chicago, University of Virginia, and the Toulouse School of Economics, respectively, and represent different developments within economic literature.

[8] A standard definition of rent-seeking is the quest for privileged benefits from government (Aidt, 2016).

the market to circumvent inefficient regulations. For example, Shleifer and Vishny (1994) presented a bargaining model explaining why politicians aim at keeping control rights over privatized firms through regulation, motivated by extracting rents from the privatized firms through corruption. However, such a theory fails to take into account the trade-offs between opportunities for corruption through regulation, and the costs related to market failures in the case of no regulation (Acemoglu & Verdier, 2000). Additionally, this type of perspective speaks more to the extortive, though not necessarily petty, forms of corruption in which the industry or private firms are more or less forced to bribe politicians, rather than colluding with them for mutual benefit. Rose-Ackerman (1999) supported that such a view was too simplistic, and argued that a perception of laws or regulations as being inefficient cannot justify the use of bribery by private firms to circumvent them.

Further developments of the already mentioned strings of literature took a more normative turn in the Toulouse School, introducing informational asymmetries and the principal-agent framework. Laffont and Tirole (1991) holds the perhaps most famous contribution of this type, developing a model where a regulatory agency may hide information from the Congress and obtain an informational rent by colluding with the firms in the regulated industry. Such analysis is based on a perception of the public agents as an active part in the crime, and regulated firms and regulators may collude in order to extract and divide rents from the regulator's principal (Laffont & Tirole, 1991). This principal-agent relationship has later been viewed as inherent to any type of regulation, and as the main contribution of the Toulouse School (Boehm, 2007a). Furthermore, the principal-agent framework allows for analyzing a range of relevant players and their interaction with one another.

4.2 Informational asymmetry and imperfect monitoring

Corruption risk can in many instances be contingent on informational asymmetries and imperfect monitoring (Søreide, 2016a). This makes the principal-agent framework useful in order to understand the mechanisms behind the possible risks of corruption. The principal-agent literature originates from the classical economic literature on the separation of ownership and control, first discussed by Berle and Means (1932). Building on this contribution, Jensen and Meckling (1976) described a principal-agent relationship as a contract where one part engages another to implement an action on their behalf, which implies a delegation of discretionary authority. The primary lesson is that unless the principal and the

agent have the exact same goals, the agent will not always act in the principal's best interest. Such deviation from the goals of the principal is first and foremost enabled by the information asymmetries present in any principal-agent relationship, in which the agent has an informational advantage and the principal cannot adequately monitor the agent.

While the principal-agent framework was initially developed for the contractual relations between parties such as owners and managers of firms, its application to analyze corruption goes back to Rose-Ackerman (1978). For the purposes of government regulation, the model is commonly developed to include a principal creating rules directed at assigning tasks to an agent, intended to regulate the agent's exchanges with a client (Lambsdorff, 2001).

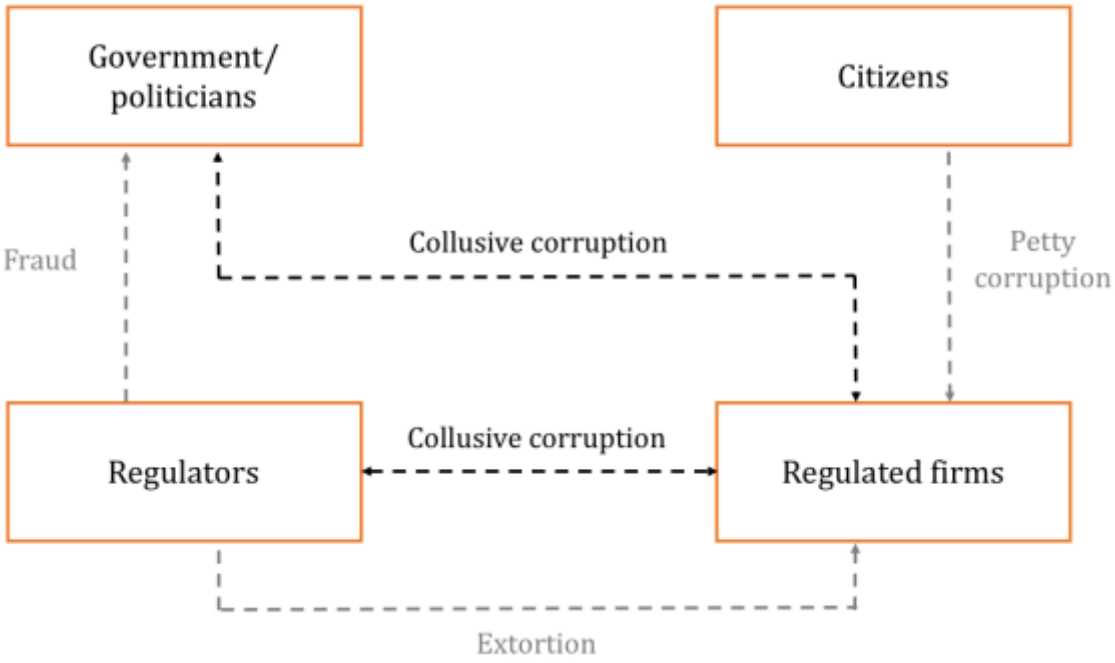
More specifically, one can distinguish between (at least) four actors in market regulation: (i) the citizens or consumers; (ii) the legislative power, which is either the politicians as individuals, or the government as an entity; (iii) the executive power, here the regulator, considered either as individuals, or the regulatory agency as a whole; and (iv) the regulated firms. However, the role of one and the same actor within a principal-agent framework may change depending on the level taken into account (Boehm, 2007a).

Regulatory processes imply several levels of informational asymmetries, that can contribute to explain corruption risk in regulatory processes. The informational asymmetries we regard as most relevant to our analyses are:

i) between citizens (the broader society) and politicians acting on their behalf;
ii) between government/politicians (legislative power) and regulatory agency (executive power), and;
iii) within the regulatory agency

The opportunities for collusive corruption in regulatory processes under the above informational asymmetries are roughly illustrated in Figure 1 below, inspired by and simplified from an illustration by Boehm (2007b).

Figure 1. Opportunities for collusive corruption



Notes: Figure 1 illustrates opportunities for collusive corruption between the actors in market regulation. The figure is a simplification of reality, and the grey arrows are included to illustrate opportunities for other forms of corruption in regulatory processes besides collusive corruption.

As illustrated in Figure 1, firms in regulated markets have (at least) two options to influence regulatory decisions in their favor – they can either collude directly with politicians or with regulators. As we discussed in Chapter 2, larger the gains from altering market regulations in the favor of a firm, the more market power or profit at play, the more incentive firms have to influence regulatory decisions and the larger the bribes they are willing to pay. However, the opportunities for collusive corruption may differ depending on the level of the informational asymmetries involved.

Politicians generally have superior knowledge about the background for the many decisions they make on behalf of society, thus creating an informational asymmetry between themselves and citizens. Politicians have to consider many different factors and competing goals before making a policy, changing a regulatory decision, or allocating a budget (Søreide, 2016b). This means there are many seemingly legitimate explanations to a specific decision that can be used as cover for corrupt trade. Further, politicians have wide discretionary authority by the nature of their roles, and citizens in general have few opportunities to monitor them

(Kenny & Søreide, 2008). The conflict of interest arises when the goals of the politicians deviate from those that are maximizing welfare for the broader society. If firms can buy regulatory decisions that lead to higher prices, inadequate product quality or reduced competition, this is rarely considered welfare enhancing for consumers. While a single politician does not necessarily have the authority to change rules, their power goes far in being able to supposedly exert legitimate influence over the processes in which regulatory matters are decided.

Furthermore, the mandates of regulatory agencies commonly involve enforcing rules and regulations, and imposing supervision or oversight on a certain market. In exercising this responsibility the regulatory agency acquires more knowledge about the sector and the regulated firms than the government does. While independent regulatory agencies are often required by law to separate the agencies from the political level and reduce the risk of populist interference, their creation may lead to new informational asymmetries. Neither politicians nor citizens have information about all the agencies' decisions, resulting in insufficient opportunities for monitoring and making the value of independence uncertain (Søreide, 2016a). In some instances, politicians have power to influence or give instructions to regulators, and the processes in which regulatory agencies are given their mandates. Hence, corrupt politicians may be able to undermine the independence of the regulators. In circumstances of disputes between regulators and firms, close connections with politicians may further be an asset to firms (Boehm, 2007a).

The third level of informational asymmetries we identified as most relevant to our discussions of collusive corruption considers the institutional structures within regulatory agencies. If an individual regulator is responsible for a certain project in relation to a firm, the regulator can obtain valuable information exclusively known to him. This informational advantage can be abused to conceal information about the regulated firms from the principal, to collude with the regulated firms and share corrupt gains (Boehm, 2007b). Such corrupt deals may for example include a violation of procedures, either by making it look like as if all rules have been respected, or by misusing legitimate deviations from the rules (Seim & Søreide, 2009).

Furthermore, an important assumption when analyzing corruption within a principal-agent framework is whether the principal is benevolent or non-benevolent, referring to the intentions of the principal (Lambsdorff, 2001). Generally, citizens (the broader society) can be regarded as a benevolent principal, while is seems realistic that politicians and regulators in different

circumstances might act as either benevolent or non-benevolent principals. Moreover, even though informational asymmetries and imperfect monitoring unquestionably are important factors explaining the risk of regulatory capture, corruption risk may still prevail even under perfect information and monitoring. In some situations, the principal is informed about the corrupt behavior of the agent but still fails to act (Søreide, 2016a). The players at the different institutional levels could be cooperating on colluding with firms in the regulated market, or obtain compensation for allowing corruption to continue. Furthermore, principals may expect a negative net benefit to society from deterring the corrupt acts (Søreide, 2016a).

In sum, we find that the risk of collusive corruption in regulatory processes can be explained by the discretionary authority of politicians and regulators, the informational advantages they hold over the broader society, and the lack of sufficient mechanisms to monitor the decisions they make. We also find these mechanisms to work differently at different institutional levels. The nature of corruption differs depending on whether politicians or regulators are involved, and depending on whether the principal is benevolent or non-benevolent. Nevertheless, agents may have more opportunity to deviate from the interests of their principal and hide their crimes if administrative rules are many or complex (Seim & Søreide, 2009). Further, we have seen that the risk of corruption is not entirely dependent on informational asymmetries and lack of proper monitoring, and that corruption risk cay be present even when these functions are intact. Potential implications of these findings will be discussed further in the last part of our thesis.

5. Empirical literature

In the previous chapter, we reviewed theoretical explanations of the risk of collusive corruption in regulatory processes. Turning to the relevant empirical literature, most of the existing research is based on macro-level data. Both corruption and market regulation are multidimensional phenomena that are difficult to measure directly. In terms of market regulation, relevant research utilizes different measures such as the number of procedures required to register a company or the size of the government budget.

Starting in one end, the relationship between government size and extent of corruption is much debated (Rose-Ackerman & Palifka, 2016). For example, Goel and Nelson (1998) found a significant and positive correlation between government size and corruption by public officials. Their study used real per capita expenditure of the local governments to examine the effect of government size on the number of public officials convicted for abuse of public office. Finding that larger governments seemed to be associated with more corruption led them to argue that state intervention and public spending give rise to rent-seeking activities and corruption. Similar results were also found by Fisman and Gatti (2002) in a cross-country study of decentralization. This study reported that more fiscal decentralization in government expenditure was strongly associated with lower corruption. However, using the number of convictions to measure corruption levels can also lead to a different explanation, in which increased real per capita expenditure provided the judiciary branch with more funds and consequently resulted in higher conviction rates (Lambsdorff, 1999). While conviction rates may have seemed as an objective measure, it can paradoxically indicate that more resources for investigation and prosecution of corruption leads to higher corruption levels.

In contrast to the above results, Elliott (1997) found an inverse correlation between the size of the government budget and corruption levels, in which the size of the government budget relative to GDP decreased with higher corruption levels. This result was later supported by Graeff and Melkoph (2003), who found the size of government to correlate negatively with the Corruption Perception Index (CPI), suggesting that larger governments are less exposed to corruption. In this regard, one could point to the Nordic countries, where low corruption levels and high government budgets seem to coexist. However, Elliott (1997) also argued that the types of activities performed by the government might be more important than the mere size of the government in causing corruption.

Furthermore, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) emphasized that the size of the government budget might not be a very good measure of state interference in markets. Rather, the authors utilized the amount of governmental redistributive activities in the form of total government transfers and subsidies to indicate the extent of state interference. Their results indicated a positive correlation with corruption as measured by a Political Risk Services index.[9] In a similar manner, Ades and Di Tella (1997) showed that more active industrial policy fosters corruption. Their results hold for both panel and cross-section estimates, and were robust to corruption indices from different sources.[10] Based on their study, they argued that a substantial part of the benefits of active industrial policies is lost when one considers the interaction with corruption (Ades & Di Tella, 1997). However, the authors acknowledge that corruption may also cause policy distortions and not only vice versa, bringing about problems of simultaneity bias (Lambsdorff, 1999).

Treisman (2000), investigated a similar hypothesis of whether countries with more state intervention in the economy, in the form of regulation, taxation, or commercial state activity, had higher corruption levels. This relationship only proved significant in some of his regressions. However, the author cautioned that the state intervention variable was based on a survey question about business executives' perceived levels of state interference from the World Competitiveness Report, and that it might be questionable how sharply the respondents distinguished state intervention from corruption in answering the survey (Treisman, 2000). Furthermore, the same survey data is included in the compilation of the CPI, causing a circularity problem.

As decisions regarding the extent of entry into markets can greatly affect the profitability of the firms in the market, it may create willingness to pay for certain outcomes. In this regard, Djankov et al (2002) found that stricter regulation of entry was associated with sharply higher levels of corruption. Their study measured entry regulation based on the number of procedures required to start a business, the minimum official time to start a business, and the official cost of following the required procedures, and based their measure of corruption on the CPI.

[9] The Political Risk Services (PRS) Group is a commercial business information provider that produce and sell the International Country Risk Guide (ICRG).

[10] The authors used corruption data from sources such as the World Competitiveness Report and the German business publication Impulse.

According to the authors, their results lent evidence to the public choice view of regulatory capture, which claims that entry regulation benefits politicians and bureaucrats through the collection of bribes (Djankov et al, 2002). A study by Treisman (2007) reviewed the results of Djankov et al (2002), and confirmed that the time necessary to start a business was positively associated with higher levels of corruption, using different years of data and including of a larger set of control variables.

Further, Seim and Søreide (2009) found a positive association between the number of procedures required to start a business and higher levels of corruption. They investigated bureaucratic complexity and performance in the utility sector, using the number of procedures required to start a business from the World Bank Enterprise Survey. However, the authors further found that this relationship depends on a country's level of economic development, in which there is no longer a correspondence between corruption and bureaucratic complexity. This may indicate that a large number of administrative rules has different effects in rich and poor countries (Seim & Søreide, 2009).

Other authors have focused on whether low levels of international competition might contribute to explain corruption, since lack of international competition may signal state-induced barriers to entry. For example, Graeff and Mehlkop (2003) analyzed the impact of economic freedom on corruption using the Index of Economic Freedom (IEF) and the CPI, separating the IEF into its different components.[11] As previously mentioned, they found a negative relationship with the size of government, while other components of the IEF such as freedom to trade with foreigners was positively correlated with higher levels of corruption. Using the same index of economic freedom in a cross-sectional structural equation model (SEM), Shen and Williamson (2005) found indications of a strong and positive effect of economic freedom on perceived corruption, with corruption measured as a latent variable.

Similarly, Ades and Di Tella (1999) found corruption levels to be higher in countries where domestic firms are sheltered from foreign competition by natural or policy induced barriers to trade, with economies dominated by a small number of firms, or where antitrust regulations

[11] The IEF was compiled by Gwartney, Lawson, and Samida (2000), and its seven components are size of government; structure of the economy and use of markets; monetary policy and price stability; freedom to use alternative currencies; legal structure and property rights; international exchange: freedom to trade with foreigners; and freedom of exchange in capital and financial markets.

are not effective. On the other hand, Treisman (1999) found very few significant evidence of corruption being correlated with a country's openness to trade, expressed by the value of imports of goods and services as a share of GDP. He also commented on the surprisingly small effect of the openness to trade variable and its clear endogeneity problem, as exposure to imports may reduce corruption, but corrupt officials are likely to create rent-generating barriers to trade (Treisman, 1999).

The size of the unofficial economy in a country is further viewed as closely related to corruption levels. A study conducted by Loayza, Oviedo, and Servén (2005), found that a heavier regulatory burden is associated with reduced growth and induces informality. They argued that many informal firms trying to escape the control of the state forces may use irregular procurement and distribution channels, constantly divert resources to mask their activities, or simply bribe officials. To measure business regulation Loayza et al (2005), construct an index based on a range of different sources, covering firm entry, trade barriers, fiscal burden, financial markets, labor markets, bankruptcy regulation, and contract enforcement.[12] However, the effects are mitigated by improved institutional quality. The authors emphasize that countries with better institutions tend to limit a regulator's margin for arbitrariness and thus their ability to commit corrupt acts that place firms at a disadvantage.

Pointing to the example of the Nordic countries, where low corruption and high government budgets coexists, Friedman, Johnson, Kaufman, and Zoido-Lobaton (2000) also show that higher tax shares are associated with low corruption. According to their study, low corruption induces more economic activity to occur in the formal economy where it is taxable, and the authors argue that citizens in democracies are willing to support higher levels of public expenditure only if the government is honest and competent.

There are relatively few studies that explicitly focus on high-income countries. However, Hamilton (2012) finds that regulatory density is positively associated with levels of perceived corruption in high-income democracies. He describes various ways in which agents can abuse their discretion as opportunities for rent extraction, and argues that this depends on the extent

[12] Their index is based on data sources such as Doing Business (World Bank), Economic Freedom of the World (The Fraser Institute), Labor Market Indicators Database, The Corporate Tax Rates Survey (KPMG), and the International Country Risk Guide (The PRS Group).

of distortions and the number of regulations in markets. Furthermore, Auriol and Lassebie (2013), investigated whether tight government budget constraints impact corruption levels, and focused on the difference between capture and extortion. They found that extortion is higher in countries with lower income levels, but that the relationship between income levels and corruption is more uncertain in terms of regulatory capture or collusive corruption.

Despite measurement problems and lack of solid and reliable data, the evidence from empirical research seems to indicate a relationship between market regulation and corruption levels. However, not all hypotheses are robust to different econometric approaches, and the results somewhat vary with the different measures of market regulation or corruption. In this literature review, we have not thoroughly addressed the limitations of each study, but we underline that the results are often associated with uncertainties.

6. Data and empirical method

In the first part of our thesis we have explored the association between market regulations and the risk of corruption. In our empirical analysis we will test a null hypothesis of no significant association between the extent of market regulation and the estimated levels of corruption. In this chapter, we present the data and variables we have used in the analysis. We further describe the applied econometric techniques, and comment on whether our data meets the requirements for ordinary least squares regression (OLS), as well as the measures taken to fulfill them. We briefly introduce the conditions for unbiased and consistent OLS estimates, and discuss limitations to the econometric method. Any theory presented in this respect is based on Wooldridge (2014), unless specified otherwise. Corruption and market regulation are both difficult to quantify, and research on the topic is associated with significant limitations. We therefore begin this chapter by commenting on some of the challenges related to researching corruption and variables associated with it.

6.1 Challenges related to researching corruption

Researching corruption implies a number of challenges related to data availability, quality and reliability. The largest problem of assessing the magnitude of corruption is that it is an invisible and largely unobservable crime, and people act as if they are not involved. In turn this results in weak and insufficient data on corruption. Since corruption cannot be measured directly, cross-national corruption indices are usually based on perceptions of corruption, determined by expert assessments and opinion surveys. However, perceptions are subjective in nature and largely dependent on the reference point of individuals. Expert assessments may also be colored by personal experience or the lack thereof (Søreide, 2016a). The underlying surveys used to compile the indicators refer to broad and diverse concepts of corruption, and it might be difficult to tell exactly which act the perceptions refer to. As we have discussed, corruption takes many different forms, and countries do not criminalize them equally despite efforts of legal harmonization, which implies that cross-country comparison will compare both legal and illegal forms of corruption (Søreide, 2016a).

Research on corruption is also based on other types of data such as fact-based information, micro-level controlled experiments, and self-reporting experience surveys, but this data come with their own set of limitations. Fact-based information, for example data on revealed and

prosecuted corruption cases, is hard to generalize as we do not know how many cases go undetected and therefore if the data is representative of the problem (Søreide, 2016a). Micro-level, controlled experiments provide high-quality data and may be the best way to establish causality. However, controlled experiments are both time- and resource consuming and highly context specific which makes reliable generalization difficult. Self-reporting experience surveys provide useful information about how people and firms experience corruption. The number of survey-based data sources increase each year, but the coverage by country is still limited (Søreide, 2016a).

In addition to challenges related to data availability, corruption may be endogenously determined with other economic indicators which also lead to biased estimations (Auriol & Lassebie, 2013). When relating corruption to other variables, problems of reverse causality may arise. This means that the relationship between corruption and other variables may be one in which they simultaneously affect each other, so that corruption at the same time may be both a cause and a consequence of another variable. As previously mentioned, we are especially cautious when interpreting the results of our analysis as there might be issues of endogeneity and reversed causality between our variables. The extent of market regulation might explain corruption levels, but it is also possible that corruption levels affect the extent of market regulation.

Research on corruption implies a number of challenges related to data availability and reliability, and there are no entirely reliable estimates of the total cost of corruption on societies. The uncertainty of the data calls for cautious interpretation of empirical results, and it is important to be aware of both the strengths and weaknesses of the different data. However, the growing amount of empirical research, surveys, experiments, and information on corruption, will, when combined, all contribute to improving the understanding of the causes and consequences of corruption (Søreide, 2016a).

6.2 Main sample

In this thesis we mainly study corruption in the context of high-income developed countries. We have therefore based our main sample on the 42 countries covered by the OECD STRI. This sample includes the 34 OECD member countries and eight emerging economies: Brazil, China, Colombia, India, Indonesia, Latvia,[13] the Russian Federation, and South Africa.[14] These emerging economies are the largest economies outside of the OECD, and have large financial markets. They are also well-integrated into the world economy. In terms of economic development, the countries in our main sample thus seem reasonably comparable. While the inclusion of the emerging economies implies some more sample heterogeneity, we still have a set of reasonably comparable countries in terms of factors of economic development. There is some, but not complete, overlap between the countries included in our analysis and the countries included in similar research. In addition to our main sample, we briefly introduce an additional sample with a country coverage that is extended beyond the OECD and largest emerging economies. The purpose of this is to serve as a robustness control for sample-specific effects. We comment on the use of the additional sample in the following sections.

6.3 Variables

In the following sections, we present our variables and their respective sources, and explain any adjustments we have made to the data material. We give an account of the control variables included in our model, as well as argue for their relevance. All the data used in our regressions are retrieved from publicly available sources published by international organizations such as the OECD, the World Bank, and Transparency International. Our data is on cross-sectional form, implying that each variable only occurs as one observation for each country included in the data set. For all variables the data is taken from the latest year available in cases where 2015 data was not available, or based on an average value of the most recent data to account

[13] Latvia became an official member of the OECD on June 1st 2016 when it deposited its instrument of accession to the OECD Convention. However, as we use data from 2015 we choose to treat Latvia as a non-OECD member, in line with OECD's own definition at the time of updating the STRI.

[14] See Appendix for the complete list of countries in the sample.

for short-run variations.[15] The choice of control variables and econometric techniques are inspired by previous research on the association between corruption and regulation, but with modifications due to both the availability and updates of data.[16] Furthermore, as our thesis focuses primarily on developed countries, this will affect our choices of control variables.

6.3.1 Dependent variable

Our dependent variable indicates the level of estimated corruption in a given country. We use two different sources of data for this variable. The first one is the Control of Corruption indicator (CCI) published by the World Bank as part of their Worldwide Governance Indicators project (WGI). The WGI project presents aggregate and individual governance indicators for over 200 countries and territories over the period 1996–2015, using six dimensions of governance, including the control of corruption.[17] These aggregate indicators combine the views of a large number of enterprise, citizen, and expert survey respondents, based on more than 30 individual data sources. In our analysis, we use the governance indicator for the control of corruption (CCI) as an indicator of the level of corruption in each country. The CCI captures perceptions of both petty and grand forms of corruption, as well as capture of the state by private interests and elites (World Bank, 2016a).[18] Each country is given a governance score ranging from -2,5 to 2,5 and a percentile score of 0 to 100, where higher values correspond to less corruption. The scores are reported alongside a standard error, which captures the uncertainty of estimating governance in a country.

The second source of data for the corruption variable is the Corruption Perception Index (CPI), published by Transparency International. The CPI is an annual ranking of about 190 countries based on their perceived levels of public sector corruption, and has been published since 1985.

[15] Some variables are averaged over longer time periods, when this is appropriate.

[16] For example, we are inspired by Ades & Di Tella (1997) studying lack of competition, and Seim & Søreide (2009) focusing on regulatory complexity.

[17] All six CCI governance dimensions are: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption.

[18] Capture of the state corresponds to what we describe as regulatory capture in Chapter 4.

Based on both expert assessments and a range of opinion surveys, the index ranks countries on a scale of factors from 100 to 0, indicating that a country is very clean or highly corrupt, respectively. To be included in the CPI, a country must have been included in at least three out of 12 surveys in a given year. A country's rank indicates its position relative to the other countries in the index, and the higher the rank the less corrupt the country. The CPI is probably the most well-known indicator of corruption levels in any country, and it is widely referred to by both academia and policymakers. The fact that the CPI is based on a larger set of surveys makes it possible to compare a larger set of countries. A problem however, is that the different surveys do not necessarily measure the same forms of corruption, as we discussed in the first part of Chapter 6. If the definition of corruption varies between the surveys, this makes it harder to compare the corruption levels across countries. Nevertheless, the CPI is one of the most commonly used measures for corruption in empirical analysis.

Both the CCI and CPI can have important policy and signaling effects, and provides opportunity for cross-country research on corruption. However, especially the CPI is based on perceptions, and as we briefly discussed in the first section of this chapter there are some important weaknesses related to using this type of data. Perceptions may be unreliable due to their subjective nature, and are influenced by a range of factors. Composite indicators do not reveal the factors shaping citizens' perceptions, such as the extent of media coverage of corruption cases and have further been criticized for failing to account for the systemic challenges causing corruption. Such indices also suffer from methodological weaknesses, and the CPI for example has large confidence intervals, meaning that a country's correct score and rank lies somewhere within a large interval of scores. On the other hand, the CPI ratings and the component surveys and ratings from which they are formed, are highly correlated among themselves, despite completely different methodologies and inputs. Consequently, this strengthens the reliability of the data (Treisman, 2000). While there undoubtedly is a need for more accurate data, the CCI and CPI today has the best coverage of OECD member countries and is therefore the best choice for our analysis.

The results of each survey included in the index are normalized to the same mean and variance, so that the remaining information consists solely of the comparative cross-country information, further strengthening the reliability of the data (Husted, 1999). To facilitate comparison across estimations using each of the two indices, and to make our regression results more intuitive, we have rescaled and inverted the original indices so that they run on a scale from 0 to 1, with higher values representing more corruption rather than less. In order to

account for some of the potential variation in a country's score resulting from large confidence intervals and major events altering the score in one year, we have also averaged the CCI scores over the years 2010 to 2015, and the CPI scores over the years 2012 to 2015.[19] As a robustness check, we run the main specification of our model, using only the 2015 values of the CCI and CPI, and find no large differences in the results.

6.3.2 Independent variable

The explanatory variable of interest in our analysis is the measure of the extent of market regulation in each country. This variable is first and foremost represented by data from the OECD Services Trade Restrictiveness Index (STRI). The STRI aims at quantifying regulatory measures that potentially impacts trade in services in one composite index of restrictiveness (OECD, 2016c). The index goes beyond internationally discriminatory measures and includes domestic regulations that are important for effective market access and the creation of competitive markets. These include impediments to competition and technical standards, as well as a range of measures related to regulatory transparency and administrative requirements. As regulation of service trade largely consists of domestic market regulations with restrictive effects, the STRI gives an indication of the general extent of market regulation.

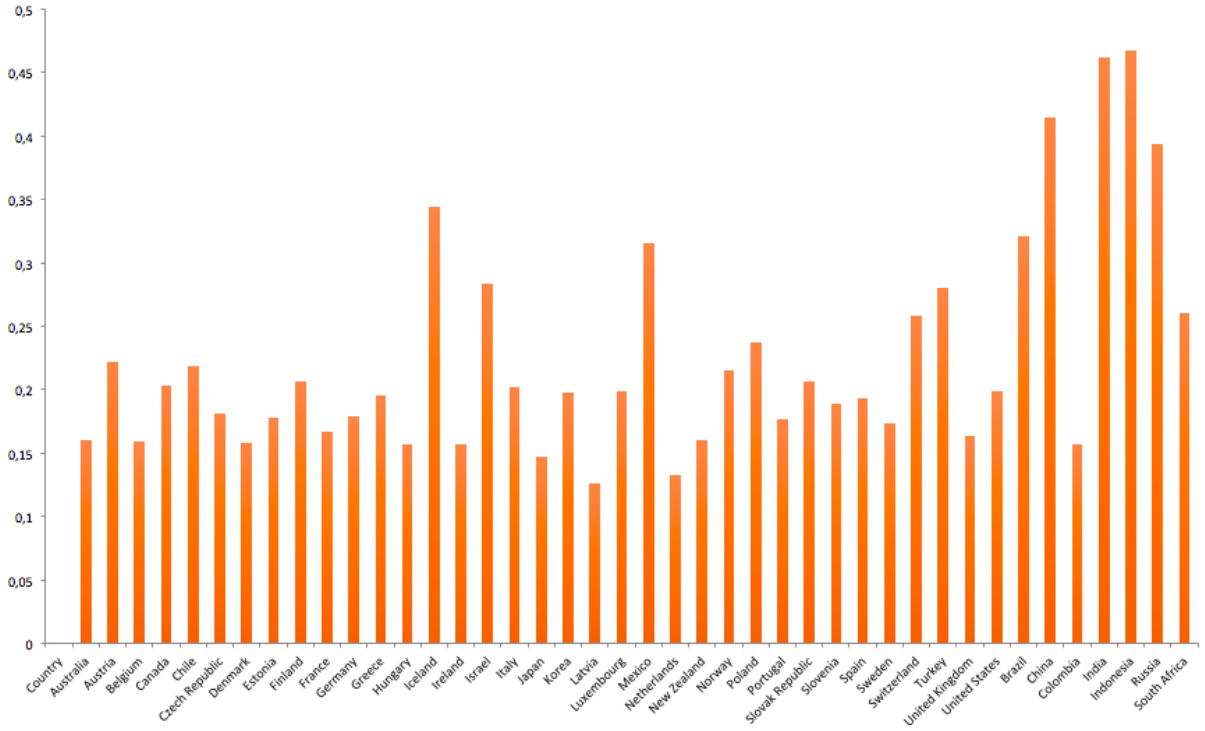
In the composite STRI, the restrictions are quantified over five policy dimensions: restrictions on foreign entry, restrictions on the movement of people, other discriminatory measures, barriers to competition, and regulatory transparency (OECD, 2016c). The index takes values from 0 to 1, where a completely closed sector is given the value of 1 and a completely open sector the value of 0. It is relevant to underline that a score of more than 0.2 represents significant barriers to international trade, and hence a substantially regulated market (OECD, 2016c).

As we are interested in cross-country comparison, we create a variable from the average value based on all the service sector values. We thus make an implicit assumption that an average value across all sectors is a suitable indicator of the overall regulation level in each country,

[19] Before 2012 the CPI was based on a different calculation method and may be less comparable. In related research averaging the values over the last couple of years is a common practice.

and our findings depend on the suitability of this assumption.[20] Figure 2 below gives an overview of the average extents of market regulation in our sample of 42 countries. We see that the variation is quite large, ranging from approximately 0.13 in Latvia, to 0.47 in Indonesia. The averages we have constructed largely coincide with OECD's own account of the most restrictive countries (OECD, 2016a).[21]

Figure 2. Average extents of market regulation (STRI)



[20] We return to the possible limitations associated with this assumption in the last part of Chapter 7.

[21] The STRI currently does not provide an aggregated measure, but indicates the number of sectors with scores above or below average. For example, Canada has a lower STRI score than the sample average in 15 of 22 sectors (OECD, 2016a).

As a complementary analysis we use data from the World Bank's Doing Business Survey to create an alternative measure for the extent of market regulation. This is first and foremost useful to discuss robustness, both in terms of differences in what types of market regulations the data measures, and to increase the country coverage beyond the OECD and the largest emerging economies. The latter allows us to control that our results also are meaningful in a less homogenous sample. The Doing Business survey provides measures of business regulations and their enforcement across 190 economies, and ranks the economies on their ease of doing business in which they have more conducive regulatory environments.

The score of each country is presented as a "distance to frontier" score (World Bank, 2016b). Here, the frontier represents the best performance observed on each of the indicators across all economies in the Doing Business sample since 2005. The scores and rankings are determined by sorting the aggregate difference between the actual score of a country and the frontier score on 10 topics,[22] each consisting of several indicators giving equal weight to each topic. The distance to frontier score helps assess the absolute level of regulatory performance over time. A country's distance to the frontier score is reflected on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the frontier. For example, a score of 75 means that an economy was 25 percentage points away from the best performances across all economies and across time. Lastly, we have rescaled the Doing Business values to range from 0 to 1, where 0 indicates lower extents of market regulation.

6.3.3 Control variables

We control for several variables that we assume may have explanatory power to the statistical association between the corruption variable and the variable indicating the extent of market regulation. In doing so, we seek to eliminate parts of the unexplained variance in the error term, in order to reduce estimation bias and strengthen our model. However, with a relatively small sample it is also important to be careful not to over-fit the model, resulting in too few degrees of freedom and misleading insignificant relationships. The risk associated with over-

[22] The Doing Business topics include: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency.

specifying the model and controlling for too many factors at the same time, is that the data does not contain enough variation to distinguish clearly between the different variables (Treisman, 2000). Our control variables included are thus a result of careful considerations and are based on similar research, modified by the availability of updated data and the focus of our analysis on developed countries.

First of all, our main sample is relatively comparable in terms of economic development. Nevertheless, we find it important to account for variations. We therefore add GDP per capita as our first control variable, representing differences in the level of development in each country. Previous research has reported significant correlations between levels of GDP and corruption, and the assumption that corruption levels decrease with increasing income levels is widely accepted (Søreide, 2016a).

In addition to income levels, income inequality may be associated with the level of corruption. We therefore add a variable representing the level of income inequality, measured by the Gini coefficient. Our Gini coefficient estimate is produced by the World Bank, and measures the extent to which the income distribution among individuals or households within a country deviates from a perfectly equal distribution (World Bank, 2016c). The index ranges from 0 to 1, indicating perfect equality and perfect inequality, respectively. As for several factors associated with corruption, the direction of causality between income inequality and corruption is not straight-forward. On one hand, high levels of corruption may lead to a misallocation of resources, and thus contribute to preserving and reinforcing income inequality. On the other hand, high levels of income inequality may promote corruption (Husted, 1999).

Despite large variances in the corruption scores among the OECD members, the non-OECD members in our sample mostly perform worse on the CPI. There could also be other reasons for systematic differences between member and non-members, and an OECD dummy may capture economic characteristics beyond GDP per capita as well as potential membership effects.[23] In order to control for such potential differences between the members and non-

[23] By membership effects we refer to potential differences between a group of countries with a specific membership and countries outside of this group, that are driven by the membership. In the context of the OECD this might involve the availability of experts, peer pressure or the extent of mutual legal assistance that could affect corruption deterrence.

member countries, we include a dummy variable that takes the value of 0 if a country is a member of the OECD, and the value of 1 if a country is not an OECD member.[24]

Furthermore, we control for institutional quality as the relationship between corruption and market regulation may depend on institutional characteristics of the regulatory environment. To represent institutional quality, we use the current level of democracy as defined by the Polity IV project.[25] This variable is both well-known and broadly accepted as a measure of institutional quality (Cust and Harding, 2015). The scale of the indicator runs between -10 and 10, and indicates the state of democracy on a scale from strongly autocratic to strongly democratic. To better match our data set, we normalize and rescale these values between 0 and 1, with higher values indicating better institutional quality. We further base our measure on an average of the values from 1950 to 2015, rooted in the belief that past events may contribute to current levels of corruption, and that a shorter time-period might not give a fair indication of the effect of institutional quality on corruption levels. Creating an average reduces the impact of short-term changes, and may therefore represent the long-term trend in institutional quality more accurately. In our main sample with only developed countries there is relatively small variation in this variable, while we see a wider variation when we extend the sample beyond developing countries in our complementary analysis.

Population size is often included as a control variable in similar studies, indicating either the mere size of the country or the size of the internal markets. The latter is also used as a proxy for the level of competition in markets, which may be important to our analysis as the lack of competition is a common rationale for market regulation. We therefore include the total population in each country as a control variable, retrieved from the World Bank, and log-transform it to better ensure normality.

Similar to population size, related studies have used different measures of trade and trade openness to indicate the extent to which domestic firms are subject to foreign competition.

[24] As previously stated, our dataset consists of the 34 OECD member countries and the eight largest emerging economies (Brazil, China, Colombia, India, Indonesia, Latvia, Russia and South-Africa) representing the group of non-OECD members.

[25] The Polity IV project has estimated institutional quality back to the 1800s, and is mostly comprised of ratings related directly to the definition of democracy, such as fair elections, suppression of opponents, and constraints on the power of the executive leader (Marshall, Gurr & Jaggers, 2016).

Relating this to corruption, the argument is often that competition from foreign firms will reduce the rents enjoyed by domestic firms, thus reducing the rewards from corruption (Ades & Di Tella, 1999), or that the market discipline imposed on an open economy in turn will require good governance (Wei, 2000). We therefore include a control variable measured as total imports and exports as a percentage of GDP, averaged over the years 2011-2015.

Further, we control for the level of education in each country which is a frequently used control variable in studies of corruption. This is based on a presumption that more educated countries with superior information flows, will better understand the costs of corruption to society and socially condemn corruption (Ades & Di Tella, 1997). As we focus on OECD and emerging economies, we assume that the levels of secondary schooling might be characterized by relatively small variation across our sample.[26] We therefore include a measure of higher education based on the entry rates into Bachelor level degrees, provided by the OECD. At this level of education, we expect more variation across the countries in our main sample, and that this might influence our results to a greater extent than measures of lower education levels. When we conduct the complementary analysis using the Doing Business data and extend the sample beyond developed countries, we rather include a measure for the school life expectancy at primary and secondary levels, provided by the World Bank Education Statistics.[27] This measure is available for a larger number of countries, and the extended sample has more variation between the countries. Due to unbalanced data coverage across countries and years, we average the values over the years 2010 to 2015.[28]

As part of our complementary analysis where we replace the STRI variable with the Doing Business data, we extend our sample beyond developed countries. This increases the heterogeneity in the sample, and we therefore have to add a larger number of control variables. On the other hand, as the larger number of observations equals more degrees of freedom we reduce the risk of over-specifying the model. To control for the level of press freedom, we add a variable from Freedom House indicating whether a country's press is defined as free. This indicator ranges from 0 to 100, where 0 indicates a free press. To facilitate comparison, we

[26] Secondary schooling is frequently included in similar studies that focus on developing countries.

[27] Measured as the average participation (number of years) in primary and secondary education.

[28] When we average, the level of education remains relatively stable over the years in question.

rescale this variable so that it ranges from 0 to 1, and higher values now represent a freer press. Further, inspired by Treisman (2014) we add dummy variables for the legal origin of each country. The sample is divided into categories of French, English, German, Socialist and Scandinavian legal origin.[29] Lastly, we control for economic growth rates and population density. All the control variables included in the extended sample of the complementary analysis are inspired by previous research on corruption. However, as we emphasize the analyses considering the main sample of OECD and emerging countries, we do not elaborate further on the additional control variables.

As previously discussed, it is not possible to control for all factors associated with corruption and market regulation. Omitted variables may lead to biased and unreliable results, while over-specifying the model can make it impossible to distinguish between the effect of the different explanatory variables on the dependent variable. As we are interested in the effect of the extent of market regulation on estimated corruption levels, and focus on the significance and sign of the coefficients rather than the size, we focus less on the risk of omitted variable bias than we would if we were to predict the value of the dependent variable.

6.3.4 Summary statistics

All our variables are obtained using publicly available secondary data.[30] Using secondary data require assessing the validity of the data source and the extent to which one can rely on and draw valid conclusions based on the data (Saunders, Lewis, & Thornhill, 2012). Since all our data is gathered from international organizations that rely on the objectivity and reliability of their data, we find the validity of the data to be satisfactory. However, we recognize the possible weaknesses associated with using aggregated estimates and composite indices. The following table provides an overview of the variables we have described in more detail in the previous sections and the sources from which they are retrieved.

[29] As described by La Porta et al (1999).

[30] Secondary data refers to data collected by others than the authors, while primary data refers to data collected by the authors themselves (Saunders, Lewis & Thornhill, 2012).

Table 1. Description of variables and their sources

Variable	Description	Source
Corruption, CCI	WGI Control of Corruption indicator, average values 2010-2015	World Bank
Corruption, CPI	Corruption Perception Index, average values 2012-2015	Transparency International
Regulation, STRI	Services Trade Restrictiveness Index, average value across 22 service sectors, 2015	OECD
Regulation, Doing Business	Overall Ease of Doing Business score, 2015	World Bank
GDP	GDP per capita, in 1000 USD, 2015	World Bank
Non-OECD	Dummy for non-OECD members in our main sample (India, Indonesia, Brazil, Colombia, China, South Africa, Latvia, Russian Federation)	OECD
Trade	Total imports and exports in % of GDP, average values 2011-2015	World Bank
Population	Total population size, log-transformed, 2015	World Bank
Gini	Inequality of income distribution, average values 2000-2014	World Bank
Polity IV	Democracy and institutional quality, average values 1950-2015	Center for Systemic Peace
Higher Education	Entry rates at Bachelors level, 2014	OECD
Education	School life expectancy rates (years), primary and secondary, both sexes (2010-2015)	World Bank
Population density	Population divided by land area in square kilometers (in 1000), 2015	World Bank
GDP growth	GDP growth, in %, 2015	World Bank
Press freedom	Freedom of the press, 2014-2015	Freedom House
Legal origin	Dummy for Scandinavian, English, French, German and Socialist legal origin	Treisman (2007)

We also include the summary statistics for the variables in our main analysis, including their mean values and standard deviations, as presented in Table 2 below. The summary statistics for the complementary analysis can be found in the Appendix. Some of the estimates are rescaled to better facilitate comparison and interpretations of coefficients. The estimated corruption values range from 0 to 1, where higher values equal more corruption. The estimate for institutional quality is similarly rescaled to range from 0 to 1, with higher values indicating relatively better institutional quality. The measure for the extent of market regulation based on the STRI ranges from 0 to 1, where higher values equals a higher extent of market regulation. GDP per capita is measured in USD, and both GDP per capita and population size (total) is divided by 1000. Trade is measured by total imports and exports as a percentage of GDP. The Gini coefficient (World Bank estimate), ranges from 0 to 1, where 1 equals perfect inequality. Lastly, the measure for higher education ranges from 0 to 1, where higher values indicate a higher entry rate at Bachelor level of higher education.

Table 2. Summary statistics for variables in the main analysis (STRI)

	(1)	(2)	(3)	(4)	(5)
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Corruption, CCI	42	.3097465	.2001037	.0270262	.6947722
Corruption, CPI	42	.3665476	.1872832	.09	.72
Regulation, STRI	42	.2243282	.0856512	.1262448	.4674542
GDP per capita	42	31.33071	22.59444	1.581589	101.45
Trade[31]	42	.9375128	.6211748	.2532739	3.623379
Population, in log	42	16.88757	1.854466	12.70934	21.03897
Polity IV	41	.8515514	.2110471	.1280303	1
Inequality, Gini	38	.3582671	.0873674	.2472	.63195
Higher education	32	.5617544	.1626082	.2455	.93604

Notes: The table shows (1) the number of observations, (2) the mean value, (3) the standard deviation from the mean value, (4) the minimum value, and (5) the maximum value.

[31] Measured by total imports and exports as a percentage of GDP.

6.4 Econometric method

Our empirical analysis seeks to test a null hypothesis of no association between the extent of market regulation and the level of estimated corruption. The empirical analysis is inspired by previous research on corruption, both with regards to the chosen control variables and econometric techniques.[32]

With more years of data included in the STRI, panel regression with country fixed effects would have been a good initial starting point for an empirical analysis of the association between market regulation and corruption. However, due to limited data accessibility and relatively constant regulation extents over time, a cross-sectional study is useful. The focus of the analysis is to test a null hypothesis of no significant association between the extent of market regulation and corruption levels, measured by the World Bank's Control of Corruption Index (CCI) and, as a robustness test, the Transparency International's Corruption Perception index (CPI). Instead of looking at the development within a country over time, we examine a cross-section of observations, trying to determine how the observations differ across countries.

To test the null hypothesis, we plan to perform an ordinary least squares (OLS) regression, which is a method for estimating a multiple linear regression model where the estimates are obtained by minimizing the sum of squared residuals. The residual value equals the difference between the actual and the predicted value (Wooldridge, 2014). When running OLS regressions on our data, we assume a linear relationship that is common for all countries included in our analysis. To assume meaningful inference from the results of OLS regressions, we have to rest our conclusions on a set of assumptions and make sure that these assumptions are not violated. Violations of the Gauss-Markov assumptions would mean that OLS is no longer the best linear unbiased estimator (BLUE). Further in this chapter we present the specific model we estimate, and discuss assumptions, weaknesses of and alternatives to our econometric approach.

[32] For example, Treisman (2000), Ades and Di Tella (1999), and Seim and Søreide (2009).

6.4.1 Model and equations

In our empirical analysis we estimate the following general model:

$$Corruption_i = \beta_0 + \beta_1 Regulation_1 + x_i + u_i$$

Where the dependent variable (Y) is our measures of corruption and our main explanatory variable (x_1) is our measure for the extent of market regulation. Further, x_i represents the control variables we have included, and u_i is the error term. Our main model is specified into the following regression equations:

(1) $$CCI_i = \beta_0 + \beta_1 STRI_i + \beta_2 GDP_i + \beta_3 OECD_i + \beta_4 Trade_i + \beta_5 Population_i + \beta_6 Gini_i + \beta_7 Polity_i + \beta_8 Education_i + u_i$$

(2) $$CPI_i = \beta_0 + \beta_1 STRI_i + \beta_2 GDP_i + \beta_3 OECD_i + \beta_4 Trade_i + \beta_5 Population_i + \beta_6 Gini_i + \beta_7 Polity_i + \beta_8 Education_i + u_i$$

In our main analysis, our dependent variable is informed by either the Control of Corruption Indicator (CCI) or the Corruption Perception Index (CPI). The explanatory variable we are most interested in is the variable measuring the extent of market regulation, in our main analysis represented by the STRI data. The other independent variables in the equation regressions are control variables in the following order: Economic development (GDP per capita), OECD membership, trade (imports and exports), population size, income inequality (the Gini coefficient), institutional quality (Polity IV), and higher education levels. The main focus of our analysis is the sign and the significance of β_1, indicating the effect of the variable capturing the extent of market regulation on estimated corruption levels.

6.4.2 OLS and WLS regression

When running OLS on cross-sectional data multiple problems can lead to biased, inconsistent and unreliable results (Wooldridge, 2014). To prove a causal relationship, the data and model needs to fulfill a set of requirements. OLS is considered the best linear unbiased estimator (BLUE) when a set of assumptions are met, namely the Gauss-Markov assumptions. OLS is BLUE when the regression is linear in parameters, we have a random sample of observations,

there is variation across x and the error term has a zero conditional mean. In addition, we assume no perfect collinearity, homoscedasticity and normality. However, not all the Gauss-Markov assumptions are equally important to determine whether OLS provides unbiased results (Wooldridge, 2014).

In cross-sectional data the volatility of each unit is likely to vary, producing non-constant variance, and heteroscedasticity is therefore a common problem (Wooldridge, 2014). In our data set each country's estimated corruption level has a different conditional variance, represented by the variation in scores of the data sources available for each country. This means that the precision of the estimated corruption level in each country varies. In an ordinary least squares regression each observation would be given equal weights. An alternative to OLS, when the variance of each observation is known, is to run the regression using weighted least squares (WLS), weighting by the inverse of the variance of corruption ratings for each country.[33] This way, we place greater emphasis on the cases where the different surveys included in the composite indices gave more similar ratings. As there may be more than one source of heteroscedasticity, we nevertheless run our regressions using robust standard errors. With robust standard errors we are able to provide results that are robust to heteroscedasticity. Comparing the results from a WLS regression with the results from an OLS regression is in addition a way to test the reliability of the results. If there are large differences in the sizes or signs of significant coefficients between the two methods, this should cause worry, as it may indicate that one or more of the Gauss-Markov assumptions are violated (Wooldridge, 2014).

In addition to homoscedasticity, we assume normality. The CPI score is constrained to values between 0 and 1, and is thus not drawn from a normal distribution.[34] If the residuals are not normally distributed this can lead to biased results, with either over- or under-estimating the influence of the explanatory variables on the dependent variable (Hamilton, 2013). However, normality is not the most important assumption when determining whether the OLS estimators

[33] The scores are reported alongside a standard error, which captures the uncertainty of estimating governance in a country.

[34] Originally, the CPI takes values between 0 and 100, but we have rescaled the variable from 0 to 1.

are BLUE (Wooldridge, 2014). After inspecting the distribution of the residuals, we find that this is not a big concern in our analysis.[35]

Endogeneity, omitted variable bias and model misspecification are other problems associated with OLS breaking the Gauss-Markov assumption that the error term has a zero conditional mean. We have a problem with endogeneity when an explanatory variable is correlated with the error term, either because of an omitted variable, measurement error or simultaneity (Wooldridge, 2014). This can cause biased and unreliable results, and it is therefore important to discuss whether the explanatory variables included in the model are exogenous of the dependent variable and whether there are any omitted variables. As previously discussed, we acknowledge that corruption may also cause policy distortions that increases the extent of market regulations, as well as vice versa, leading to a simultaneity bias. In addition, we suspect that our analysis may be subject to omitted variable bias, as there are a lot of factors influencing both the measure for corruption and regulation. We therefore run a Ramsey regression specification-error test (RESET) for omitted variables and model misspecification after each regression.[36] These results are presented and discussed together with the presentation of our empirical results in Chapter 7.

When conducting multiple regression analysis, we assume that there is no perfect collinearity between the explanatory variables included in the model. If such a relationship is present, the model is subject to multicollinearity. With high collinearity (imperfect multicollinearity) the model is still BLUE, but it will suffer from high variance and covariance, which will increase the confidence levels. Multicollinearity will thus affect the model's precision. To establish whether such relationships exist within our model, we begin our analysis by examining a correlation matrix. There is no established limit to the degree of approved correlation between variables, but with high correlation it is wise to either leave variables out or re-specify the model. As several of our variables are likely to correlate, we run a variance inflation factor (VIF) test post estimation to determine whether the degree of collinearity is too high. A common rule of thumb is to be cautious of values exceeding a VIF value of 10 (Wooldridge, 2014). We present the comment on the results of the VIF test in Chapter 7.

[35] The results are presented in the Appendix.

[36] We run the RESET tests in accordance with Torres-Reyna (2007).

The statistical software package Stata, provides us with useful tools to assess whether our data set meets the necessary requirements for OLS.[37] The results from the graphical and formal tests are presented and commented in detail in the Appendix. After testing our data set, we find that we have normally distributed residuals, and no perfect collinearity, but we fail the test for homoscedasticity in some of the regressions. We find that the data sets do not meet all requirements, and that OLS therefore may not be BLUE. However, as Stata enables us to run our regressions using robust standard errors to account for heteroscedasticity, and we compare our results using both OLS and WLS, we believe that our data set meets the basic requirements to conduct further cross-sectional analysis.

6.4.3 Alternative econometric approaches

Cross-sectional linear regression is one way to analyze the relationship between the extent of market regulation and corruption levels. Alternative methods could be to conduct panel data fixed effects (FE) regression, pooled regression or IV regression. Panel data FE regression requires time series data over 2 or more years, and that the observations vary over the time span (Wooldridge, 2014). Even though the STRI is updated for several sectors in 2015, we do not have enough variation in our dataset to conduct such an analysis. Even as the STRI is updated in the upcoming years, the issues regarding reversed causality and rarely changing parameters would still be prominent with this econometric approach.[38][39]

Pooling cross-sections from different points in time is often an efficient way to assess changes in government policy, and could have been an alternative approach to our analysis. This would have allowed for an increased number of observations in the analysis. However, pooled regression would have been more appropriate if our data set consisted of data from different points in time some years apart, and not two consecutive years. Our measures of corruption, the CCI and CPI, both have large confidence intervals and we have tried to reduce the risks

[37] All tests and regressions are conducted using Stata, while the data sets are prepared in Microsoft Excel.

[38] OLS requires sample variation in the explanatory variables (Wooldridge, 2014).

[39] As the measure for the extent of regulation in each country is based on the average across 22 sectors, we expect the level to be relatively constant over time. Industry policies can in addition be expected to be relatively stable across time.

associated with this by basing them on average values across 6 and 4 years, respectively. In a pooled regression, we could have included all the available STRI data from both 2014 and 2015,[40] but this entails that we would have to compare data on corruption levels across years, a practice that have been much criticized.[41] The STRI is at the time of writing updated for seven sectors in 2015: computer services, construction, accounting, architecture, engineering, legal services and telecommunications. This could have been enough to create a valid measure for the extent of regulation in the economy, based on the average value across the seven sectors, but it may lead to difficulties when comparing the results to the cross-sectional analysis and would thus be a less reliable robustness check.

While panel data FE and pooled regressions are alternative methods to ordinary OLS, none of them offer solutions to issues related to reversed causality and endogeneity. The most common technique to correct for endogeneity is instrumental variables or two stage least squared regressions. This, however, requires a set of suitable instrumental variables. The instrumental variables need to be highly correlated with the endogenous variables it replaces in the model, and not directly associated with the dependent variable (Wooldridge, 2014). This method is commonly used in research on the causes and consequences of corruption. For research on the association between the extent of market regulations and corruption however, it is particularly hard to determine a valid instrumental variable. Whether the instruments used in research on corruption are indeed valid instruments are also subject to much debate.

The relatively small sample size included in our analysis is associated with additional limitations regarding the inference we can draw from our results. The sample size limits the number of control variables, due to lack of degrees of freedom, and makes the results sensitive to outliers. The sample consists of a relatively homogenous set of countries, which makes the need for control variables less crucial, as we have reason to believe that the causes of corruption may be relatively similar across the countries included in the analysis. On the other hand, this limits the variation across the different covariates, making the results sensitive to changes in how the model is specified. One solution is to increase the sample size. As the STRI data is limited to 42 countries, increasing the sample size to add more observations is

[40] Instead of using 2015 data only.

[41] For further discussion, see Anja Rohwer (2009).

not an option. Instead we perform a complementary analysis using a larger data set, where we base the measure for the extent of market regulation on the Doing Business data, rather than the STRI. This however, leads to another problem, as this data set consists of a less homogenous set of countries. The increased heterogeneity makes us less confident in assuming a linear relationship across all countries. On the one hand, a larger sample size enables us to include further control variables due to more degrees of freedom, on the other hand the increased heterogeneity in the alternative data set requires a larger set of control variables.

There are several possible econometric approaches to test a null hypothesis of no association between the extent of market regulation and the level of corruption empirically. Based on our data set we find that weighted least squares regression (WLS) is the most appropriate econometric approach for our analysis. Our data set is on cross-sectional form, and our dependent variables (the CCI and CPI) are reported alongside a standard error making it possible to give more weight to estimates with lower variance. As a robustness check we compare the WLS results with regression results from ordinary least squares regressions (OLS). We add a number of control variables to the model, in order to eliminate parts of the unexplained variance of the error term and to see if any significant associations hold when other variables with potential explanatory power are included.

We further conduct a complementary analysis in which we replace the main explanatory variable with another measure for the extent of market regulation. This is useful as a robustness check in terms of the types of market regulations measured by the data, and also allows us to extend the sample beyond developing countries. As discussed throughout this chapter, there are several challenges to researching corruption and several limitations associated with our econometric approach. We therefore caution generalization of the results from our analysis. In the following chapter we present and comment on the empirical results.

7. Empirical results

This chapter presents the empirical findings of our thesis. We start by conducting weighted least squares regression (WLS), using the World Bank's Control of Corruption Index (CCI) to represent our dependent variable, and the STRI as our main explanatory variable. Our empirical analysis seeks to test a null hypothesis of no significant association between the extent of market regulation and the level of estimated corruption. We begin with the most parsimonious model and further test whether any significant association holds with different control variables and specifications.[42] As a complementary analysis, we run similar regressions using the World Bank's Doing Business data as an alternative measure of the extent of market regulation in each country.

7.1 Main regression results

Table 4 reports the results from our main specification using the STRI index as the main explanatory variable, and the WGI Control of Corruption Indicator (CCI) and the TI Corruption Perception Index (CPI) as the dependent variables, respectively. As mentioned earlier, we have included several control variables to better isolate the possible association between the extent of market regulation and corruption levels. All regression results originate from cross-sectional weighted least squares (WLS) regressions as described in Chapter 6.4.

[42] The most parsimonious model is defined as "a model with as few parameters as possible for capturing any desired features" (Wooldridge, 2014, p. 577).

Table 4. Main regression results

VARIABLES	(1) CCI	(2) CCI	(3) CCI	(4) CPI	(5) CPI	(6) CPI
Regulation, STRI	0.671***	0.588**	0.786***	0.713***	0.589**	0.853***
	(0.177)	(0.259)	(0.279)	(0.188)	(0.252)	(0.261)
GDP per capita	-0.00647***	-0.00690***	-0.00754***	-0.00584***	-0.00613***	-0.00665***
	(0.00101)	(0.00103)	(0.00111)	(0.00104)	(0.00104)	(0.00105)
Non-OECD		0.00384	0.0422		0.0189	0.0627
		(0.0661)	(0.0635)		(0.0679)	(0.0675)
Trade[43]		0.0267	0.0362		0.0175	0.0323
		(0.0487)	(0.0553)		(0.0498)	(0.0581)
Population, in log		0.00767	0.0109		0.00712	0.0149
		(0.0158)	(0.0192)		(0.0150)	(0.0193)
Inequality, Gini		0.159	0.147		0.231	0.239
		(0.320)	(0.521)		(0.342)	(0.512)
Polity IV		0.0229	0.140		0.0459	0.208
		(0.0755)	(0.119)		(0.0859)	(0.127)
Higher education			-0.00523			-0.0166
			(0.129)			(0.127)
Constant	0.363***	0.163	-0.0167	0.381***	0.156	-0.158
	(0.0647)	(0.334)	(0.433)	(0.0715)	(0.328)	(0.456)
Observations	42	38	32	42	38	32
R-squared	0.756	0.808	0.808	0.727	0.794	0.796
Regression	WLS	WLS	WLS	WLS	WLS	WLS
RESET	0.0127	0.0605	0.1696	0.0119	0.0315	0.2029

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From the regression results we find support to reject a null hypothesis of no significant association between the extent of market regulation and the level of corruption, across all regressions. In order to reduce the risk of omitted variable bias, and thus producing unreliable results, we have added a number of control variables. Adding too many control variables in a relatively small sample would, however, make it hard to distinguish the effect of the different variables.

[43] When trade is included as a control variable Luxembourg is excluded from the regressions due to outlier values.

In the first two regressions with both measures for corruption, the RESET test indicates that we cannot reject a null hypothesis of no omitted variables and functional form misspecification. In the least parsimonious specification of the model on the other hand, regression (3) and (6), the RESET test indicates that we can reject a null hypothesis of no omitted variables, and that our models do not suffer from issues with functional form misspecification. However, we still cannot be certain that the model does not suffer from omitted variable bias and need to show caution when interpreting the results. After each regression we run a variance inflation factor (VIF) test, to assess the effect of high collinearity between the independent variables. High correlation between the independent variables may affect the stability of the coefficients. We find that the VIF values in no case exceed the cut-off value of 10.

In regression 1 we have introduced the most parsimonious model, including only the main explanatory variable as well as the control of the level of development in each country, measured by GDP per capita. Further, we introduce the additional control variables successively in order to detect large changes in the coefficients indicating high correlation between the different variables.[44] In regression (2) and (4) in Table 4, we have added the following control variables: a dummy variable for OECD membership, trade, population size (measured in log), the Gini coefficient measuring income inequality, and the Polity IV as an indicator of institutional quality. We then add an additional control variable measuring the level of higher education in regressions (3) and (6). This variable is added in a separate step as the inclusion of both the Gini coefficient and higher education causes the sample size to drop from the total of 42 countries to 32 countries. We find that the support for rejecting a null hypothesis of no relationship is maintained when all the control variables are included. Our two measures of corruption, the CCI and the CPI, are nearly perfectly correlated (0.99), but the precision in the estimates differ. The precision is represented by the variance of each observation and is accounted for in the analysis by weighting each observation by the inverse of the variance. This may explain the difference in the size of the coefficients.

[44] Not all regressions are presented in the table. The results from successively adding control variables showed no large differences in the estimates.

The size of the coefficients is less important than the test for statistical significance and the sign of the coefficients. As our analysis is based on a aggregated data for a relatively small sample of countries, and consider complex phenomena as corruption and market regulation, we cannot claim that an increase of 0.01 in the level of STRI would cause a 0.0067 increase in the estimated corruption level.[45] However, we find that the relation between regulation and corruption is significant and positive across different specifications of the model, and as we will see, this holds also for an alternative measure of the extent of market regulation.

Furthermore, the association between the other covariates and the level of corruption is similarly constant across the regression specifications. The sign of the coefficients of the significant covariates are as expected, indicating that an increase in the extent of market regulation is associated with higher levels of corruption, while higher levels of GDP per capita is associated with lower levels of corruption. We do not pay much attention to the coefficients of the variables that turn out insignificant in the regression, but note that the coefficients for institutional quality (Polity IV) seems to both lack economic and statistical significance. We would expect that an increase in institutional quality would be negatively associated with the level of corruption. It is important to note that the variation in the Polity IV variable is small, due to the homogenous set of countries, and this may make the coefficient estimate for Polity IV more sensitive to re-specification of the model than other variables. We would also like to mention that trade is positively associated with corruption levels, contrary to our initial expectations. However, compared to institutional quality it is not obvious which direction we should expect from the coefficient as the effect of trade on corruption can be ambiguous.

As a robustness check we test whether the associations hold when we base the level of corruption on the 2015 values, rather than averages, and find no significant changes in the results. Further, we run the regressions using the log-transformed GDP per capita and find that the significant association is not robust to this re-specification of the model. Previous research shows that both real GDP per capita and log-transformed GDP per capita are commonly included as control variables when studying causes of corruption. In larger samples the variable is log-transformed when this is appropriate due to issues of normality and linearity. In many studies of corruption in high-income countries it seems to be usual to include real per

[45] Example from regression 1 in Table 4.

capita GDP, rather than log-transformed GDP. In our model the linear fit between our dependent variables and GDP per capita is more satisfactory than when we do not log-transform the variable. Nevertheless, the result tells us that our model is sensitive to re-specification and that we need to be cautious when interpreting the results. As an additional robustness check we run all regressions using OLS in addition to WLS and compare the results.[46] Large differences in the significance or sign of the estimated coefficients would indicate that one or more of the Gauss-Markov assumptions are false. We find no large differences between the two econometric techniques.

7.2 Complementary analysis

Most of the results from the main specification of our model hold when we conduct a quick complementary analysis, in which we replace the variable representing the extent of market regulation with data from the Doing Business Survey. In the interest of comparison, we first conduct the complementary analysis on the same sample of countries as when we used the STRI in our regressions. Iceland is the only country in our main sample that is not covered by the Doing Business Survey, and we are therefore left with 41 observations in the first part of the complementary analysis.

7.2.1 OECD sample

In the first part of our complementary analysis we continue to use the same sample of countries as in our main analysis, which consist of the OECD member countries and the eight largest emerging economies. Substituting the STRI data with Doing Business data as the measure for the extent of market regulation, we examine whether different types of market regulations measured by these two sources have an impact on our results. We find that market regulation is statistically significant and positively associated with corruption levels, similar to the results of our main analysis. This result is stable across all six regressions, as shown in Table 5 below.

[46] These regression results from comparing OLS and WLS regression on the main specification of our model are presented in the Appendix.

Table 5. Regression results from complementary analysis: OECD sample

VARIABLES	(1) CCI	(2) CCI	(3) CCI	(4) CPI	(5) CPI	(6) CPI
Regulation, DB	0.971***	0.693*	1.205**	1.104***	0.864**	1.302***
	(0.229)	(0.399)	(0.432)	(0.244)	(0.362)	(0.425)
GDP per capita	-0.00564***	-0.00613***	-0.00624***	-0.00485***	-0.00517***	-0.00531***
	(0.000784)	(0.00122)	(0.00129)	(0.000793)	(0.00111)	(0.00118)
Non-OECD		-0.0134	0.0162		-0.00863	0.0264
		(0.0827)	(0.0746)		(0.0842)	(0.0780)
Trade[47]		0.0116	0.00802		-0.0117	-0.0172
		(0.0498)	(0.0542)		(0.0533)	(0.0646)
Population, in log		0.0106	0.00957		0.00495	0.00893
		(0.0171)	(0.0207)		(0.0155)	(0.0197)
Inequality, Gini		0.0806	0.0642		0.117	0.0445
		(0.330)	(0.580)		(0.356)	(0.575)
Polity IV		-0.0377	0.0453		-0.0266	0.0826
		(0.0704)	(0.109)		(0.0786)	(0.115)
Higher education			0.000527			0.000148
			(0.00137)			(0.00124)
Constant	0.239***	0.136	-0.0630	0.227***	0.203	-0.0381
	(0.0795)	(0.327)	(0.424)	(0.0821)	(0.316)	(0.441)
Observations	41[48]	38	32	41	38	32
R-squared	0.772	0.795	0.801	0.764	0.791	0.789
Regression	WLS	WLS	WLS	WLS	WLS	WLS
RESET	0.0697	0.0458	0.1487	0.0768	0.0306	0.2099

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We also observe that the level of development (GDP per capita) is significant and negatively associated with the level of corruption, similar to the results shown in Table 4. Furthermore, using the same sample as in our main analysis the results are not robust to a log-transformation of GDP per capita in this model either, and the linear fit is better ensured using the real terms.

We further note that the size of the coefficients of the regulation variable is greater when we use the Doing Business data across all regressions, than the coefficients of the regulation

[47] When trade is included as a control variable Luxembourg is excluded from the regressions due to outlier values.

[48] Data for Iceland is missing in the Doing Business data set.

variable when the STRI data is used. This difference is also larger than the difference between the first two specifications. The results from the above regressions serve as a robustness check for our main analysis, but the results also suffer from the same limitations. Even though the results from the first part of the complementary analysis support the results from our main analysis, we are still cautious in the interpretation of the empirical results.

7.2.2 Extended sample

As the Doing Business dataset includes observations for a greater number of countries than the STRI, we also run regressions on a sample that is extended beyond the OECD and emerging economies. This allows us to check whether a null hypothesis of no association between corruption and market regulation would hold also with larger differences between countries in terms of income and level of development and more control variables.

The specification of this model is mostly based on the main specification with STRI as the measure for market regulation, but with additional control variables as the increased degrees of freedom enables us to include more covariates. Similar to our previous results presented in Tables 4 and 5, the regression results from the second part of the complementary analysis indicate a significant and positive association between the extent of market regulation and estimated corruption levels across all regressions. The significant and negative association with GDP per capita similarly holds in this analysis.

The differences in the size of the coefficients between regressions 1-3 (CCI) and regression 4-6 (CPI) indicates that even with an extended sample the model is sensitive to re-specification and we are thus more interested in the significance and sign of the coefficients than the size of the coefficients. After each regression we run a VIF test and find that the regressions do not suffer from high multicollinearity.[49] The results from the RESET test on the other hand, indicate that the model might suffer from functional form misspecification.

[49] With a cut-off value around 10, as described in Chapter 6.

Table 6. Regression results from complementary analysis: Extended sample

VARIABLES	(1) CCI	(2) CCI	(3) CCI	(4) CPI	(5) CPI	(6) CPI
Regulation, DB	0.621***	0.432***	0.564***	0.644***	0.404***	0.485***
	(0.0751)	(0.128)	(0.137)	(0.0839)	(0.124)	(0.128)
GDP per capita	-0.00644***	-0.00590***	-0.00380***	-0.00621***	-0.00508***	-0.00355***
	(0.000659)	(0.000785)	(0.000840)	(0.000705)	(0.000815)	(0.000825)
Trade		0.0189	0.00508		0.0180	0.000262
		(0.0270)	(0.0262)		(0.0314)	(0.0287)
Population, in log		0.0106	0.0114		0.0108	0.00870
		(0.00735)	(0.00833)		(0.00842)	(0.00827)
Inequality, Gini		-0.195	-0.0266		-0.149	-0.0656
		(0.141)	(0.161)		(0.156)	(0.162)
Polity IV		0.0436	0.0362		0.0346	0.0394
		(0.0537)	(0.0501)		(0.0633)	(0.0501)
Education		-0.000198	-0.000439		-0.000197	-0.000370
		(0.000315)	(0.000326)		(0.000334)	(0.000323)
Population density		-0.0680	-0.0239		-0.0299	-0.0143
		(0.0573)	(0.0557)		(0.0489)	(0.0532)
GDP growth		-0.145	-0.198		-0.129	-0.166
		(0.167)	(0.164)		(0.172)	(0.157)
Press freedom		-0.296***	-0.266***		-0.342***	-0.313***
		(0.0575)	(0.0545)		(0.0636)	(0.0535)
Legal origin, English			0.0550			0.0577
			(0.0407)			(0.0434)
Legal origin, French			0.0770*			0.0876*
			(0.0430)			(0.0451)
Legal origin, German			0.00596			0.0184
			(0.0415)			(0.0438)
Legal origin, Socialist			0.142***			0.119***
			(0.0382)			(0.0401)
Constant	0.366***	0.475***	0.266	0.397***	0.521***	0.414**
	(0.0367)	(0.169)	(0.203)	(0.0408)	(0.187)	(0.204)
Observations	133	98	97	133	98	97
R-squared	0.795	0.858	0.877	0.792	0.858	0.870
Regression	WLS	WLS	WLS	WLS	WLS	WLS
RESET	0.0135	0.0051	0.0056	0.0052	0.0063	0.0096

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The purpose of this part of the complementary analysis was simply to do a swift analysis of whether the previous results would hold in a more heterogeneous and larger sample of countries, and with a larger set of control variables. Therefore we do not emphasize the results from this part of the analysis, and do not elaborate much on the interpretation of the control variables' coefficients in this sample. However, we note that the coefficients of the education control variable indicate a negative association with the level of corruption. The economic interpretation meets our expectations of higher levels of education being associated with lower levels of corruption, but the association is not statistically significant. Furthermore, based on previous research we would expect that institutional quality would be negatively associated with the level of corruption. From the regression results however, we find that institutional quality is positively associated with corruption. Nevertheless, the coefficients are not statistically significant and we therefore do not emphasize this. Moreover, we find that press freedom is however significantly and negatively associated with the estimated level of corruption, indicating that a freer press is associated with less corruption.

Lastly, Scandinavian legal origin serves as the reference group for the other legal origin dummies, and is consequently left out of the regressions. Relative to the reference group, all the other dummy variables are positively associated with the estimated level of corruption. This means that relative to a Scandinavian legal origin, the other legal origins are associated with higher levels of corruption. However, only French and Socialist legal origin turn out significant in the regression results. Furthermore, the countries covered in the Scandinavian reference group all have low estimated levels of corruption according to the corruption indices. Thus, the positive associations for the dummy variables included in the model are not surprising. However, we note that there are differences in the size of the coefficients, indicating a difference between the countries with different legal origins. On the other hand, the difference may be caused by other factors than legal origin. We therefore do not emphasize the importance of this control variable.

Despite the fact that we with this sample were able to include a greater number of control variables due to the increased degrees of freedom, the heterogeneity in this sample makes the assumption of linearity more challenging. This is in addition reflected in the post estimation

tests of the Gauss-Markov assumptions, where the assumption of normality is not met.[50] From the RESET test we find that we cannot reject a null hypothesis of no omitted variables and that our model does not suffer from functional form misspecification. The results from the VIF test indicate that the regression results may further be biased due to relatively high collinearity between the independent variables. Any inference from our analysis will further be based on the regression results from the OECD samples.

7.3 Summary and limitations

Our empirical results indicate that we can reject a null hypothesis of no significant association between the extent of market regulation and estimated corruption levels. We find that the results are robust across the two measures for the level of corruption, as well as for two different measures of the extent of market regulation. As discussed thoroughly in Chapter 6, there are limitations to our empirical analysis and we therefore caution generalization of the results. While we have included several important control variables we cannot be certain that our model does not suffer from omitted variable bias, and the sensitivity of the analysis to re-specification of the model indicates a need for further research. Furthermore, in our complementary analysis with a sample extended beyond the OECD, the RESET tests indicate that the model might suffer from functional form misspecification. This indicates that the data set does not meet all requirements for OLS, which may lead to biased and unreliable results. Any inference drawn from our analysis will therefore be based on the regression results using the sample of OECD member countries and the largest emerging economies.

The possible interpretations and implications of the results largely depend on the data used to measure the variables. In the first part of our thesis we defined corruption according to a criminal law definition. In our empirical analysis however, the data measuring corruption may capture both legal and illegal forms of influence, and the many grey zone areas of undue influence. There are many forms of corruption, and these are not equally criminalized in different countries despite efforts of legal harmonization, making cross-country comparison difficult. Furthermore, corruption estimates may be more indicative of grand corruption in some countries and petty corruption in others (Rose-Ackerman & Palifka, 2016). There is also

[50] The results from the post estimation tests are presented and discussed in the Appendix.

market heterogeneity in corruption levels even within countries (Olken & Pande, 2011), which creates an additional limitation related to country comparison. We argue that the corruption indices we utilize are suited to compare the levels of undue influence across countries, but are nevertheless careful when interpreting the empirical results.

Similar to market heterogeneity in corruption levels, we note that the extent of market regulation is likely to vary across different industries within a country and that aggregated measures does not capture these variations. Furthermore, an association between corruption and market regulation may depend on the specific types of regulation considered. Using aggregated measures of market regulation we cannot easily identify which specific market regulations are related to corruption risk. We comment further on this in the following chapter, where we will discuss potential implications of the findings in our empirical analysis.

8. Discussion

Regulatory failure poses a significant threat to markets, and undue influence on regulatory decisions divert benefits away from the many and into the hands of the few, regardless of the legal status of such acts. The findings in our thesis suggest that there is a significant relationship between the extent of market regulation and the estimated level of corruption in the context of our focus on OECD countries. This indicates that corruption risk related to regulatory decisions is present in the OECD. In the following chapter, we briefly discuss some underlying explanations of our results, linking them to the theoretical and empirical literature from the first part of the thesis. Further, we present a normative discussion of what can be done to better face the risk of corruption related to market regulation.

8.1 Underlying explanations

Our empirical results suggest that countries with lower extents of market regulation experience lower levels of estimated corruption. However, the absence of state intervention does not necessarily guarantee low levels of corruption and our results are not strictly deterministic. Colombia is among the less regulated countries in our data set, but ranks close to the bottom of our sample when it comes to corruption levels.[51] Latvia is the newest member to the OECD and the least regulated country in our data set, but on the CPI Latvia is not performing much better than its more regulated neighboring countries.[52] Norway is another interesting example, ranked among the top five least corrupt countries according to Transparency International, but is far from the least regulated country in the sample.[53] In this section we discuss whether characteristics of the regulatory environments may contribute to explain country differences. We start by discussing market related characteristics, before turning to institutional characteristics of the regulatory environment.

[51] Colombia scores below average in 18 out of 22 sectors on the OECD STRI (OECD, 2016a), and scores 37 points out of 100 possible points on the CPI (Transparency International, 2015).

[52] Latvia scores well below average in all 22 sectors on the OECD STRI (OECD, 2016a), and scores 55 points out of 100 possible points on the CPI (Transparency International, 2015).

[53] Norway scores below average in 13 out of 22 sectors on the OECD STRI (OECD, 2016a), and scores 87 out of 100 possible points on the CPI (Transparency International, 2015).

In terms of market related characteristics of countries' regulatory environments, a natural starting point is to consider the effect of different income levels on the relationship between corruption and market regulation. In our analyses, we find GDP per capita to be significantly associated with corruption across all regressions, with higher income levels corresponding to lower corruption levels. This is a common relationship found in research on corruption. However, countries with high income levels have both high and low extents of market regulation. Income levels thus cannot alone explain the country variations we observe. Income inequality is another characteristic associated with corruption. Several studies indicate an association between greater inequality in the distribution of income and higher levels of corruption (Rose-Ackerman & Palifka, 2016). In societies with entrenched income inequality, wealthy elites are potentially able to reinforce their positions through corruption. However, the Gini coefficient measuring income inequality in our empirical analysis turns out insignificant, and we therefore cannot comment on the effect of income inequality based on our empirical results.

Market characteristics such as market and population size might further contribute to explain the observed country differences. Corruption risk is for example assumed to be higher in markets with few competitors, as firms may have more to gain in terms of profits or market power following from a regulatory decision. If markets in smaller countries are also less open to foreign trade there are likely more monopolies or oligopolies than in larger countries, with associated profits that may incentivize corruption. Furthermore, a country's population size could indicate something about the level of integration between private firms and the political sphere. In small countries, the size of the group of people frequenting these spheres makes it more likely that regulated firms and their regulators have personal ties, while large markets may provide fewer opportunities to approach decision-makers. However, our population variable seems to indicate that larger populations are associated with more corruption, in line with findings by several authors. For example, Root (1999) argued that small countries rely on being governed well in order to be financially viable, leaving less room for corruption by the government. In other words, as arguments can be made both ways the effect of population size is ambiguous and might be driven by sample-specific effects.

The association between corruption and the extent of market regulation may further depend on different institutional characteristics of the regulatory environment. As discussed in Chapter 4 on regulatory capture, it is often difficult to differentiate between legitimate policy objectives and corrupt motives. Corruption risk in regulatory processes may then depend on

the capacity of institutions such as the bureaucracy and the legal regime, rather than the extent or complexity of regulations (Rose-Ackerman & Palifka, 2016). In our empirical analysis we controlled for the general level of institutional quality, which correlates negatively with estimated corruption.[54]

Furthermore, regulatory agencies might be insufficiently qualified to discover illegitimate excuses for a regulatory decision. Alternatively, unknowing regulators could potentially be steered by corrupt politicians. Greater regulatory complexity may especially contribute to lack of oversight of the motives behind the regulations implemented. Based on this, one would have expected that the variables in our analysis controlling for education levels would be significantly associated with the estimated level of corruption. However, we study a small sample and the variables do show the expected sign of the coefficient, and we would therefore not overstate this. Lack of capacity might also be a matter of resources rather than qualifications, as underfunded regulatory agencies will struggle more to keep oversight. In this regard, Estache and Wren-Lewis (2009) asks whether governments sometimes deliberately withhold funding, as a means of undermining regulatory agencies. Some OECD countries also have provisions allowing the government to overrule decisions made by regulatory agencies, constraining the independence of the agencies (OECD, 2016b).

Furthermore, higher levels of trust in government institutions are frequently associated with lower corruption levels. Trust in institutions is often associated with smaller populations, which might contribute to our previous discussion of why larger populations seem to be associated with more corruption. Simultaneously, low corruption levels can be said to influence the level of trust in institutions, described by Rose-Ackerman and Palifka (2016) as a virtuous spiral where trust and low corruption levels reinforce each other. Focusing on another institutional characteristic, Friedman et al (2000) found that higher tax shares are associated with lower levels of corruption. They suggest that citizens are more willing to support high levels of public expenditure if the government is considered competent and

[54] Our variable controlling for institutional quality is measured by the Polity IV index, which correlates negatively with both the CCI and the CPI (see section B1 in the Appendix), indicating that better institutions are associated with less corruption. In our regressions, however, this variable is positively associated with corruption, which we assume is due to weaknesses in our model.

honest, which may contribute to explain that low levels of estimated corruption and large government budgets coexist in the Nordic countries.

Characteristics of the regulatory environments such as levels of income and income inequality, market size, trust in institutions, as well as the qualifications and resources of regulators, may contribute to explain some of the difference we observe in the relationship between the extent of market regulation and estimated corruption. However, as we have underlined, market regulations are difficult to compare across countries, and country-level differences in their relationship to corruption could originate from – or be jointly determined with – a broader range of factors than covered in this thesis.

8.2 Normative implications

Over the last decades, a range of international initiatives has been established to coordinate anti-corruption efforts. In the OECD, such efforts include the Working Group on Bribery monitoring country adherence to the OECD Anti-Bribery Convention, the Working Party on Responsible Business Conduct, and several regional programs.[55] Despite the substantial efforts to develop robust integrity mechanisms, harmonize legal frameworks, and form an international battle against corruption, different country evaluations indicate serious obstacles to law enforcement. We will therefore briefly discuss some normative implications related to the detection, deterrence, and control of corruption in OECD countries. From the theoretical review we draw the general understanding that reducing the probability of corruption in regulatory processes, requires providing sufficient information to those with incentives to react to regulatory capture. In this regard, we will discuss the roles of both citizens, international organizations, and firms in regulated markets.

Finding that an increased extent of market regulation correlates positively with corruption levels might lead to a recommendation of scaling back on market regulations. This would however be overly simplistic and wrong. In a similar manner as Ades and Di Tella (1997), we do not question the general idea that interventionist economic policies are necessary for countries to achieve competitive, fair, and efficient markets. Instead, we consider the need for

[55] International initiatives are not limited to the OECD, and we could also mention initiatives such as the UN Global Compact, as well as several transparency platforms such as EITI, StAR, and CoST.

some active market regulation as given, and would not suggest that mere deregulation or decentralization is the sole answer to reducing the risk of corruption. However, our results indicate that corruption could be a potential side-effect of intervening in markets, either intended or unintended, and that this may compromise the achievement of the desired goals of market intervention. We find expected government intervention to create an arena for political corruption, where market failures are allowed to continue in exchange for benefits. Based on this we emphasize the importance of considering the full effects of regulatory policies in the presence of corruption when designing market regulations.

As explained by Søreide (2016b), one reason why governments struggle to combat corruption is that they are part of the problem they are supposed to solve. With the wide discretionary authority of politicians and lack of sufficient monitoring mechanisms, political corruption is also especially difficult to detect and control. As mentioned, politicians have to consider many different factors and competing goals before making a policy, changing a regulatory decision, or allocating a budget, which may enable them to find a supposedly legitimate excuse for any decision. In turn, this can make it almost impossible for outsiders suspecting political corruption to prove that a regulatory decision was bought. If market regulation contributes to higher risk of corruption at the political and higher bureaucratic level, this creates additional challenges for corruption control. According to Transparency International (2012), political party financing is inadequately regulated and lobbying is insufficiently transparent across most European countries. At the same time, the barriers against corruption generally seem to be weak when it comes to elected politicians, including in countries that rank high in terms of indicators of good governance (Søreide, 2016b).

The above findings support the value of policies that strengthen accountability and enforce transparency. Since corruption will only exist if it is possible to hide the illegal deals involved or to avoid punishment if they are discovered, transparency and accountability are undoubtedly important ingredients of a regulatory environment aiming at minimizing corruption risk. By enabling information about government actions, citizens can better monitor politicians and bureaucrats, and enforce greater electoral accountability. In this regard, access to information laws and disclosure laws can be important transparency measures, as well as the protection of

whistle-blowers and maintaining the watch dog functions of non-governmental organizations and an independent media.[56]

Furthermore, reviewing corruption risk in light of informational asymmetries allowed us to understand that reducing the ability of agents to exploit their informational advantage over their principals is important to control corruption. Achieving this might be possible through increasing the number of regulatory agents, since this would decrease the ability of any individual regulator to hide information (Estache, 2011). Similarly, if a firm is closely connected to politicians, then distancing the politicians from control of the firm is likely to reduce the effect of capture, but if the main risk is that of a firm capturing regulatory agencies, then distancing the agency from relatively accountable politicians may increase the probability of corruption (Søreide, 2010). Furthermore, the independence of regulators is a debated issue. On one hand, provisions allowing governments to overrule decisions by regulatory agencies can potentially control an unfaithful regulator, but at the same time it provides unaccountable politicians with another opportunity to influence regulatory processes on behalf of a corrupt firm. On one hand, greater independence is often believed to increase transparency, but limiting discretionary power could also contribute to reduce the risks of collusion in regulatory decisions (Estache, 2011).

Additionally, our results underline the need for a better understanding of the results and consequences of market regulation, rather than focusing only on the suitability of regulatory procedures. More specifically, we have discussed whether market regulations affecting profits and market power seems to be most prone to contribute to increase corruption risk. For incumbent firms the value of restraining new entry to the market may for example be tremendous and thus tempting to obtain through capture or corruption. However, if price, quality and the access to a given good or service are all satisfactory in the perspective of the many, then corruption related to regulations would not seem to be a problem. Such a perspective might indicate that it is necessary to direct attention to potential connections between decision makers and firms that have a lot to gain from reducing the competition they

[56] Access to information laws allow access by the general public to data held by governments, establishing the right of, and procedures for, the public to request and receive government-held information (Open Society Justice Initiative, 2012). Disclosure laws emphasize the disclosure of sources of income and business connections by politicians. However, such laws are debated in terms of consequences for privacy that may affect the pool of applicants for political positions negatively (Djankov et al, 2010).

face in the market, which would be very relevant in markets with network characteristics or natural monopolies. By implementing mechanisms to monitor government decisions that are important to firms, it could be possible to reduce the gains that firms can obtain from corruption (Søreide, 2016b).

Similarly, evidence from research on corruption often points toward fair competition as an essential anti-corruption remedy, arguing that rules securing fair and open markets are de facto barriers to corruption. International collaboration on competition control is better established than on anti-corruption, and economists have emphasized the relevance of non-criminal measures to prevent corporate corruption (Søreide, 2016b). The role of competition law in controlling anti-competitive behavior is especially relevant in this regard, because it protects the functioning of markets regardless of the reasons for market distortions. Competition authorities are trained to analyze market consequences of policies, and could be given extended authority and mandate to protect markets against more forms of distortions than they currently focus on (Søreide, 2016b). Because non-criminal prosecution implies lower standards of evidence, it could supplement criminal law regulation of corruption. Furthermore, other firms are among the most incentivized to react against bribery by their competitors as it affects their competitive terms. A sharper focus on markets through competition authorities might also make it easier for firms to file complaints and claim compensation when they lose business because competitors have used bribes to gain benefits (Søreide, 2016b).

While criminal law regulation of corruption is implemented and broadly harmonized across most OECD countries, there are still serious shortcomings and significant variation concerning actual law enforcement. If governments are not sufficiently able or lack incentives to control corruption in their own markets, or are parts of the problem, this may emphasize the value of assembling international teams of experts to assess policy performance. If countries also fail to coordinate their anti-corruption efforts, then the role of international governmental organizations such as the OECD may be increasingly important. The OECD produces country evaluations and urges member countries to take part in peer reviews on how governments enforce their anti-bribery legislation. Such evaluations have revealed severe challenges along the law enforcement value chain, including in the most developed countries. This may further underline the need for countries to increase their collaboration and mutual legal assistance in detecting and controlling corruption to ensure more objective policy evaluation.

9. Conclusion

In this thesis, we asked which implications different extents of market regulation would have on the risk of collusive corruption in OECD countries. In order to answer our research question, we have reviewed relevant theoretical and empirical literature, and used weighted least squares regression to investigate whether there is a significant relationship between the extent of market regulation and corruption.

Corruption in regulatory processes divert benefits away from the many and into the hands of the few, regardless of the legal status of undue influence on politicians or regulators and poses a severe threat to markets. Reviewing relevant theoretical and empirical literature, we find that the risk of collusive corruption in regulatory processes can be explained by the discretionary authority of politicians and regulators, the informational advantages they hold over the broader society, and the lack of sufficient mechanisms to monitor the decisions they make. Expected government intervention in markets may create an arena for political corruption, where firms have greater incentives for exerting undue influence on regulatory decisions the more profit or market power at stake.

The results of our empirical analysis indicate a positive association between the extent of market regulation and the level of corruption. This may imply that the risk of corruption in OECD countries seems to be higher when markets are more heavily regulated. The association is however not deterministic, and we control for and discuss the relevance of different variables that may affect corruption in regulatory processes. We further discuss the extent to which that market characteristics such as levels of income and income inequality, competition and size of the market, as well as institutional characteristics such as institutional quality, trust in institutions or qualifications and independence of regulators, may contribute to explain differences in countries' regulatory environments. The empirical results we present should be interpreted with caution as they are based on a relatively narrow sample, and suffer from limitations due to the quality of data available and challenges of simultaneity biases.

Finding a positive association between larger extents of market regulation and more corruption does not necessarily lead to straight-forward conclusions. Extensive market regulation can be based on legitimate motivations such as ensuring competitive, fair, and efficient markets. It is thereby uncertain whether reducing the extent of market regulation is always the better choice, even though it is associated with lower estimated corruption. Hence, we cannot conclude that

interventionist policies are unnecessary or that the possible corruption risks outweigh the benefits of market regulation. However, our findings emphasize the importance of considering the full effects of regulatory policies in the presence of corruption risk, and to ensure better knowledge about the results of market regulation.

We also suggest that corruption should be countered from many different angles, including by supplementing criminal law regulation of corruption with non-criminal measures and a focus on markets. In this respect, extending the mandates of competition authorities may strengthen law enforcement at the national level. Additionally, our findings support the need for international collaboration to combat corruption, especially through taking part in peer reviews, offering mutual legal assistance, and allowing international teams of experts to evaluate regulatory policies.

Lastly, we would like to include a few suggestions for further research. In the extension of our thesis, it would be interesting to perform time series analysis using the STRI as more years of data are made available, or applying an event study methodology to study how policy changes making a country more or less regulated, might impact the estimated level of corruption. However, corruption is a multidimensional phenomenon, and aggregate studies cannot alone give conclusive answers. A non-deterministic relationship between the extent of market regulation and estimated corruption suggested by our empirical results, also indicated the need for in-depth country or case specific research. Furthermore, differences in corruption levels across countries ultimately occur at the sector level. Future research could therefore also attempt to study empirically the association between corruption and market regulation at the sector level. If corruption indicators are compiled at the sector level, it would be possible to examine their relationship to sector-specific market regulation, using the STRI data for the service sector or similar data for industries such as utilities or extractives.

References

Literature

Acemoglu, D., & Verdier, T. (2000). The Choice Between Market Failures and Corruption. *American Economic Review, 90*(1), 194-211.

Ades, A., & Di Tella, R. (1997). National Champions and Corruption: Some Unpleasant Interventionist Arithmetic. *The Economic Journal, 107*(443), 1023-1042. doi:10.1111/j.1468-0297.1997.tb00005.x

Ades, A., & Di Tella, R. (1999). Rents, Competition, and Corruption. *American Economic Review, 89*(4), 982-993.

Aidt, T. S. (2016). Rent seeking and the economics of corruption. *Constitutional Political Economy, 27*(2), 142-157. doi: 10.1007/s10602-016-9215-9

Auriol, E., & Lassebie, J. (2013). *Capture for the Rich, Extortion for the Poor.* Unpublished manuscript. Toulouse School of Economics, France.

Baldwin, R., Cave, M., & Lodge, M. (2010). *The Oxford Handbook of Regulation.* Oxford: Oxford University Press.

Baldwin, R., Cave, M., & Lodge, M. (2012). *Understanding Regulation: theory, strategy and practice* (2nd Ed.). New York: Oxford University Press.

Becker, G. (1983). A Theory of Competition Among Pressure Groups for Political Influence. *Quarterly Journal of Economics, 98*(3), 371-400.

Benitez, D., Estache, A., & Søreide, T. (2012). *Infrastructure policy and governance failures*. CMI Working Paper No. 5. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2334625

Berle, A., & Means, G. (1932). *The Modern Corporation and Private Property.* New York: The Macmillian Company.

Black, J. (2001). Decentering Regulation: Understanding the Role of Regulation and Self-Regulation in a 'Post-Regulatory' World. *Current Legal Problems, 54*(1), 103-147.

Boehm, F. (2007a). *Regulatory Capture Revisited – Lessons from Economics of Corruption.* Working paper. Available from the Internet Center for Corruption Research (ICCR) at http://www.icgg.org/corruption.research.html

Boehm, F. (2007b). *Anti-Corruption Strategies as Safeguards for Public Service Sector Reforms.* Working paper. Available from the Internet Center for Corruption Research (ICCR) at http://www.icgg.org/corruption.research.html

Council of Europe. (1999). Protocol to the Criminal Law Convention on Corruption. *European Treaty Series 173*. Strasbourg: Council of Europe.

Cust, J., & Harding, T. (2015). Institutions and the location of oil exploration. *OxCarre Research Paper, 127*.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). The Regulation of Entry. *Quarterly Journal of Economics, 117*(1), 1-37.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2010). Disclosure by politicians. *American Economic Journal: Applied Economics, 2*(2), 179-209.

Elliott, K. A. (1997). Corruption as an International Policy Problem: Overview and Policy Recommendations. In K.A. Elliott (Ed.), *Corruption and the Global Economy* (pp. 175-233). Washington, DC: Institute for International Economics.

Estache, A. (Ed.). (2011). *Emerging Issues in Competition, Collusion and Regulation of Network Industries.* London: Centre for Economic Policy Research.

Estache, A., & Wren-Lewis, L. (2009). Toward a Theory of Regulation for Developing Countries: Following Jean-Jaques Laffont's Lead. *Journal of Economic Literature, 47*(3), 729-770.

Fisman, R., & Gatti, R. (2002). Decentralization and corruption: evidence across countries. *Journal of Public Economics, 83*(3), 325-345.

Francis, J. G. (1993). *The politics of regulation: a comparative perspective.* Oxford: Blackwell.

Friedman, E., Johnson, S., Kaufmann, D., & Zoido-Lobaton, P. (2000). Dodging the grabbing hand: the determinants of unofficial activity in 69 countries. *Journal of public economics, 76*(3), 459-493.

G20. (2014). The G20 High-Level Principles on Corruption and Growth. Retrieved from http://www.g20australia.org/official_resources/g20_high_level_principles_corruption_and_growth.html

Goel, R. K., & Nelson, M. A. (1998). Corruption and Government Size: A Disaggregated Analysis. *Public Choice, 97*(1), 107-120. doi:10.1023/A:1004900603583

Graeff, P., & Mehlkop, G. (2003). The impact of economic freedom on corruption: different patterns for rich and poor countries. *European Journal of Political Economy, 19*(3), 605-620. doi:10.1016/S0176-2680(03)00015-6

Gwartney, J., Lawson, R., & Samida, D. (2000). Economic Freedom of the World 2000 Annual Report. Vancouver: The Fraser Institute.

Hamilton, A. (2013). *Small Is Beautiful, at Least in High-Income Democracies: The Distribution of Policy-Making Responsibility, Electoral Accountability, and Incentives for Rent Extraction.* Working Paper No. 6305, Policy Research Working Paper Series. Washington, DC: World Bank.

Hjelmeng, E. J., & Søreide, T. (2016). Bribes, Crimes and Law Enforcement. Forthcoming in the *European Business Law Review*. University of Oslo Faculty of Law Research Paper No. 2016-07. Retrieved from https://ssrn.com/abstract=2742770

Husted, B. W. (1999). Wealth, culture, and corruption. *Journal of International Business Studies, 30*(2), 339-359.

Jain, A. K. (1998). Models of Corruption. In A. K. Jain (Ed.), *Economics of Corruption* (pp. 13-34). New York: Springer US.

Jensen, M., & Meckling, W. (1976). Theory of the Firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. doi:10.1016/0304-405X(76)90026-X

Kenny, C., & Søreide, T. (2008). *Grand Corruption in Utilities*. World Bank Policy Research Working Paper No. 4805. Washington, DC: World Bank.

Krueger, A. (1974). The Political Economy of the Rent-Seeking Society. *American Economic Review, 64*(3), 291-303.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The Quality of Government. *The Journal of Law, Economics and Organization, 15*(1), 229-279.

Laffont, J.-J., & Tirole, J. (1991). The Politics of Government Decision-Making: A Theory of Regulatory Capture. *Quarterly Journal of Economics, 106*(4), 1088-1127.

Lambsdorff, J. G. (1999). *Corruption in Empirical Research – A Review.* Paper presented at the 9th International Anti-Corruption Conference, Durban, South Africa. Retrieved from http://www1.worldbank.org/publicsector/anticorrupt/d2ws1_jglambsdorff.pdf

Lambsdorff, J. G. (2001). How Corruption in Government Affect Public Welfare – A Review of Theories (No. 9). Center for European, Governance and Economic Development Discussion Paper, University of Göttingen.

Loayza, N. V., Oviedo, A. M., & Servén, L. (2005). *The Impact of Regulation on growth and Informality: Cross-Country Evidence*. World Bank Policy Research Working Paper No. 3623. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=755087

Marshall, M. G., Gurr, T. R., & Jaggers, K. (2016). *Polity IV Project: Dataset Users' Manual.* Retrieved from http://www.systemicpeace.org/inscr/p4manualv2015.pdf

Molinuevo, M., & Sáez, S. (2014). *Regulatory Assessment Toolkit: A Practical Methodology for Assessing Regulation on Trade and Investment in Services.* Washington, DC: World Bank. doi:10.1596/978-1-4648-0057-3.

OECD. (2015). *Consequences of Corruption at the Sector Level and Implications for Economic Growth and Development.* Paris: OECD Publishing.

OECD. (2016a). Compare your country: Services Trade Restrictiveness Index. Retrieved from http://www2.compareyourcountry.org/service-trade-restrictions

OECD. (2016b). Regulatory Database for Services Trade Restrictiveness Index. Retrieved from http://www.oecd.org/tad/services-trade/regulatory-database-services-trade-restrictiveness-index.htm

OECD. (2016c). Services Trade Restrictiveness Index. Retrieved from http://www.oecd.org/tad/services-trade/services-trade-restrictiveness-index.htm

Ogus, A. I. (1994). *Regulation: Legal Form and Economic Theory.* Oxford: Hart Publishing.

Olken, B. A., & Pande, R. (2011). *Corruption in developing countries*. National Bureau of Economic Research, NBER Working Paper Series No. 17398.

Open Society Just Initiative. (2012). Access to Information Laws: Overview and Statutory Goals. Retrieved from http://www.right2info.org/access-to-information-laws

Prosser, T. (2006). Regulation and Social Solidarity. *Journal of Law and Society, 33*(3), 364-387.

Rohwer, A. (2009). Measuring Corruption: A Comparison Between the Transparency International's Corruption Perception Index and the World Bank's Worldwide Governance Indicators. *CESifo DICE Report, 7*(3), 42-52.

Root, H. (1999). *The importance of being small*. Center for International Studies Working Paper No. 99-13, University of Southern California.

Rose-Ackerman, S. (1978). *Corruption: a study in political economy.* New York: Academic Press.

Rose-Ackerman, S. (1999). *Corruption and Government: Causes, Consequences, and Reform.* New York: Cambridge University Press.

Rose-Ackerman, S., & Palifka, B. J. (2016). *Corruption and Government: Causes, Consequences and Reform* (2nd Ed.). New York: Cambridge University Press.

Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research methods for business students* (6th Ed.). England: Pearson Education Limited.

Seim, L. T., & Søreide, T. (2009). Bureaucratic complexity and impacts of corruption in utilities. *Utilities Policy, 17*(2), 176-184. doi:10.1016/j.jup.2008.07.007

Shen, C., & Williamson, J. B. (2005). Corruption, Democracy, Economic Freedom, and State Strength: A Cross-National Analysis. *International Journal of Comparable Sociology, 46*(4), 327-345.

Shleifer, A., & Vishny, R. (1994). Politicians and Firms. *Quarterly Journal of Economics, 109*(4), 995-1025.

Stigler, G. J. (1971). The Theory of Economic Regulation. *The Bell Journal of Economics and Management Science, 2*(1), 3-21.

Søreide, T. (2010). *Drivers of corruption: A Brief Review.* World Bank Studies. Washington, DC: World Bank. doi:10.1596/978-1-4648-0401-4

Søreide, T. (2016a). *Corruption and Criminal Justice: Bridging Economic and Legal Perspectives.* Cheltenham: Edward Elgar.

Søreide, T. (2016b). Regulating Corruption in International Markets: Why Governments Introduce Laws They Fail to Enforce. Forthcoming in E. Brosseau, J. M. Glachant, & J. Sgard (Eds.), *The Oxford Handbook on International Economic Governance and Market Regulation.*

Torres-Reyna, O. (2007). *Linear Regression Using Stata.* Princeton University. Retrieved from https://www.princeton.edu/~otorres/Regression101.pdf

Transparency International. (2012). *Money, Politics, Power: Corruption Risks in Europe*. Berlin: Transparency International.

Treisman, D. (2000). The causes of corruption: a cross-national study. *Journal of Public Economics, 76*(3), 399-457.

Treisman, D. (2007). What have we learned about the causes of corruption from ten years of cross-national empirical research. *Annual Review of Political Science, 10*(1), 211-244.

Treisman, D. (2014). What does cross-national empirical research reveal about the causes of corruption? In P. Heywood (Ed.), *Routledge Handbook of Political Corruption.* Abingdon: Routledge.

Tullock, G. (1967). The Welfare Costs of Tariffs, Monopolies, and Theft. *Western Economic Journal, 5*(3), 224-232. doi: 10.1111/j.1465-7295.1967.tb01923.x

U.S. Department of Justice, Office of Public Affairs. (2016). *VimpelCom Limited and Unitel LLC Enter into Global Foreign Bribery Resolution of More Than $795 Million; United States Seeks $850 Million Forfeiture in Corrupt Proceeds of Bribery Scheme* [Press release]. Retrieved from https://www.justice.gov/opa/pr/vimpelcom-limited-and-unitel-llc-enter-global-foreign-bribery-resolution-more-795-million

Viscusi, W. K., Harrington, J. E., & Vernon, J. M. (2005). *Economics of regulation and antitrust* (4th Ed.). Cambridge: MIT Press.

Wei, S. J. (2000). Natural openness and good governance. *National Bureau of Economic Research*, Working Paper Series (No 7765). Retrieved from http://www.nber.org/papers/w7765.pdf

Winston, C. (2006). *Government Failure versus Market Failure: Microeconomics policy research and government performance.* Washington, DC: Brookings Institution Press.

Wolf, C. (1979). A theory of nonmarket failure: Framework for implementation analysis. *The Journal of Law & Economics*, 22(1), 107-139. Retrieved from: http://www.jstor.org/stable/725215

Wooldridge, J. M. (2014). *Introduction to Econometrics* (Europe, Middle East and Africa Edition). South Western: Cengage Learning.

World Bank. (2016a). Control of Corruption. Retrieved from http://info.worldbank.org/governance/wgi/pdf/cc.pdf

World Bank. (2016b). Doing Business: Distance to Frontier. Retrieved from http://www.doingbusiness.org/data/distance-to-frontier

World Bank. (2016c). World Data Bank: World Development Indicators. Retrieved from http://databank.worldbank.org/data/reports.aspx?source=2&type=metadata&series=SI.POV.GINI

Data sources

Center for Systemic Peace. (2015). *Polity IV Annual Time-Series 1800-2015* [Data set]. Available from http://www.systemicpeace.org/inscrdata.html

Freedom House. (2016). *Scores and Status Data (1980-2016), Freedom of the Press: Global (2014-2015)* [Data set]. Available from https://freedomhouse.org/report-types/freedom-press

OECD.Stat. (2015). *Services Trade Restrictiveness Index* (2015), Indicator STRI [Data base]. Available from http://stats.oecd.org/Index.aspx?DataSetCode=STRI

OECD.Stat. (2016). Education at a Glance 2016, *Graduation rates and entry rates* (2014) [Data base]. Available from http://stats.oecd.org/

Transparency International. (2012). *Corruption Perception Index* (2012) [Data set]. Available from http://www.transparency.org/cpi2012/results

Transparency International. (2013). *Corruption Perception Index* (2013) [Data set]. Available from http://www.transparency.org/cpi2013/results

Transparency International. (2014). *Corruption Perception Index* (2014) [Data set]. Available from http://www.transparency.org/cpi2014/results

Transparency International. (2015). *Corruption Perception Index* (2015) [Data set]. Available from http://www.transparency.org/cpi2015#downloads

Treisman, D. (2007). What have we learned about the causes of corruption from ten years of cross-national empirical research. *Annual Review of Political Science, 10*(1). Legal Origin [Data set]. Available from http://www.sscnet.ucla.edu/polisci/faculty/treisman/Pages/publishedpapers.html

World Bank. (2014). World Development Indicators, *GINI index (World Bank Estimate) (2000-2014)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. (2015a). *Distance to Frontier dataset, 2004-2017 (2015)* [Data set]. Available from http://www.doingbusiness.org/data/distance-to-frontier

World Bank. (2015b). Education Statistics – All Indicators, *School life expectancy, primary and secondary, both sexes (years) (2010-2015)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=education-statistics-~-all-indicators

World Bank. (2015c). World Governance Indicators, *Control of Corruption (2010-2015)* [Data base]. Available from: http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. (2015d). World Development Indicators, *GDP growth (2015)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. (2015e). World Development Indicators, *GDP per capita (Current US) (2015)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. (2015f). World Development Indicators, *Population Density (2015)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. (2015g). World Development Indicators, *Population Total (2015)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Bank. (2015h). World Development Indicators, *Trade (% of GDP) (2011-2015)* [Data base]. Available from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

Appendix

A. Lists of countries in the sample

A1. Countries included in the main sample (N=42)

OECD Members
Australia
Austria
Belgium
Canada
Chile
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

Non-OECD Members
Brazil
China
Colombia
India
Indonesia
Latvia
Russian Federation
South Africa

A2. Countries included in the extended sample (N=133)

OECD Members
Australia
Austria
Belgium
Canada
Chile
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

Non-OECD Members
Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Azerbaijan
Bahrain
Bangladesh
Belarus
Benin
Bhutan
Bolivia
Botswana
Brazil
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Central African Republic
Chad
China
Colombia
Costa Rica
Croatia
Cyprus
Dominican Republic
Ecuador
El Salvador
Ethiopia
Gabon
Ghana
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
India
Indonesia
Iraq
Jamaica
Jordan
Kazakhstan
Kenya
Kosovo
Kuwait
Latvia
Lebanon
Liberia
Libya
Lithuania
Madagascar
Malawi
Malaysia
Mali
Mauritius
Moldova
Mongolia
Montenegro
Morocco
Mozambique
Namibia
Nepal
Nicaragua
Niger
Nigeria
Oman
Pakistan
Panama
Paraguay
Peru
Philippines
Qatar
Romania
Russian Federation
Rwanda
Saudi Arabia
Senegal
Serbia
Sierra Leone
Singapore
South Africa
Sri Lanka
Sudan
Suriname
Tajikistan
Tanzania
Thailand
Togo
Tunisia
Uganda
Ukraine
Uruguay
Uzbekistan
Vietnam
Zambia
Zimbabwe

B. Summary statistics

B1. Summary statistics: Variables in the main analysis

	(1)	(2)	(3)	(4)	(5)
Variable	**Obs**	**Mean**	**Std.Dev.**	**Min**	**Max**
Corruption, CCI	42	.3097465	.2001037	.0270262	.6947722
Corruption, CPI	42	.3665476	.1872832	.09	.72
Regulation, STRI	42	.2243282	.0856512	.1262448	.4674542
GDP per capita	42	31.33071	22.59444	1.581589	101.45
Trade	42	.9375128	.6211748	.2532739	3.623379
Population, in log	42	16.88757	1.854466	12.70934	21.03897
Polity IV	41	.8515514	.2110471	.1280303	1
Inequality, Gini	38	.3582671	.0873674	.2472	.63195
Higher education	32	.5617544	.1626082	.2455	.93604

Notes: The table shows (1) the number of observations, (2) the mean value, (3) the standard deviation from the mean value, (4) the minimum value, and (5) the maximum value. The summary statistics for the main analysis are described in more detail in Chapter 6.3.4

B2. Summary statistics: Variables in the complementary analysis, OECD sample

	(1)	(2)	(3)	(4)	(5)
Variable	**Obs**	**Mean**	**Std.Dev.**	**Min**	**Max**
Corruption, CCI	41	.3144134	.200262	.0270262	.6947722
Corruption, CPI	41	.3704878	.187839	.09	.72
Regulation, Doing Business	41	.2588931	.0750602	.1325244	.4733
GDP per capita	41	30.87113	22.67551	1.581589	101.45
Trade	41	.9351172	.6286951	.2532739	3.623379
Population, in log	41	16.98948	1.754404	13.25282	21.03897
Polity IV	41	.8515514	.2110471	.1280303	1
Inequality, Gini	39	.3573513	.0863997	.2472	.63195
Higher education	32	.5617544	.1626082	.2455	.93604

Notes: The table shows (1) the number of observations, (2) the mean value, (3) the standard deviation from the mean value, (4) the minimum value, and (5) the maximum value. The observations for Iceland is not included in the data set from the complementary analysis, based on Doing Business by the World Bank.

B3. Summary statistics: Variables in the complementary analysis, extended sample

Variable	(1) Obs	(2) Mean	(3) Std.Dev.	(4) Min	(5) Max
Corruption, CCI	133	.5077361	.2035317	.0270262	.7927679
Corruption, CPI	133	.557312	.1969631	.09	.9025
Regulation, Doing Business	133	.3745115	.129678	.1265799	.6800631
GDP per capita	133	13.80965	18.99765	.2759824	101.45
Trade	131	.8723627	.4383254	.2404013	3.583839
Polity IV	108	.6325694	.276112	.094697	1
Population, in log	105	16.49706	1.516969	13.25282	21.03897
Inequality, Gini	108	.3873269	.0883614	.2472	.63195
Population density	108	.1267938	.1617382	.0019047	1.236811
GDP growth	108	.0272999	.035068	-.2030125	.0960752
Press freedom	107	.5325234	.2113929	.07	.9
Education	98	130.0693	40.93979	26.83134	231.2423

Notes: The table shows (1) the number of observations, (2) the mean value, (3) the standard deviation from the mean value, (4) the minimum value, and (5) the maximum value. All variables are described in detail in Chapter 6.3. (Note that Education is square transformed to better ensure normality. The variable was originally reported in number of years of expected primary and secondary schooling.)

C. Statistical tests of assumptions

As discussed in Chapter 6, we need to determine whether our dataset meets the basic requirements for OLS and test the assumptions of homoscedasticity, normality and no perfect collinearity. The test results for omitted variable bias and functional form misspecification (RESET test) are presented and commented along with the regression results in Chapter 7. Stata offers a number of possible post estimation tests/commands to determine the suitability of the model, as well as an assessment of the data set.

C1. Multicollinearity: Correlation matrix

We start by inspecting the correlation matrix to determine whether our data set are subject to multicollinearity. We find that the two measures for corruption are highly correlated. This does not cause multicollinearity in our analysis however, as the two measures are not simultaneously introduced in the regressions. In all three data sets we find that there are several variables that are highly correlated. In order to determine whether some of the variables should be left out of the regression, we run a VIF test after the regressions. The results from the VIF tests are discussed along with the regression results in Chapter 7.

Correlation matrix: Main data set (STRI)

	CCI	CPI	STRI	GDP per cap	Population	Gini	Polity IV	Trade	Higher education
CCI	1.0000								
CPI	0.9954	1.0000							
STRI	0.5517	0.5561	1.0000						
GDP per cap	-0.8189	-0.7965	-0.3642	1.0000					
Population	0.5195	0.5061	0.4901	-0.4632	1.0000				
Gini	0.5080	0.5283	0.3389	-0.4500	0.4780	1.0000			
Polity IV	-0.6179	-0.6037	-0.5623	0.5942	-0.4616	-0.4506	1.0000		
Trade	-0.2600	-0.2444	-0.3013	0.4171	-0.6434	-0.4427	0.2488	1.0000	
Higher education	-0.3416	-0.3672	-0.3459	0.1336	-0.3111	-0.3499	0.4359	-0.0756	1.0000

Correlation matrix: Complementary data set (Doing Business), OECD sample

	CCI	CPI	Doing Business	GDP per cap	Population	Gini	Polity IV	Trade	Higher education
CCI	1.0000								
CPI	0.9947	1.0000							
Doing Business	0.6999	0.7241	1.0000						
GDP per cap	-0.8118	-0.7775	-0.4293	1.0000					
Population	0.4398	0.4393	0.4352	-0.4457	1.0000				
Gini	0.4773	0.5042	0.4837	-0.4137	0.4724	1.0000			
Polity IV	-0.6435	-0.6201	-0.6234	0.6010	-0.5848	-0.5122	1.0000		
Trade	-0.2540	-0.2404	-0.0412	0.4366	-0.6837	-0.4242	0.2878	1.0000	
Higher education	-0.3938	-0.4194	-0.5686	0.1604	-0.3442	-0.3883	0.4472	-0.0285	1.0000

Correlation matrix: Complementary data set (Doing Business), extended sample

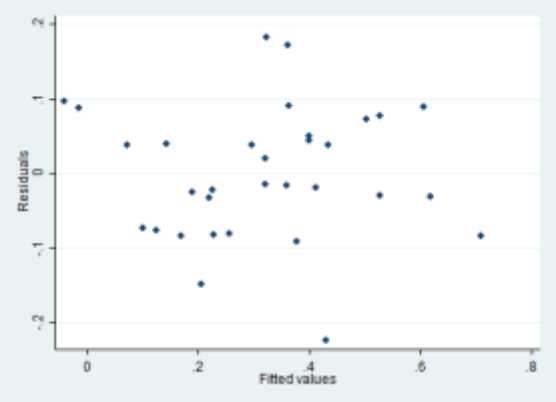
	CCI	CPI	Doing Business	GDP per capita	Trade	Population	Gini
CCI	1.0000						
CPI	0.9921	1.0000					
Doing Business	0.7661	0.7731	1.0000				
GDP per cap	-0.8416	-0.8316	-0.6461	1.0000			
Trade	-0.2689	-0.2780	-0.3112	0.2229	1.0000		
Population	0.1235	0.1219	0.0334	-0.0635	-0.4417	1.0000	
Gini	0.2922	0.3067	0.3847	-0.3711	-0.2622	0.0476	1.0000
Polity IV	-0.5944	-0.6010	-0.6151	0.4726	0.0936	-0.0548	-0.2550
Population density	-0.1969	-0.1881	-0.1696	0.2108	0.5171	-0.0281	-0.1254
GDP growth	0.0266	0.0371	0.0488	-0.0872	-0.0795	0.1408	0.1653
Press freedom	0.6761	0.6939	0.5231	-0.5416	-0.1316	0.1548	0.2551
Education	-0.7016	-0.7055	-0.7652	0.6501	0.2566	-0.1163	-0.2562

	Polity IV	Population density	GDP growth	Press freedom	Education
Polity IV	1.0000				
Population density	-0.0391	1.0000			
GDP growth	-0.1238	0.0131	1.0000		
Press freedom	-0.7769	0.0852	0.0539	1.0000	
Education	0.5409	0.0234	-0.1532	-0.5646	1.0000

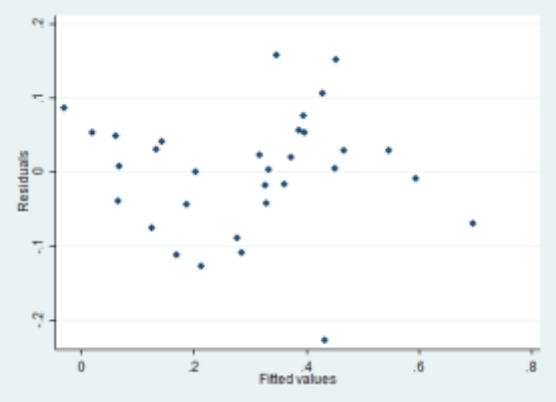
C.2 Homoscedasticity: Residuals versus fitted values

All the following post estimation tests are based on the least parsimonious model of the WLS regression using CCI as the measure for corruption. In order to detect possible issues of heteroscedasticity we start by using a graphical method to inspect the residual versus fitted values of our model. Any form of pattern in the plot gives an indication of heteroscedasticity. From the scatter plots we find that we have reason to suspect heteroscedasticity, breaking the assumption of homogeneity of variance of the residuals. We further run the formal Breusch-Pagan/Cook-Weisberg test for heteroscedasticity after each regression. The null hypothesis of the Breusch-Pagan/Cook-Weisberg test is that the variance is constant. In order to account for issues related to heteroscedasticity, we run our regressions using Stata's option for robust standard errors.

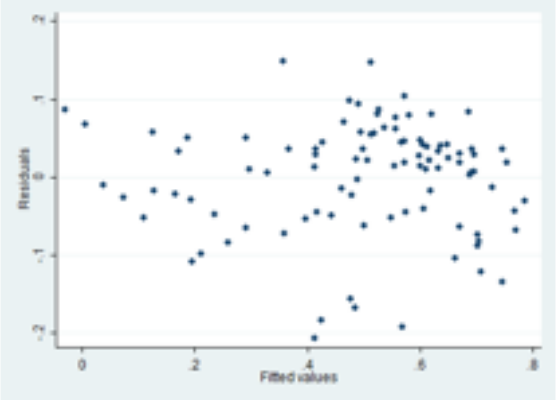
a) Main data set (STRI)



b) Complementary data set (Doing Business), OECD sample



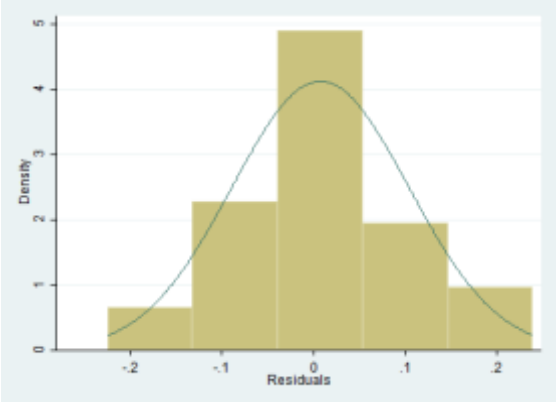
c) Complementary data set (Doing Business), extended sample



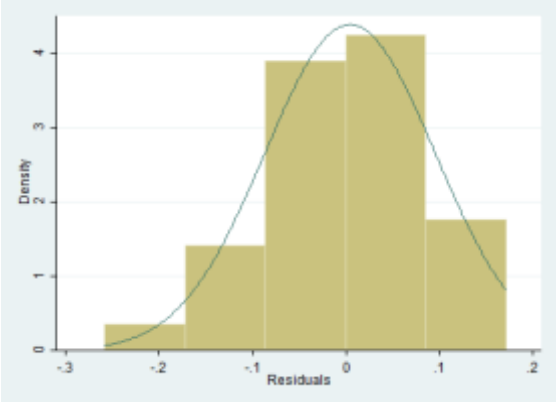
C.3 Normality: Normally distributed residuals

The following histograms present the distribution of the models' residuals versus the normal distribution. We find that the residuals are not perfectly normally distributed and note that the skewed distribution of residuals may cause our regression estimates to be over or underestimated, or indicate that one of the other Gauss-Markov assumptions are false. However, the assumption of normality is in itself not considered the most important requirement for OLS and we find the normal distribution of the residuals in the STRI data set satisfactory (Wooldridge, 2014).

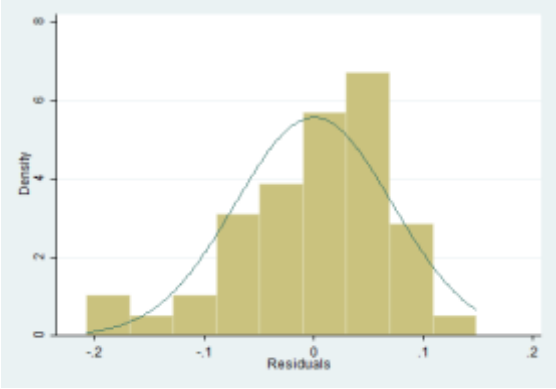
a) Main data set (STRI)



b) Complementary data set (Doing Business), OECD sample



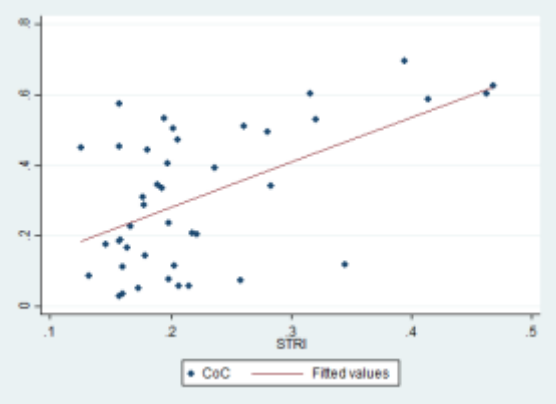
c) Complementary data set (Doing Business), extended sample



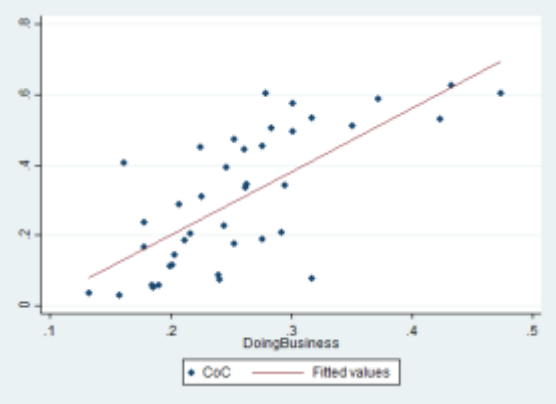
C4. Scatterplot observations versus fitted values

The following graphs depict the fitted relationship between the level of estimated corruption and the extent of market regulation. From the graphs we find that the extent of market regulation increases with higher levels of corruption. Comparing graph 1 and 2, we see that the dispersion is greater at lower levels of market regulation, but also that this relationship is not strictly deterministic.

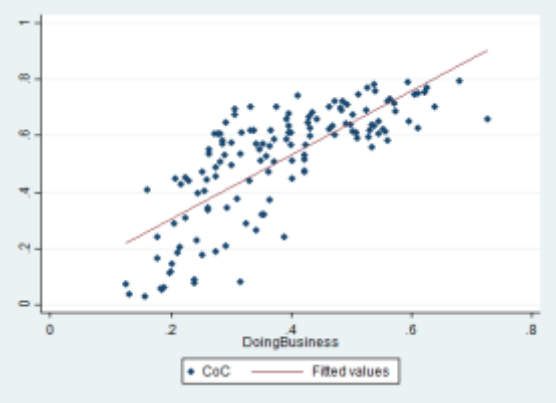
a) Main data set (STRI)



b) Complementary data set (Doing Business), OECD sample



c) Complementary data set (Doing Business), extended sample



D. Comparison of OLS and WLS regression results

We compare the regression results for our main specification of the model using both ordinary least squares (OLS) and weighted least squares (WLS) regression to check for large differences, as this may indicate that one or more of the Gauss-Markov assumptions are violated. In weighted least squares regression, the observations are weighted by the inverse of the variance of the CCI and the CPI respectively, explaining the difference in the sizes of the coefficients. Other than this we find no large or particularly worrisome difference in the results, when comparing the results of the OLS regressions with the results of the WLS regressions.

Main data set (STRI) and CCI as the measure for corruption

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	CCI	CCI	CCI	CCI	CCI	CCI
Regulation, STRI	0.683***	0.605**	0.807***	0.671***	0.588**	0.786***
	(0.184)	(0.248)	(0.273)	(0.177)	(0.259)	(0.279)
GDP per capita	-0.00631***	-0.00682***	-0.00744***	-0.00647***	-0.00690***	-0.00754***
	(0.00106)	(0.00104)	(0.00111)	(0.00101)	(0.00103)	(0.00111)
Non-OECD		0.00578	0.0440		0.00384	0.0422
		(0.0663)	(0.0644)		(0.0661)	(0.0635)
Trade		0.0267	0.0348		0.0267	0.0362
		(0.0484)	(0.0548)		(0.0487)	(0.0553)
Population, in log		0.00693	0.00947		0.00767	0.0109
		(0.0158)	(0.0190)		(0.0158)	(0.0192)
Inequality, Gini		0.171	0.164		0.159	0.147
		(0.327)	(0.520)		(0.320)	(0.521)
Polity IV		0.0214	0.137		0.0229	0.140
		(0.0773)	(0.123)		(0.0755)	(0.119)
Higher education			-0.00479			-0.00523
			(0.131)			(0.129)
Constant	0.354***	0.165	-0.00156	0.363***	0.163	-0.0167
	(0.0680)	(0.339)	(0.432)	(0.0647)	(0.334)	(0.433)
Observations	42	38	32	42	38	32
R-squared	0.745	0.805	0.804	0.756	0.808	0.808
Regression	OLS	OLS	OLS	WLS	WLS	WLS
RESET	0.0072	0.0552	0.1543	0.0127	0.0605	0.1696

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Main data set (STRI) and CPI as the measure for corruption

VARIABLES	(1) CPI	(2) CPI	(3) CPI	(4) CPI	(5) CPI	(6) CPI
Regulation, STRI	0.671***	0.587**	0.781***	0.713***	0.589**	0.853***
	(0.175)	(0.225)	(0.238)	(0.188)	(0.252)	(0.261)
GDP per capita	-0.00568***	-0.00634***	-0.00682***	-0.00584***	-0.00613***	-0.00665***
	(0.00109)	(0.00100)	(0.00105)	(0.00104)	(0.00104)	(0.00105)
Non-OECD		0.00182	0.0365		0.0189	0.0627
		(0.0592)	(0.0570)		(0.0679)	(0.0675)
Trade		0.0233	0.0358		0.0175	0.0323
		(0.0504)	(0.0581)		(0.0498)	(0.0581)
Population, in log		0.00556	0.0113		0.00712	0.0149
		(0.0149)	(0.0193)		(0.0150)	(0.0193)
Inequality, Gini		0.248	0.278		0.231	0.239
		(0.307)	(0.487)		(0.342)	(0.512)
Polity IV		0.0421	0.173		0.0459	0.208
		(0.0775)	(0.117)		(0.0859)	(0.127)
Higher education			-0.0235			-0.0166
			(0.126)			(0.127)
Constant	0.394***	0.192	-0.0483	0.381***	0.156	-0.158
	(0.0667)	(0.327)	(0.444)	(0.0715)	(0.328)	(0.456)
Observations	42	38	32	42	38	32
R-squared	0.716	0.793	0.787	0.727	0.794	0.796
Regression	OLS	OLS	OLS	WLS	WLS	WLS
RESET	0.0047	0.0711	0.2355	0.0119	0.0315	0.2029

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1