THE POWER TO BRIBE
Three Economic Essays on the Causes and Consequences of Corruption

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Acknowledgments

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Abstract

This thesis assesses some of the causes and consequences of endemic corruption by drawing on economic theory and applying econometric methods. Aside from an introductory and concluding part, the main matter is divided into three essays, each of which addressing a specific research question.

From a theoretical perspective, the first essay establishes the causal impact of a federal structure of government upon the extent of corruption. Federalism divides public power between tiers of governance and thereby modifies an essential component upon which corruption - defined as an abuse of public power for private benefit - rests. In particular, such multi-tiered governance exhibits vertical externalities to the extent that two distinct governments operate directly upon the economy. Due to inevitable overlapping responsibilities, federations are believed to suffer from corrupt overgrasing (Shleifer and Vishny, 1993). Essay 1 suggests, however, a more complex mapping from federalism onto corruption. Analogous to tax competition in federations (Keen and Kotsogiannis, 2002, 2003), where horizontal and vertical externalities arise across jurisdictions and tiers of government, decentralising public power over a multitude of jurisdictions provides a remedy against corruption. Contrary to taxation, participation decisions guide the voluntary choice of government representatives and firms to engage in corrupt conduct. Above all, participation constraints endogenise the number of Leviathans, which in turn determine how many profit maximising firms they are willing to corrupt into bankruptcy to maximising graft. Decentralising public power according to the federal principle allows, furthermore, to exploit possible differences in incentives and monitoring across jurisdictions, which underly the participation constraints for corruption. Thus, strong central government will be preferable to political decentralisation when combatting corruption (Shleifer and Vishny, 1993), only if the central tier remains unaffected by endemic bribery. Assigning clear spheres of responsibility to central and local government provides an alternative to centralisation when dealing with corrupt overgrasing in federations.

Remaining with corruption in federations, the second essay endeavours to establish the empirical mapping between multi-tiered governance and government misconduct. Based on data comparing perceived differences in corruption around the world, previous studies suggest
federations to be more corrupt (Treisman, 2000) meanwhile fiscal decentralisation reduces the level of bribery (Fisman and Gatti, 2002). These findings provide a puzzle insofar as federations almost always assign distinct tax bases to central and local government. Indeed, countries with indisputably federalistic constitutions, like Canada, India, Switzerland, and the United States, figure among the most fiscally decentralised. Against this background, the second essay attributes this inconsistency to unattended selection bias, e.g. federalism is an endogenous variable with attributes inducing a country to draw up a federal constitution being in turn related to corruption. Moreover, the ordinal nature of survey based corruption indices renders them somewhat unsuitable in guiding OLS regressions. Applying semi-parametric matching methods as well as switching regressions instead, which mitigate against ordinality and selection bias, results in a negative impact of federalism upon corruption. The result is robust towards employing recently assembled structural data on the extent of corruption (Dreher et al., 2004), which exhibit cardinal properties.

Finally, the third essay addresses some of consequences of corruption in terms of establishing the relationship between foreign direct investment (FDI) undertaken as cross-border acquisition (CBA) and institutional quality variables. In order to explain the distribution and growth of international merger activity around the world, the current sample contains a panel of merger counts between country-pairs for the years from 1997 to 2003, aggregated from SDC Platinum, which claims to attain an almost exhaustive coverage of CBAs. The essay draws together three inter-related aspects of the literature on FDI and CBAs: First, the "knowledge-capital model" provides the theoretical underpinning relating the distribution and form of FDI to country size, relative factor endowment, and resulting factor cost. Other variables control for common language, distance, trade-barriers, and preferential trading agreements. Secondly, the empirical specification accounts for the growth of CBAs based on finance-related variables such as financial deepening and relative wealth effects. Thirdly, institutional quality is introduced, which was the focus of Rossi and Volpin (2003), but the present variables refer to a more general concept of institutional quality manifesting in host country characteristics such as established democratic rule, voice and accountability, established and secure property rights, modest regulation, as well as the absence of corruption. The role of such broader measures of institutional quality have been highlighted, among else by the World Bank, as why developing countries do not fully benefit from globalisation. Based on estimation by means of panel-count techniques, results suggest that - controlling for established economic covariates for FDI - institutional quality is an important determinant facilitating CBAs, though some variables featuring prominently in previous research like investment cost (Carr et al. 2001) or common law origin (La Porta, 1997, 1998, 1999) fail to produce statistically or economically significant impacts. Furthermore, since SDC Platinum reports standard industry classification codes (SDC) of merging companies, the full sample
can be split into horizontal deals, which typically involve acquiring and target firms with equal SIC codes, and vertical respectively conglomerate deals, which typically involve acquiring and target firms with different SIC codes. The conditional impact of institutional quality variables suggests voice and accountability, property rights, and regulatory quality to matter more for horizontal deals. Conversely, vertical and conglomerate deals are rather facilitated when investment cost are low and the control of corruption is effective.

To subsume, the present thesis shows how institutions like federalism, which decentralises public power, stand crucial to combat abuses of public power for private benefit. Creating and maintaining institutions, which foster uncorrupted government conduct, can, however, put a considerable burden on a countries resources and involve a long time period to establish effective checks and balances. For some countries, a reduction of endemic corruption back to tolerable levels might only happen in the long-term. The economic benefits thereof, e.g. in terms of receiving more FDI, tend, however, to be substantial.
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Part I

Introduction and Literature Review
Chapter 1

Introduction: Corruption and Economics

Corruption is a persistent phenomenon, evolving with the ever more complex structures of governance in human society. Every country around the world has witnessed practices of bribery, embezzlement, fraud, or nepotism. Not surprisingly, social sciences like history, law, philosophy, political science, and sociology have contributed to a substantial strand of literature endeavouring to explain the nature of corruption. Conversely, up to the 1990ies economics contributed only sparsely towards this literature, even though bribery involves economic elements like the exchange of scarce resources or the tradeoff between the benefits from extracting kickbacks and the possibility of arrest. Identifying corruption as a major obstacle for economic development, the ongoing globalisation, and newly assembled empirical data have since sparked a dramatic increase in economic research about the causes and consequences of corruption. Not wanting to disregard the efforts undertaken by other disciplines, corruption will here be analysed from an economic perspective.

Against this background, the present three essays on corruption must be seen as small but specific contributions. Although not comprehensive in terms of coverage, the essays encompass a broad range of theoretical and empirical methods applied in the economics of corruption. Furthermore, both the economic causes and consequences of endemic bribery are subject of the present thesis.

Preliminary to the essays, the following presents some general thoughts on the definition and the nature of corruption as well as its features that matter when adopting an economic perspective. So, bribery constitutes a voluntary exchange between issuing specific rights or providing privileged public services against paying a price - e.g. in terms of a kickback - entailing efficiency and distributional effects on the allocation of scarce resources. By way of contrast, political science would focus more on misconduct within the political process,
with a special emphasis on bribery entailing voting-scandals meanwhile legal scholars tend
to research the differences among monitoring systems and their effectiveness in combatting
corruption.

Meanwhile adopting such an economic perspective, section 1.1 of this introduction reviews
some definitions of the term corruption and section 1.2 discusses some typical economic
features inherent in these definitions. Finally, section 1.3 proposes some categories, based on
which corruption can be classified.

1.1 Defining Corruption

Although recognising corrupt conduct seems straightforward, there exists no consensus about
the definition of the term "corruption".\(^1\) In order to nevertheless provide a flavour of the
definition of corruption, this section reviews some popular examples. This should not be
seen as an attempt to reveal the best, or even more, the right definition - a definition merely
constitutes a tautological convention and can therefore not be right or wrong. The purpose
of circumscribing the term "corruption" lies rather in ensuring that hypothesis coming out of
economic theory can be tested in a transparent manner. Furthermore, from a theoretical and
empirical perspective, a clear ground in understanding the term corruption seems inevitable
because "how corruption is defined ends up determining what gets modeled and measured"
(Jain, 2001, p.73).

As regards common language, the meaning of the term corruption is threefold:\(^2\)

*Corruption* (from Latin corrumpere = to break up, destroy, annihilate, spoil, weaken):

(a) *Impairment, decay or decomposition of integrity, virtue, or moral principle*
*by inducement to the wrong, by improper or unlawful means especially of*
*people in authority: allegations of bribery and corruption.*

Example: I either want less corruption, or more chance to participate in it.

(b) *The act or effect of making somebody change from moral to immoral stan-
dards of behaviour.*

Example: Power tends to corrupt, and absolute power corrupts absolutely.
- Lord Acton (Historian, 1834-1902).
(c) The form of a word or phrase that has become changed from its original form in some way.

Example: The word "holiday" is a corruption of "holy day".

In its wider sense corruption relates, thus, to a conduct that undermines the rules being valid in society either as enacted, legal norms or informal customs and conventions. Therefore, whether or not a behaviour is considered to be corrupt depends crucially on the corresponding cultural context, which is itself subject to social change. E.g. local customs need taking into account to distinguish the presentation of a gift from offering a bribe to a public official (see e.g. Neild 2002, p.5). As regards social change, selling parliamentary seats for profit or lending parts of public funds for private benefit was not considered to be reprehensible in 18th century Britain (Wraith and Simkins, 1965, pp.63ff.). By today’s standards this would undoubtedly be considered as public misconduct.\(^3\) In its tighter sense, corruption refers to acts of bribery.\(^4\) Within this spirit, legal definitions typically take an extensional form by circumscribing corruption with a list of practices, which may be involved when extracting a bribe. E.g. the Council of Europe states in its Civil Law Convention on Corruption:

> For the purpose of this convention, "corruption" means requesting, offering, giving or accepting, directly or indirectly, a bribe or any other undue advantage or prospect thereof, which distorts the proper performance of any duty or behaviour required of the recipient of the bribe, the undue advantage or prospect thereof.

The advantage of such extensional, legal definition lies in their clarity. Conversely, at times the law enjoys little support or does not coincide with the prevailing norms, legalistic definitions are too restrictive insofar as they ignore the social and cultural dimensions of bribery.

In contrast, intentional definitions seek to point out a combination of typical aspects characterising corrupt exchanges, such as the violation of rules, the abuse of public power, the seeking of personal benefit, or the infringement of the public interest. Nye (quoted in Philp, 1997) provides an example of a definition with a more intentional character:

> Corruption is a behaviour which deviates from the formal duties of a public role because of private regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private regarding influence. This includes such behaviour as bribery (use of reward to pervert the judgement of a person in a position of trust); nepotism (bestowal of patronage by reason of ascriptive relationship rather than merit); and misappropriation (illegal appropriation of public resource for private-regarding uses) (p.440).
The following popular definition, among else used by the World Bank (e.g. Tanzi, 1998), states the major characteristics of corruption in a concise manner:

*Corruption is the abuse of public power for private benefit.*

Brevity renders this definition somewhat vague. It remains e.g. unclear why corruption must involve compulsively the public domain and whether or not abuses of discretion for private benefit, which do not impair prevailing laws, still constitute an act of corruption.

Indeed, corruption typically harms the public interest and normally involves a breaking of prevailing laws. A definition among else build around this idea can be found in Friedrich (1971):

*Corruption is a kind of behaviour which deviates from the norm actually prevalent or believed to prevail in a given context, such as the political. It is deviant behaviour associated with a particular motivation, namely that of private gain at public expense. But whether this was the motivation or not, it is the fact that private gain was secured at public expense that matters.* (p.127).

It would be meaningless to extend the list with more definitions which have been considered in the literature. Finding the right definition - in the sense of the for economics most purposive one - is a pointless task. Instead, the next section endeavours to establish some aspects inherent in bribery that matter from an economic perspective.

### 1.2 Economic Aspects of Corruption

From an economic perspective, persistent corruption requires rents and discretionary power to coexist, which provides the basis for an exchange between offering a bribe and obtaining privileges impairing prevailing laws (compare Jain, 2001, pp.77ff or Aidt, 2003, p.633). Therefore, aside from legal remedies, an economic strategy to combat corruption must aim at reducing economic rents and dispersing discretionary power.

Corrupt exchanges involve at least two parties, which may, however, consist of one or several individuals with parties termed "corruptant" or "bribe-payer", respectively "corruptee" or "bribe-taker". Typically, but not necessarily, the corruptee represents the public domain (politician, bureaucrat, police officer, political party etc.) with the corruptant belonging to the private domain (citizen, firm, association etc.). The corruptant pays a kickback merely as a compensation for the corruptee doing him a favour. Corruption shares, hence, some similarities with other market transactions, where "market structure" might crucially determine the "market outcome", e.g. whether or not a society suffers from endemic bribery. Moreover, this reciprocity stands crucial in contrasting corruption with other economic crimes like fraud.
or embezzlement. However, unlike other transactions, corruption is typically not embedded in an institutional framework and therefore lacks established and secure property rights. Hence, corrupt conduct occurs normally on the basis of personal trust within a face to face bargain. Then, the bribe-payer can hardly engage in arbitrage. Therefore, the bribe-taker typically possesses substantial bargaining power, which can be abused meanwhile seeking self-enrichment.

Adopting and implementing economic policies almost always benefits some parties meanwhile others will find themselves be made worse-off. Therefore, rent-shifting between different parties like consumers, producers, or government representatives constitutes an inevitable, albeit sometimes undesired, effect of any government intervention into the economy. When parties affected by an economic policy can clearly be identified, decision makers enacting, executing, or enforcing regulations might be tempted to abuse their discretion in order to secure "their" share of rent. In general, such competition aiming at creating, maintaining, and finally capturing rents is referred to as rent-seeking (Krueger 1974; Bhagwati 1982). Although rent-seeking is not illegal per se (e.g. when lobbying a public decision maker to obtain a favourable outcome), more often than not it involves practices like smuggling, buying and selling on black markets, or bribery. The exact difference between corruption and rent-seeking is therefore hard to establish as both include elements of unproductively extracting resources. Some authors indeed consider these concepts as interchangeable (e.g. Persson and Tabellini, 2003, p.959). As mentioned previously, acts of corruption typically include a government representative as bribe-taker, whereas rent-seeking does not further specify the agents involved. When at least one of the following conditions applies, Jain (2001) considers rent-seeking to likewise constitute an act of corruption:

(a) The process of adopting and implementing economic policies is not carried out according to the rules known to all agents in advance.

(b) There exist secret side payments to some agent.

(c) The decision-makers' benefits depend directly on the rents earned by his clients, which requires a close link between the manner economic policies are implemented and the income of decision makers.

Corruption requiring some form of government intervention tempts to conclude that deregulation provides the most effective way to combat public misconduct. However, countries undergoing economic transition, which lead to more freedom and economic deregulation, at least initially saw an increase in the level of bribery (see Abed and Davoodi, 2000). Furthermore, despite their extensive government intervention, Scandinavian countries figure among the least corrupted. Apparently, government intervention and corruption interact in a more
CHAPTER 1. INTRODUCTION

complex manner.

Power stands crucial in corrupt conduct as stated by the famous dictum of Lord Acton that "power tends to corrupt, and absolute power corrupts absolutely". The availability of discretion, in the sense of the relevant public official possessing the authority to adopt and execute policies on a case to case basis even against the will of the potential corrupter, provides the basis for any kind of opportunistic behaviour (compare Aidt, 2003, p.633 and Jain, 2001, pp.77ff.). Discretionary power puts authorities in a position to enact (legislative power), execute (executive power), or enforce (judicatory power) policies. Trivially, only politicians, bureaucrats, and judges possessing discretionary power can engage in public misconduct.

Corruption is commonly perceived as wrongdoing, with an agent taking advantage of his position by deviating from the original instructions of a principal. Indeed, "the person bribed must necessarily be acting as an agent for another individual or organisation since the purpose of the bribe is to induce him to place his interest ahead of the objectives of the organisation for which he works" (Rose-Ackerman, 1975, p.157). Such practices are costly, insofar as the policies a country has adopted necessitate rules, which are bypassed and in the long-term undermined by endemic corruption. Consequently, corruption constitutes an illegal act, which, if discovered, is subject to punishment. This allows applying an economic "crime and punishment" approach (Becker, 1968) where corrupt exchanges involve a tradeoff between obtaining kickbacks against the probability of being caught and convicted.

Corrupt exchanges are sometimes referred to as victimless crimes (see Ruggiero, 2000) in the sense that no individual is directly exposed to any kind of economic damage or harm. Conversely, an indirect damage on agents not included in the corrupt exchange might occur via inducing institutional decline, which jeopardises the validity of a set of prevailing rules.

Aside from its illegality, corruption is often seen as an act of immoral behaviour as personal gain has been put ahead of social benefit at the expense of the integrity of public rules. However, this judgement rests itself on the perceived integrity of the rules under consideration. A prisoner bribing his way out of a concentration camp provides a striking example for this (Rose-Ackerman, 1978).

1.3 Classifying Corruption

Various categories and classifications have been put forward in order to disentangle different forms of corruption. Table 1.1 contains an overview of the classifications featuring in the literature on corruption (see e.g. Tanzi, 1998, p.565; Shleifer and Vishny, 1993, pp.5, 6; Bliss and Di Tella, 1997, p.1003), most of which refer to the way corrupt exchanges are structured
and in what way the conduct of parties involved, or the effects of bribery differ.

### Table 1.1: Various Classifications of Corruption

<table>
<thead>
<tr>
<th><strong>Dimension</strong></th>
<th><strong>Examples</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure of Corruption</td>
<td>Centralised vs. Decentralised</td>
</tr>
<tr>
<td></td>
<td>Petty vs. Grand</td>
</tr>
<tr>
<td></td>
<td>Political vs. Bureaucratic</td>
</tr>
<tr>
<td></td>
<td>Private vs. Public</td>
</tr>
<tr>
<td>Conduct of Parties</td>
<td>Coercive vs. Collusive</td>
</tr>
<tr>
<td>Effects of Corruption</td>
<td>Cost-Reducing vs. Benefit-Enhancing</td>
</tr>
<tr>
<td></td>
<td>With Theft vs. Without Theft</td>
</tr>
<tr>
<td></td>
<td>Cost Reducing vs. Surplus Shifting</td>
</tr>
</tbody>
</table>

Sources: Tanzi, 1998, p.565; Shleifer and Vishny, 1993, pp.5,6; Bliss and Di Tella, 1997, p.1003

Some of the proposed classifications are debatable. In particular, distinguishing a case with theft and without theft (Shleifer and Vishny, 1993) seems hard to justify since corruption involves the shift of rents and, thus, always inflicts a cost burden upon some third party. E.g. even if corrupt customs officers do not steal imported commodities, the citizens of the corresponding country could forgo some tariff-revenue and hence be affected in their role as tax payer. Moreover, policies upon which a country has agreed will be undermined. Likewise, the concept of surplus shifting corruption (Bliss and Di Tella, 1997, p.1003) seems rather inaccurate, as surplus is rather shared in order to obtain rights and privileges in an illegal, albeit mutually beneficial, exchange.

Another way of distinguishing various types of corruption draws on the role of the economic parties involved.

Figure 1.1 depicts the relationship of decision-makers in a stylised country identifying three areas of corrupt exchanges.

(a) **Political Corruption**

The political elite enacts, executes, and enforces policies by excreting power, which must be based on some legitimation in order to establish and maintain authority. Democratic leaders are selected by an electoral process meanwhile totalitarian regimes typically refer to traditions (monarchy) or the charisma of their leader (dictatorship) in order to
legitimate power. Abusing state power, in the sense of ignoring the rules or traditions inherent in a society, can bring about enormous private benefits for the political elite. This kind of political corruption, which is typically grand in style, undermines the authority of the political elite and can ultimately induce the population to overthrow a government, be it through a revolution or democratic defeat at the polls.

(b) Bureaucratic Corruption

Any political system requires bureaus to collect information and to take low level decisions. Most bureaus are monopoly suppliers of their public service, which is provided on an agreed level against a budget. The fact that there is no direct link between the provision of a public service and the remuneration of the bureaucrat stands crucial within the context of corruption. Indeed, according to Niskanen (1974, pp.15ff.) typical features of bureaus are, firstly, that the owners and employees of bureaus do not appropriate any part of the net revenues as personal income and, secondly, that a major part of the recurring revenues of such organisations derives from other than the sale of output at per-unit prices. Corruption can emerge as soon as a service shares some
private good characteristics in the sense of exclusively affecting some clearly defined group of recipients. Then, cynical bureaucrats could be tempted to engage in corrupt exchanges by demanding undue compensation ahead of providing a service. Such kind of corruption is typically petty in style.

(c) *Nepotism*

Appointing bureaucrats is a delicate issue, as for the period they are in office they sometimes possess a substantial amount of discretionary power which can be abused for private benefit. This includes the entire discounted present value of the expected future legal and illegal revenue and privileges attached to a post. Not surprisingly, there have been cases where large amounts were paid in order to be appointed to a certain post. However, to maintain the quality and integrity of a bureaucracy necessitates, of course, appointments on grounds of ability and merit, rather than nepotism.

Finally, Rose-Ackerman (1999, pp.113ff.) suggest a classification according to the level and distribution of discretionary power between (private) bribe-payers and (public) bribe-takers:

Table 1.2: Classification according to Power

<table>
<thead>
<tr>
<th>Domain</th>
<th>Powerful Bribe-Payers within the Private Domain.</th>
<th>Multiple weak Bribe-Payers within the Private Domain.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption concentrated among Political Elite</td>
<td>Bilateral Monopoly</td>
<td>Kleptocracy</td>
</tr>
<tr>
<td>Decentralised Corruption in Bureaucracy.</td>
<td>Mafia dominated State</td>
<td>Competitive Bribery</td>
</tr>
</tbody>
</table>

Source: After Rose-Ackerman (1999, p.115)

A Kleptocracy emerges where a powerful elite controls the government without facing substantial constraints in the private domain. Then, the elite might be able to design a government structure, which suits them best in diverting large amounts of resources into their own pockets. When the elite faces an equally powerful opponent across the table, a bilateral monopoly emerges where the level of bribery and nepotism depends crucially on the distribution of bargaining power. Conversely, if the power is concentrated in the private sector, gangs, respectively mafias, could employ bribes in order to keep other criminal activities afloat without interference from state prosecution. Finally, with power being decentralised
in both the public and private domain, a situation of competitive bribery occurs.

The importance of classifying corruption according to some dimension should not be overestimated. Any classification constitutes by no means a theory in itself, but merely allows to identify specific types of bribery. Above all this section has stressed the versatility of corrupt practices by reemphasising the importance of the distribution of power and the concept of rent-seeking meanwhile analysing corruption from an economic perspective.
NOTES

Notes

1Hence, many studies into corruption start with a discussion about its definition. Examples include Rose-Ackerman (1999), Neild (2002), Jain (2001), and Tanzi (1998).

2See Merriam-Webster or Oxford Dictionary.

3Another example, where social change manifests in the meaning of the term corruption can be borrowed from Johnston and Hao (1995). They report that in the late 1970ies the meaning of the term official corruption in China was threefold: tanwu referring to public embezzlement and swindling, shouhui referring to bribery, and tequan referring to privilege seeking. However, by the early 1990ies the term corruption had broadened to include fubai (moral decay) and guandao (official speculation).

4See e.g. Doig (1984): "Corruption is bribery and bribery is corruption" (p.25).

5Bhagwati (1982) defines the somewhat broader concept of unproductive-profit-seeking (DUP) as activities that "yield pecuniary returns but do not produce goods or services that enter a utility function directly or indirectly via increased production or availability to the economy of goods that enter a utility function."

6This conjecture can be traced back to the Roman historian Publicus Cornelius Tacitus stating that: "The more corrupt a society, the more numerous the laws".

7E.g. as measured by the corruption perceptions index (CPI) compiled by Transparency International (www.transparency.org).

8Jain (2001) only considers corrupt conduct within democratic societies. Authoritarian forms of government are included here, since they tend to foster corruption (see e.g. Lederman et al., 2005).

9Zaire under Mobuto, the Philippines under Marcos, but also France under the Bourbons provide examples for this.

10Here the term "bureaus" is used instead of its euphemism "civil service".
Bibliography


Chapter 2

Literature Review on the Economics of Corruption

The present literature review on the economic aspects of corruption should not be seen as an attempt to comprehensively survey all contributions in the field, as this has recently been done elsewhere (Aidt, 2003; Jain, 2001; Tanzi, 1998; Bardhan, 1997). In order to prepare the ground for the essays of the following chapters, the aim lies, rather, in identifying the major lines of research by restricting the focus on some selected studies.

Two dimensions structure the present literature review: First, as in any field of economics, the research into corruption can be divided between empirical contributions, which are reviewed in section 2.1, and theoretical contributions, which are reviewed in sections 2.2 and 2.3. Meanwhile theory produces models to portray certain aspects of reality from a particular perspective, empirical approaches serve to test the models against the data. In the end, only a match between theoretically underpinned relationships and empirical predictions yields compelling explanations for corrupt patterns around the world. Thereby, neither theoretical nor empirical research into corruption employs new economic methods or techniques. Rather, studying corruption relies on applying existing economic thought and techniques to a new field.

Secondly, studies differ between those looking at the causes and those investigating the consequences of corruption. The complexity of the phenomenon corruption manifests in the fact that, even within economic science, numerous points of view - or theories - have been proposed in order to understand its causes and consequences. Therefore, both the empirical and theoretical sections of this literature review reflect this for the economics of corruption fundamental distinction between its causes and consequences.

All categorisations bear the risk of oversimplification meaning some research might not fit perfectly into the scheme or may address issues that fall into several sections. Therefore, some contributions will be referred to several times, however from a different perspective.
2.1 Empirical Studies

In order to provide the basis for the following more theoretical sections, this section surveys the empirical relationship between corruption and economic or social variables. Thereto, some indices quantifying the extent of corruption around the world need looking at first.

Due to its clandestine character, which provides parties involved with every incentive to disguise their misconduct, direct measures on the extent of corruption are notoriously unreliable. Ironically, a large number of reported cases could be a sign of rather clean institutions, insofar as endemic corruption does not completely undermine prosecution. Moreover, cultural differences and changes in social attitudes render a comparison between the extent of corruption across both countries and time difficult. Nevertheless, some indirect ways relying on survey based techniques have been proposed in order to gauge the relative extent of bribery and nepotism around the world. This has triggered a dramatic increase in the number of empirical studies into the economics of corruption during the last decade. However, due to the problems mentioned above, empirical data should be treated with some caution.

2.1.1 Measuring Corruption around the World

The lack of reliable data has long ruled out empirical studies into the economic nature of corruption (compare Ades and Di Tella, 1999, p.982). Indeed, Transparency International (TI) - the leading NGO in the combat against corruption - publishes its composite Corruption-Perceptions-Index (CPI) on a yearly basis only since 1995. Based on a survey of surveys, the CPI draws together the opinion of business people, country analysts, and local residents to measure the degree to which corruption is perceived to exist among politicians and bureaucrats. Surveys included regularly in the CPI are the:


(b) World Competitiveness Yearbook published by the Institute of Management Development, IMD, Lausanne (Surveyed Group: Executives in top and middle management).

(c) Country Risk Service and Country Forecast published by the Economists Intelligence Unit (Surveyed Group: Expert Staff).

(d) World Business Survey published by the World Bank (Surveyed Group: Senior Managers).

Figure 2.1 maps the CPI for the year 2005 with more intensive red colours designating countries with higher perceived levels of corruption.

The bulk of empirical studies draws on subjective perceptions rather than the objective extend of corrupt exchanges (e.g. in terms of the number of transactions or the amount of
Due to the nature of survey-based data, some caution needs to be exercised when applying. In particular, the CPI represents an ordinal ranking rather than cardinally measured differences in the extent of corruption between country-pairs. Clearly, a doubling of the CPI does not necessarily translate into a proportional change of corruption, but merely reflects the relative position of countries as regards the extent of bribery. Still, most subjective measures are closely correlated, which suggests some reliability of survey-based techniques in picking up bribery (compare Lederman et al., 2005). Since a small number of reported cases could be a sign of inefficient or corrupt institutions rather than ubiquitous honesty, employing objective data instead could likewise be misleading (Ades and Di Tella, 1997, p.985f.). Furthermore, the number of reported cases depends, among else, on the underlying legal definition of corruption.

Based on the well-known causes and consequences of corruption, Dreher et al. (2004) have extracted a corruption index as latent variable, which is embedded in a structural model calibrated for the years 1990-1997. The resulting structural corruption index (CSI) mitigates against ordinality insofar as it directly relates to cardinally measured causal and consequential variables, albeit no meaningful interpretation can be attached to the index score itself.
2.1.2 Empirical Patterns

Within an econometric model, corruption may serve either as dependent variable to investigate its underlying causes, or as independent variable to look at its consequential impact upon economic performance variables. Studies conducted thus far allow to sketch the following empirical patterns.

Empirical Causes of Corruption

(a) *Institutionalised accountability prevents corrupt conduct.*

In respect to the relationship between corruption and institutional quality, Lederman et. al. (2005) focus on political determinants. In general, they find that political institutions matter in the sense of shaping the environment - especially the incentive structure - in which relations between individuals and the government take place. In particular, corruption tends to be substantially lower the more widespread institutions fostering accountability in terms of democratic rule, parliamentary systems, political stability, and the freedom of press.

Decentralisation constitutes an institutional component exhibiting somewhat ambivalent effects onto corruption. On the one hand, Fisman and Gatti (2002) suggest a strong negative relationship between fiscal decentralisation and bribery. On the other hand, according to Treisman (2000) politically decentralised federations are perceived to be more corrupt.

Restricting the focus on democracies, Persson et al. (2003) highlight the effect electoral rules exhibit upon political corruption. Consistent with theory, voting on party lists as well as increasing the barriers to entry by having relatively small electoral districts, reduces the potential for voters to hold corrupt politicians accountable at the polls and therefore increases the empirically observed level of bribery. Due to offsetting effects, a switch from strictly proportional to a strictly majoritarian electoral system impacts only slightly negative upon the extent of corruption.

(b) *Cumbersome regulation tends to increase corruption.*

Across 85 countries, Djankov et al. (2002) compare the official number of procedures as well as the time and cost required to legally set up a business. They find that countries with more burdensome regulation of entry have higher levels of perceived corruption but no better quality in the provision of public goods. As regards opposing motives underlying the regulation of entry, results support the public choice perspective, where politicians and bureaucrats abuse their discretion to grab rents, rather than implementing rules in the public interest.
(c) **Efficiency wages provide a way to tackle bureaucratic corruption.**

Van Rijikeghem and Weder (1997) look at the effects of wages in bureaucracies. In the empirical part of their study, a negative relationship between government wages relative to manufacturing wages and corruption is found across developing countries, which supports the hypothesis of efficiency wage models. This kind of reasoning can however only be applied to bureaucratic bribery, where effort is compensated by earning a regular wage. Conversely, wage considerations do not appear to lie at the core of political corruption.

(d) **Competitive markets erode rents and undermine the basis for corrupt conduct.**

Likewise to political competition in elections, competition on product markets erodes rents, decentralises power and thereby undermines the pillars, upon which endemic corruption rests (see section 1.2). In particular, Ades and Di Tella (1999) find lower levels of corruption in countries more open to international trade. In a similar vain, OECD membership, which entails a strong commitment to market economy, relates negatively to bribery and nepotism (Treisman, 2000).

(d) **Countries with a high share of protestants suffer less from corruption.**

As regards religions affiliation, a high share of Protestants relates negatively to corruption (e.g. Treisman, 2002; La Porta et al., 1999). Compared with other belief systems, Protestantism arguably shapes a culture to challenge agents intrusted with power through its relatively non-hierarchical (or decentralised) structure. Furthermore, historically Protestants have developed a supportive attitude towards state institutions.

(e) **Common law heritage secures property rights and thereby reduces corruption.**

According to La Porta et al. (1999) countries with a French colonial heritage or French civil law systems tend to have relatively less secure property rights. Conversely, common law has evolved in England largely as a response against the attempts of the sovereign to expropriate property owners. Empirically, there is indeed some evidence on common law countries suffering less from corruption.

**Empirical Consequences of Corruption**

(f) **Corruption slows down economic growth by discouraging investment.**

Mauro (1995) provides the first empirical study into the relationship between corruption and growth. Using an estimation technique robust to a possible simultaneity between economic growth and corruption, suggests that economic growth is significantly and negatively related to corruption. Likewise, endemic bribery impacts negatively upon investment. Looking at cumulative effects, this translates into a negative relationship
between the extent of corruption and income. Therefore, corruption is particularly prevalent among relatively poor countries and decreases as a country becomes more affluent. The causality between these effects is however difficult to establish, with the question remaining whether countries are poor because they suffer from endemic corruption or they suffer from endemic corruption because they are poor.

As regards investment, Wei (1997) finds a negative relationship between corruption and foreign direct investment (FDI). Especially, in comparison to taxes corruption induces further uncertainty, which arguably entails additional damage on economic welfare.

(g) Corruption is closely correlated with the size of the unofficial economy.

Friedman et al. (2000) find that both excessive regulation and endemic corruption induce firms to move into the unofficial economy. Thereby, the impact from corruption is far stronger than related effects from high tax rates meaning, the detrimental effects of corruption surmount the effect of taxation by far.

2.2 Theoretical Causes of Corruption

Causal theories attempt to identify factors entailing differences in the extent of corruption around the world. Thus far, approaches within the spirit of industrial organisation, economics of crime, regulation, principal-agent problems, and self-enforcing effects have been considered to give a framework, within which bribery may be analysed.

2.2.1 Industrial Organisation of Corruption

This theoretical approach rests on the idea of corruption being an exchange with government representatives obtaining bribes in compensation for issuing undue rights and privileges. Compared with ordinary market transactions, where property rights over goods and services are exchanged, bribery infringes prevailing rules. Still, the way corrupt exchanges are structured stands crucial in order to determine the equilibrium level of bribes. Due to the similarities with the behaviour of firms in industries, this line of research has been termed the ”industrial organisation of corruption” (Shleifer and Vishny, 1993 or Ades and Di Tella, 1999).

Similar to industrial organisation, this literature emphasises the effects competition among bureaucrats, politicians, or firms exhibits on equilibrium prices, respectively bribes. Competition tends to decentralise power and erode rents. Since bribery requires discretionary power and economic rents to coexist, the idea of competition being able to kill corruption has already been pointed out in early studies (Rose-Ackerman, 1978, p.12).
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A more rigorous treatment of this can be found in Bliss and Di Tella (1997), who consider a model with a bureaucrat exerting monopoly power by issuing licences, which permit firms to operate legally. The number of firms is determined endogenously by a zero-profit-condition. Furthermore, firms are differentiated in respect to their cost structure giving raise to economic rents, with bureaucrats unable to observe this heterogeneity. Then, monopolistic bureaucrats face a tradeoff between increasing bribes-rates and the risk of corrupting firms into bankruptcy due to the associated increase in fixed cost. Briefly, meanwhile imposing bribes, bureaucrats reduce the number of firms and thereby contract the size of their bribe-base.

Formally, this can be represented as follows: A cumulative distribution function (CDF) over the profit-bribe margin determines the endogenous number of firms, \( n = \Phi(\pi - b) \), which can operate profitably on the market. Thereby, \( b \) represents the bribe-rate and \( \pi \) denotes profits. The CDF exhibits the usual properties (\( \Phi(0) = 0, \Phi(\infty) = 1 \)). Monopolistic bureaucrats maximise

\[
    r = b\Phi(\pi - b)
\]

giving rise to the first order condition,

\[
    \frac{\partial r}{\partial b} = \Phi(\pi - b) - b\Phi'(\pi - b) = 0
\]

and optimality condition:

\[
    b = \frac{\Phi(\pi - b)}{\Phi'(\pi - b)} = \frac{\Phi(\pi - b)}{\phi(\pi - b)}
\]

Here, \( \phi \) denotes the probability density function (PDF) over the profit-bribe margin and, provided second order conditions are met, monopolistic bureaucrats set bribes (\( b \)) such that a marginal increase equals the probability to induce the marginal firm to exit the market (\( \Phi(\pi - b)/\phi(\pi - b) \)).

The degree of competition can be altered e.g. by exogenously lowering profits across firms, making cost more similar, or changing the overhead cost. To see this, introduce an exogenously imposed competition parameter, \( \alpha \), affecting profits (\( \pi(\alpha) \)) with \( \pi_\alpha < 0 \). Substituting \( (\pi(\alpha)) \) into (2.2) and applying the implicit function theorem yields:

\[
    b_\alpha = \frac{\Phi(\pi(\alpha) - b)\pi_\alpha}{-\Phi(\pi(\alpha) - b) - \phi(\pi(\alpha) - b) + b\phi_b(\pi(\alpha) - b)} \leq 0
\]

This expression can be positive or negative since the numerator is always negative but the denominator can be positive or negative (compare Ades and Di Tella, 1997, pp.1013ff.). The logic behind this ambiguity lies in competition decreasing rents available for diversion into
bureaucrats pockets but also shifting the marginal firm into a region, where it is less likely that increased bribes push firms out of business.

A similar result features in Ades and Di Tella (1999) with bureaucrats now inspecting firms’ profits for taxation purposes. Then again, the relationship between competition and corruption is ambiguous, as less fierce competition creates more rents, which conversely makes it more valuable for the public to strictly control bureaucrats. Yet, empirically a negative relationship between competition and corruption prevails (see section 2.1).

Shleifer and Vishny (1993) turn to the competitive conditions among bureaucrats. They highlight the fact that entry may require firms to obtain several, complementary licences, which introduces strategic considerations among bribees. Within this context, a government-structure with several, uncoordinated, or decentralised authorities could induce more bribery than one with a coordinating central authority. This result is a consequence of vertical externalities involved in the former, which feature prominently in industrial organisation under the term “double marginalisation”.

To illustrate, revisit the previously discussed licensing model consisting now of two bureaucrats jointly imposing bribe-rates \( b \), respectively \( B \), meanwhile inspecting firms. Then, the endogenous number of firms, which profitably operate on the market, conditions on two bribe-rates, meaning \( n(b + B) \) with \( n_b(b + B) < 0 \) and \( n_B(b + B) < 0 \). Each bureaucrat maximises his individual bribe-revenue \( r = bn(b + B) \), respectively \( R = Bn(b + B) \), with optimality condition:

\[
\begin{align*}
  n(b + B) + bn_b(b + B) & = 0 \quad (2.5) \\
  n(b + B) + Bn_B(b + B) & = 0 
\end{align*}
\]

Provided both bureaucrats hold Nash-conjectures, these conditions jointly determine the equilibrium bribe-rates \( b^* \) and \( B^* \). By cooperatively reducing \( B^* \), bureaucrats can achieve a Pareto improvement. To see this, denote the equilibrium revenue of the second bureaucrat by

\[
R(b^*, B^*) = B^*n(b^* + B^*) \quad (2.7)
\]

to find that:

\[
R_B = db^*(db^* + dB^*) + b^*n'(db^* + dB^*) \quad (2.8)
\]

Due to the envelope theorem \( db^* = 0 \) and (2.8) reduces to:

\[
R_B = b^*n'dB^* > 0 \quad \text{with} \quad dB^* < 0 \quad (2.9)
\]
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Not taking into account the effects inflicted upon the other bureaucrat gives rise to vertical externalities and in turn inefficiently high bribe-rates. Intuitively, this result states that bribing several bureaucrats could be more costly and distorting than simply bribing one central, although more powerful authority.\textsuperscript{15}

\subsection*{2.2.2 Corruption as a Crime}

Corrupt exchanges frequently result in decisions against the public interest and undermine the credibility of government. Therefore, bribery is almost always illegal under the law and punished if discovered. In essence, a tradeoff familiar from economics on crime and punishment\textsuperscript{16} emerges, which relates benefits, in terms of bribes, with cost, in terms of the probability of apprehension as well as the severity of the verdict. The following participation constraint facing the bribe-taker represents this tradeoff in a concise manner:

\begin{equation}
(1 - q)u(b + w) + qu(w_o - s(b)) < u(w)
\end{equation}

with:

- $b$: Bribe-rate.
- $w$: Wage of a bureaucrat.
- $w_o$: Wage in the private sector (outside option).
- $u()$: Utility as a function of legal ($w$) and illegal ($b$) income.
- $q$: Probability of apprehension.
- $s(b)$: Sentence as a function of bribe-rates.

Hence, a bureaucrat is only willing to abstain from corrupt conduct when the utility she gets from receiving her wage for sure outweighs the expected utility of engaging in bribery. Therefore, monitoring, $q$, and penalising, $s(b)$, provide ways to deter corrupt conduct.

Devoting more resources in order to increase the probability of apprehension does not necessarily bring about lower levels of bribery. Rose-Ackerman (1975) demonstrates how designing the monitoring and penalty system stands crucial in effectively combatting corrupt exchanges. To illustrate this, consider a simplified participation constraint with a linear utility function and bureaucratic wages normalised to zero, that is $u(b + w) = b$. Making the bureaucrat indifferent about accepting or refusing to engage in bribery, implicitly imposes an upper bound on acceptable bribe-rates for the bribe-taker:

\begin{equation}
(1 - q)b + q(w_o - s(b)) = 0 \equiv F(q, b)
\end{equation}

The impact of increasing resources to deter corruption can be established by deriving (2.11) with respect to the probability of apprehension ($q$). Applying the implicit function theorem yields:
\[
\frac{\partial b}{\partial q} = \frac{F_q}{F_b} = -\frac{w_o - b - s(b)}{1 - q - qs'(p)} = 0 \tag{2.12}
\]

Under a linear utility function, the officials’ preferences exhibit risk neutrality implying that in an extremum expected bribes \((b)\) equal the expected penalty \((s(b))\) relative to the outside option \((w_o)\).

The second order condition is given by:

\[
\frac{\partial^2 b}{\partial q^2} = (F_q)[1 - q - qs'(b)] + [w_o - b - s(b)](F_{qq} + F_{bb}) \left[ -1 + q + qs'(b) \right]^2 < 0 \tag{2.13}
\]

If \((1 - q - qs'(b)) < 0\) and hence \(\partial^2 b/\partial q^2 < 0\) (assuming \(F_{qb} > 0\)) acceptable bribe-rates reach a maximum when \(w_o - s(b) = b\). In this case, acceptable bribes are constrained by the penalty system and can, in principle, be pushed towards zero by designing an efficient enforcement system. Conversely, when \((1 - q - qs'(b)) > 0\) and hence \(\partial^2 b/\partial q^2 > 0\) (assuming \(F_{qb} > 0\)) maximal feasible bribe-rates reach a minimum when \(w_o - s(b) = b\). Ill-designing the penalty system could then induce bribe-takers to impose very high (theoretically even infinite) bribes-rates. The latter is clearly not feasible as the resources of an economy are finite. "Instead we should understand this case simply as one in which the legal sanctions themselves do not determine the solution" (Rose-Ackerman, 1975, p.194).

Kugler et. al. (2003) consider interactions among "mafias" engaging simultaneously in crime and corruption. In particular, "mafias" compete on the crime market over booties whereas, if caught, on the corruption market they can bribe their way out of punishment. Criminal activities are as usual deterred by paying high compensations to law enforcers (efficiency wages), severe punishments, and a high probability of being caught (monitoring). However, Kugler et al. (2003) emphasise the complementarity character between criminal and corrupt activities implying, under low bribing cost, policing to be ineffective as criminal organisations might react cynically via paying higher kickbacks.

### 2.2.3 Regulatory and Principal-Agent Approaches

The predominant normative rationale for economic policies lies in the desire to correct market failure, especially as regards public goods provision and dealing with externalities. However, any government intervention creates net-losers alongside net-beneficiaries meaning regulation tends to shift rents among often clearly defined parties. These may include government representatives like political parties or the bureaucracy themselves. Consequently, some kind of power needs to be exercised, in order to ensure that net-losers will comply with the adopted policies regardless. Therefore, meanwhile enacting, executing, and enforcing rules any government acts in a position of principal, who must hire agents, e.g. a bureaucracy, in order to implement adopted rules. By virtue of their superior information, the conduct of bureaus
cannot be monitored in a perfect manner. Government intervention requiring a bureaucracy with sometimes substantial discretionary power over allocating rents, creates, then, inevitably incentives for abusing delegated public power for private benefit. Thus, correcting market failure entails almost always government failure to some degree (Acemoglu and Verdier, 2000). Thereby, the following focuses on the process how a regulation is adopted and implemented, rather than discussing its welfare consequences.

Distinguishing a scenario with a benevolent principal, which always acts in the public interest, from a malevolent principal, which only cares about his private benefit, stands crucial within a principle-agent context. More colorfully, Frye and Shleifer (1996) label a scenario where authorities act in the public interest by restricting themselves to provide public goods, with the invisible hand, whereas the helping hand refers to a scenario where only some parties, respectively industries, manage to receive government support. In the for the public welfare worst case of the grabbing hand, the rationale for government intervention into the economy lies exclusively in benefitting politicians and bureaucrats themselves.

**Benevolent Principal**

Suppose a benevolent (respectively invisible hand) political elite is confronted with a principal-agent problem insofar as facing a cynical bureaucracy deviating from the Weberian ideal. Acemoglu and Verdier (2000, p.194) state the underlying assumptions in a concise manner:

(a) Government intervention requires the use of agents (“bureaucrats” [...] ) to collect information, make decisions, and implement policies.

(b) These bureaucrats are self-interested and by virtue of their superior information, hard to monitor perfectly.

This setting implies that government intervention, even if desired in terms of bringing about (potential) welfare improvement, creates incentives for cynical bureaucrats to behave opportunistically and engage in corruption. The consequences of such behaviour are a possible misallocation of resources, with e.g. an oversized public sector.

Within this context, Acemoglu and Verdier (1998) consider governments enforcing otherwise incomplete contracts in order to protect the property rights of investors. Upholding property rights benefits property owners, which can lead bureaucrats into the temptation to extract bribes in order to obtain a part of the resulting economic rent. Corruption can be prevented by paying efficiency wages, which in turn imposes an additional cost upon society and entails a misallocation of resources in the sense of the public sector attracting too much skilled labour. Therefore, a corruption-free economy might be neither desirable nor achievable and heterogenous countries, in terms of preferences or wealth, could, thus, opt for
different levels of corruption.

Aside from employing the legal system (penalties, monitoring), a benevolent political elite confronted with a cynical bureaucracy could engage in designing optimal contracts, e.g. by paying efficiency wages. Participation constraints on whether or not to accept kickbacks imply that higher wages increase the opportunity cost for dismissal and thereby act as deterrent for misconduct. Referring back to (2.11) and disregarding the penalty system \((s(b) = 0)\), such efficiency wages equal:

\[
    w^e = w_0 + \frac{1 - q}{q} b
\]

Hence, the wage deterring misconduct relates to the outside wage \((w_0)\) and a markup on the equilibrium bribe-rate \((b)\) as a function of the effectiveness of the monitoring system \((q)\).

Other studies employing an efficiency wage setting include optimal compensation policies for corruptible tax inspectors (Besley and McLaren, 1993) and inspectors monitoring pollution from factories (Mookherjee and Png, 1995).

**Non-Benevolent Principal**

On top of facing a cynical bureaucracy, the political elite could itself be subject to Leviathan behaviour. The irony that even monitoring can in principle be corrupted gives rise to the famous rhetorical question of "who shall guard the guardians?". In particular, the political elite could take advantage of its position to design institutions facilitating self-enrichment and rent-seeking. This may result in highly dysfunctional institutions. Section 2.2.1 about the industrial organisation of corruption, contains an example of such ill-designed institutions where decision-makers employ an otherwise useless licensing-scheme, in order to maximise their bribe-income (Bliss and Di Tella, 1997; Shleifer and Vishny, 1993).

Ades and Di Tella (1997) present a model, where private cost-reducing research exhibits a positive externality onto a socially desirable stock of knowledge. Then, aligning private with public objectives necessitates paying ex-ante subsidies towards firms creating technological externalities. However, benefits arising from such successful industrial policy could simply be distorted away by a corresponding increase in corruption. In particular, government officials could introduce ex-post regulations to confiscate rents that resulted from previous investment in cost-reducing activities giving rise to a hold-up problem between the private and the public sector within the spirit of Williamson (1975).

Within the non-benevolent scenario, the conduct of the bureaucracy does not become irrelevant. Given the Leviathan behaviour of the political elite, a corrupt bureaucracy could
even enhance welfare by providing ways to bypass misguided rules, in the sense of:

[...] The only thing worse than a society with a rigid, over-centralised, dishonest bureaucracy is one with a rigid, over-centralised, honest bureaucracy. (Huntington S.P. quoted in Bardhan, 1997, p.1322).

Leff (1964) suggests that graft may constitute an efficient response towards government failure since:

(a) Corruption could speed up the bureaucratic process and reduce red tape.

(b) Corruption introduces some competition over government funds, which may lead to a more efficient usage of scarce resources.

A more rigorous analysis can be found in Lui (1985), who draws up a queuing model, where speed-money allows payers to be fast-tracked as well as Beck and Maher (1986), who model corruption in terms of an auction over licences. In both, the queuing and the auction model, bribery can serve as a revelation mechanism that allows to allocate rights to those valuing them most.

The context of these models is however not without criticism (compare Aidt, 2003, p.634):

(a) Second Best:
"Efficient" corruption is necessarily second best, with the first best solution being to remove the distortion as stated by Mookherjee and Png (1995, p.146): "It is easy to wipe out corruption - the regulator needs only to abandon enforcement."

(b) Transaction Cost:
As a consequence of its clandestine character, resources will always be wasted to disguise corrupt exchanges.

(c) Loss of Credibility:
Adopting a dynamic perspective, bribery might undermine the credibility of decision makers in the long-term. Consequently, rules enhancing public welfare cannot be implemented as, ex-ante, they are expected to be corrupted down.

2.2.4 Self-Enforcing Corruption

For self-enforcing effects to occur, the benefits of corrupt conduct must relate to the proportion of society involved in misconduct. In particular, the benefits and cost accruing form bribery depend crucially on how endemic corruption is (compare Aidt, 2003, p.647). For instance:
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(a) Benefits:
Rent-seeking could be more profitable than engaging in productive activities the more widespread the former (Acemoglu, 1995).

(b) Cost:
In societies where corruption is more endemic, it might be easier to bribe oneself out of punishment. Furthermore, the moral cost attached to accepting kickbacks might be lower, when bribery is more ubiquitous.

Within a dynamic setting, history may determine the extent of corruption to a substantial degree. Such history dependence implies that societies starting-off under comparable conditions can end up with quite different levels of corruption. Technically speaking, a setting with multiple equilibria emerges.

To see this, revisit the participation constraint (2.11), which involves a tradeoff between accepting a bribe and the probability of apprehension as well as the severity of punishment. However, should a bureaucrat be arrested, he can now escape conviction by passing a bribe should the judge in charge of his case likewise be willing to engage in misconduct. For simplicity, dishonesty is assumed to be equally widespread among agents and judges as summarised by the proportion $\gamma$. Finally, bureaucrats accepting bribes suffer from a moral cost ($c(\gamma)$), which declines the more endemic corruption is ($\partial c/\partial \gamma < 0$). Then, the participation constraint (2.11) to engage in bribery becomes

$$(1 - q)(b + w) + q(w_o - (1 - \gamma)(s(b)) - c(\gamma)) = w$$

(2.15)

As pointed out by Andevig (1991), a condition like (2.15) exhibits frequency dependent equilibria. In particular, figure 2.2 depicts the mapping between the revenue and the proportion, $\gamma$, of corrupt bureaucrats under honest (H) and a dishonest (D) behaviour.

There are three equilibria A, B, and C with only the former two being stable. In particular, a society with a fairly honest ($\gamma < \gamma_C$) corps of bureaucrats will enjoy a low level of corruption whereas a society starting-off with only slightly more widespread cynical behaviour ($\gamma > \gamma_C$), will end up in a corrupt slump.

In a more versatile model, Tirole (1996) attributes the persistence of corruption in a society to group reputation. Bureaucrats reputation depends on their past behaviour but, due to incomplete information, also on the past behaviour of the entire bureaucratic corps. Therefore, incentives facing new bureaucrats depend crucially on the merits and sins committed by their elders. In other words, individual and collective reputation might interact, with society possibly being trapped within a hysteresis of corruption, where misconduct itself provides the main driving force producing more misconduct.
2.3 Theoretical Consequences of Corruption

Studies into the consequences are concerned with the theoretical knock-on effects of corrupt exchanges onto the economy. The literature has looked at the consequences foremost in terms of the detrimental impact bribery exhibits upon economic growth and investment as well as distortionary effects akin to taxation.

2.3.1 Growth and Investment

In a model with endogenous growth, Ehrlich and Lui (1999) consider an economy where agents can either invest in the accumulation of growth enhancing human capital or socially unproductive political capital. Agents consumption depends not only on their income but also on their political capital enabling to divert resources into their own pockets. Consequently, any increase in the size of government, reflected by the accumulation of political capital, typically lowers economic growth as less investment occurs in production enhancing human capital. The weakness of this model lies in the limited scope for government activities, with any productive rationale of the public domain, e.g. by providing public goods or correcting market failure, being assumed away. However, the model correctly predicts decreasing corruption with increasing income per capita.
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Focusing on the relationship between rent-seeking bureaucracies and their political authority, Sarte (1997) takes into account that the government might provide public goods to enhance private production. Nevertheless, corrupt activities can be pursued, since the bureaucracy maximises its discretionary budget, rather than providing public goods at an efficient level. Such misconduct can be combatted by strengthening monitoring. Again, less developed economies might end up in a vicious cycle where high cost to monitor an unproductive bureaucracy prevent economic growth.

Aside from allowing for productive government investment in infrastructure, Ventelou (2002) introduces dynamic aspects into a growth model, where politicians can engage in corruption at the expense of harming their reputation. Politicians in power decide between "taking the money and run" or investing in their reputation. This approach suggests that institutions play a major role in combatting corruption.

2.3.2 Corruption as a Tax

As long as government representatives are involved, corruption like taxation transfers rents towards the public sector. Hence, some studies have addressed the distortionary impact of corruption onto the private sector within the spirit of taxation theory. Although compulsory, taxes are collected respecting the rules and customs for the sake of securing public expenditure. Conversely, corrupt activities by definition involve the breaking of the rules in order to seek self-enrichment. Unlike taxation, corruption could indeed be seen as theft by government representatives. Noteworthy, in authoritarian regimes, the distinction between bribes and taxes collapses as by definition the sovereign constitutes the government implying "the treasury becomes indistinguishable from the sovereigns pocket" (Shleifer and Vishny, 1993, p.605). However, in terms of welfare, corruption seems to be more distortionary than taxes due to its lack of transparency and arbitrariness induced uncertainty. Apart from transaction cost considerations, the demand for secrecy could shift resources away from highly productive investments towards unproductive projects ending up as white-elephants. Wei (1997) tests this hypothesis finding that the second moment of a corruption index (uncertainty) to impact negatively upon the flow of foreign direct investment.
Notes

\(^{11}\)See www.transparency.org.

\(^{12}\)Objective data on the reported number of cases involving corruption can be found e.g. in the United Nations Survey on Crime Trends and the Operation of Criminal Justice Systems (see www.uncjin.org). Contrary to economic priors (Abed and Davoodi, 2000), the number of reported cases on bribery typically falls in economies in transition. Rather than being a genuine decline in corruption, this could equally reflect a decline in institutional quality and monitoring.

\(^{13}\)Under the Chicago School of industrial organisation, such a licensing scheme could be interpreted as bureaucrats imposing sunk cost on firms and thereby preventing markets from being perfectly contestable. Hence, regulation of entry (licensing) lies at the very heart of imperfect competition, creating rents that can be diverted into bureaucrats pockets.

\(^{14}\)See also Aïdt (2003), who assumes that, instead of bribe-rates, bureaucrats set the number of licenses as strategic variable.

\(^{15}\)A corresponding reasoning applies to a small but coordinated cut in \(b\).

\(^{16}\)See Posner (1986) for an overview of crime and economics.

\(^{17}\)The Weberian ideal type of bureaucracy is characterised by qualities like precision, control, responsibility, regularity, and certainty (see Gerth and Mills, 1991).
Bibliography


Part II

Essays
Chapter 3

FIRST ESSAY
Federalism, Competition, and Corruption

The first essay investigates the theoretical relationship between federal structures of government and corruption.

From an economic perspective, corruption means that agents entrusted with a public position abuse their discretionary power to secure rents in a reciprocal exchange with issuing unlawful privileges towards the bribe-payer. Such government failure involves, furthermore, a bribe-taker acting as an agent on behalf of a principal, with corruption implying opportunistic misconduct to the extent that self-interests has been placed ahead of common-interest. The theoretical literature on corruption can broadly be categorised according to the objectives of the principal: A benevolent principle (government or social planner) necessitating a self-interested agent, e.g. a corrupt bureaucracy, in order to implement adopted policies provides the theoretical framework to carry out normative analysis. Proposed measures to align the interests of the principle and the agent include paying efficiency wages (Besley and McLaren, 1993; Mookherjee and Png, 1995; Ades and Di Tella, 2000) or using legal remedies (Rose-Ackerman, 1975). Conversely, the premise that all trustees of power - including the principle - are corruptible underlies the positive approach to analyse bribery, which allows comparing the capability of various predetermined institutional arrangements to combat corruption (e.g. Shleifer and Vishny, 1993). Thereby, electoral monitoring (Ferejohn, 1986), the separation of powers (Persson et al., 1997), as well as fiscal decentralisation (Arikan, 2004; Hendriks and Lockwood, 2005) have been identified as possible institutions constraining corrupt abuses.

Within the institutional context, the theoretical implications of federalism have been neglected. Opposed to central governance, decentralising political power according to the federal principle entails horizontal and vertical interdependencies across jurisdictions and tiers, which
give rise to "externalities". Since graft is exchanged in a clandestine manner and therefore lacks the protection of well defined and enforceable property rights, the extent of corruption in one jurisdiction could affect other jurisdictions and tiers, without compensation occurring through a transfer system like the market. Within a corrupt federation, horizontal externalities rest on the size of the economy exceeding the size of jurisdictions, which entails spillovers, e.g. when differences in the extent of bribery entail a relocation of (footloose) economic activities. As regards vertical externalities, federalism implies ex-definitione that the economy is regulated upon by at least two distinct governments, which makes duplications of government activities, including bribe-taking, unavoidable in practice. Thus, competition among government representatives seeking self-enrichment gives rise to interdependence insofar as extracting bribes in one jurisdiction affects - positively or negatively - the rents at disposition of the federal tier or rival jurisdictions.

Previous papers have addressed some aspects inherent in the mapping of federalism onto corruption. Especially, in an early study, Rose-Ackerman (1978, ch.6) provides a rationale for horizontal competition among government representatives to reduce corruption when citizens shift economic activities away from jurisdictions affected by endemic bribery. In essence, decentralising bureaucratic power undermines the basis for bureaucratic misconduct. \textsuperscript{19} Shleifer and Vishny (1993) show that several authorities with overlapping responsibilities - like the federal and state tiers - regulating the same economy in an uncoordinated manner entail a potential for corrupt overgrasing. \textsuperscript{20} Furthermore, Bliss and Di Tella (1997) as well as Ades and Di Tella (1997, 1999) investigate the impact of competition on private markets onto the extent of corruption finding an ambiguous theoretical relationship, albeit empirically fiercer competition seems to erode rents and hence reduce corruption. Meanwhile assessing the capability of federalism to constrain government misconduct, the focus shifts towards competition and the corresponding externalities within the public rather than the private domain. However, Acemoglu and Verdier (2000) consider possible interdependencies between government failure and market failure. In particular, any government intervention aimed at correcting market failure creates rents, which are asymmetrically distributed across parties and therefore might induce politicians or bureaucrats to behave cynically in terms of capturing their share of rent via extracting bribes. Constraining such government failure, e.g. via strengthening monitoring or designing incentive schemes, is costly, implying that there is a tradeoff between correcting market failure and reducing government failure in terms of corruption.

Bribery resembles taxation to the extent that the public sector levies a cost-burden upon firms, which entails similar incidences and distortionary effects. Consequently, the present analysis bears some similarities with the literature on tax competition in federations (Keen and Kotsogiannis, 2002, 2003, 2004). Yet, bribing constitutes a pure transfer lacking the potential of taxation to enhance welfare via the provision of public goods. Moreover, bribery typically impairs prevailing rules and participation in such illegal conduct occurs voluntarily.
Hence, opposed to compulsory taxation, individual rationality requires corrupt exchanges to remain mutually beneficial in order to satisfy certain participation constraints, which shape the attitude of government representatives towards self-interest and social-interest. Meanwhile, the antagonism between the benevolent social planner (Keen and Kotsogiannis, 2004) and the malevolent Leviathan (Keen and Kotsogiannis, 2003), familiar from the analysis of federal tax competition, can be overcome when considering corrupt exchanges with underlying participation constraints instead.

The contributions of the present essay lie in drawing together the institutional features and establish the theoretical mapping between federalism and corruption. Opposed to the investigation of Shleifer and Vishny (1993) into corrupt overgrazing and Arikan (2004) into fiscal decentralisation and corruption, the analysis of corrupt federations must include both vertical and horizontal dimensions of government. Furthermore, similar approaches in the literature on tax competition (Keen and Kotsogiannis, 2002, 2003, 2004) are improved upon by considering the different welfare implications of corruption and, more importantly, taking into account the voluntary character of bribe exchanges. Like this, the present approach deviates from previous work by endogenising the structure in terms of the number of firms the private sector can support and the number of government representatives willing to engage in acts of bribery. Participation in corruption relates explicitly to the constraints and incentives of extracting, respectively paying, a bribe. To my knowledge participation constraints have not yet been considered in analysing taxation or corruption in federations.

I find federalism to impact upon corruption in a complex manner:

- Firstly, endemic bribery can be combatted not only by horizontal competition among firms, which reduces rents there to be grabbed by officials, but also among jurisdictions, which decentralises public power and thereby undermines a pillar upon which corruption - defined as an abuse of public power for private benefit - rests.

- Secondly, in federations vertical competition across tiers entails a potential for corrupt overgrazing, which mitigates against the benefits of interjurisdictional competition.

- Thirdly, federalism may prevent corrupt overgrazing when clear spheres of responsibility - e.g. a consensus about the distribution of power - provide one tier with a first-mover advantage.

- Finally, bribery involves a voluntary, albeit illegal, transfer and participation is subject to a tradeoff between the perceived probability of apprehension and the benefits from obtaining a kickback. Higher bribe-rates therefore tempt more officials into corruption but entail an economic cost in terms of a reduced number of firms the market can sup-
port. When conditions for participating in bribery differ substantially across jurisdictions, federalism allows that states with effective monitoring and governed by motivated politicians, respectively bureaucrats, remain free of corruption. Conversely, centralising power in order to combat bribery more effectively (Shleifer and Vishny, 1993) is only successful when incentives and monitoring prevent opportunistic behaviour on the central tier.

The remainder is organised as follows: Section 3.1 lays out the structure and timing of the model followed by section 3.2, which details the participation decision officials and firms take as well as section 3.3 describing the behaviour of corrupt Leviathans. Sections 3.4 and 3.5 constitute the core of the essay presenting the mapping of unitarian respectively federal governance onto equilibrium bribe-rates and rents. Finally, the last sections contain some comparative considerations and concluding remarks.

3.1 Structure and Timing

The economy is regulated by one supreme or federal unit - the variables pertaining to this denoted by capital letters - divided into identical lower-tiered jurisdictions or states indexed by superscripts \( s = 1 \ldots M \), each of which contains up to \( n^s \) firms indexed by superscripts \( i = 1 \ldots n^s \). The total number of firms in the federation equals \( N \equiv \sum_s n^s \).

In order to operate, profit maximising firms require permits issued by government representatives called, for convenience, officials.22 In essence, on both tiers the task of officials consists of regulating entry to a market, which encompasses the entire federation. However, the only purpose of the corresponding government licensing scheme lies in erecting a barrier to entry restricting the number of firms and in turn competition on the market.23 This allows to disregard the provision of public goods or the correction of market failure as motives underlying government intervention, which would be hard to justify meanwhile analysing the relationship between corruption and federalism. Then again, state and federal officials do not derive utility directly from issuing permits, but rather indirectly via the corresponding legally obtained wages (\( w \) respectively \( W \)) and illegally extracted bribes (\( b \) respectively \( B \)). Thus, the utility attached to working in the public sector amounts to \( u^s(b^s, w^s) \) for the official controlling state \( s \) respectively \( U(B, W) \) for the official controlling the federal tier.

Engaging in corrupt conduct impairs prevailing laws and brings about a probability \( q^s \in [0, 1] \) for state and \( Q \in [0, 1] \) for federal officials to be caught and convicted. This propensity of apprehension reflects the concept of separation of power, supposing some independent monitoring system like the judiciary or the mass media to exist, which may put corrupt conduct on trial or denounce misconduct through provoking scandals. Disregarding
the concept of benevolence gives, of course, rise to the rhetoric question: Quis custodiet ipso custodes? ("Who shall guard the guardians?"). Presuming the probability of apprehension to be exogenous provides a way out of this irony in recognition that monitoring relies on there being at least one honest agent.\textsuperscript{24} Still, officials face heterogenous propensities of apprehension, which can be attributed to some posts being more prone to bribery as well as some individuals being more talented in disguising dishonesty.\textsuperscript{25}

Idiosyncratic fixed cost ($f_{si}$) impact upon the earning potential of firm $i$ located in state $s$ with type-specific profits being denoted by $\pi_{si}(f_{si})$. Corruption forces firms to share their profits by bribing state and federal Leviathans at a rate of $b$, respectively $B$, in exchange for obtaining a permissions to operate. Thereby, $\beta^s$ denotes consolidated bribe-rates ($b^s + B^s$) within each state $s$. Likewise, fiscal decentralisation manifests in both states ($t^s$) and the federal unit ($T$) levying taxes autonomously with a consolidated rate of $\tau^s$. Tax revenue shall be earmarked for financing public sector wages $w$, respectively $W$. Taking into account that states tax $n^s$ and the federation all $N$ firms gives rise to the budget constraint on both tiers of government:

$$\begin{align*}
\text{State} & \quad t^s n^s = w^s, \quad s = 1\ldots M \\
\text{Federal} & \quad TN = W \quad (3.1)
\end{align*}$$

Information about officials’ and firms’ types is asymmetrically distributed insofar as they privately observe their propensity of apprehension ($q^s$) or idiosyncratic cost ($f_{si}$) opposed to public knowledge being confined to the corresponding joint probability density $\phi(q, f)$ and cumulative distribution $\Phi(q, f)$.$^{26}$ Both $\phi$ and $\Phi$ are supposed to follow a uniform distribution with $\phi(0,0) = 0$ and $\Phi(0,0) = 0$ as well as $\phi(1,\mathcal{F}) = 0$ and $\Phi(1,\mathcal{F}) = 1$. Thus, intervals $[0,1]$ and $[0,\mathcal{F}]$ confine the support underlying the distribution. Choosing the uniform distribution for $\phi$ and $\Phi$ merely reflects the simplest and most commonly used way to introduce heterogeneity, with a constant density of officials and firms across the support of apprehension respectively cost.$^{27}$ Moreover, independence between $q$ and $f$ - meaning intuitively that the propensity of apprehension does not relate to firms cost structure - entails firstly: $\phi(q, f) = \phi_q(q)\phi_f(f)$ and $\Phi(q, f) = \Phi_q(q)\Phi_f(f)$ meaning the joint density equals the product of marginal densities. Secondly, as regards conditional distributions between $q$ and $f$, independence implies $\phi(q|f) = \phi_q(q)$ and $\phi(f|q) = \phi_f(f)$ respectively conditional distributions equal marginal distributions.

Federalism manifests in specific institutionalised rules within the constitutional structure of government. Brennan and Buchanan (1980) define such a constitution as "a set of rules, or social institutions, within which individuals operate and interact with one another" (p.3), albeit their work features around constraints imposed by a fiscal constitution on the power
to tax, rather than the constraints of federalism on the power to extract bribes. Henceforth, \( \Gamma \) denotes the institutionalised set of rules characterising the structure of government.

Shleifer and Vishny (1993) refer to the mapping of various government structures onto corruption as "industrial organisation of corruption". Despite technical similarities with analysing industry structures, this term seems too narrow to encompass the versatile features inherent in governance. Moreover, the term "constitution" is more entrenched in the literature on political economy (e.g. Brennan and Buchanan, 1985).

Formally, the constitution \( \Gamma \) combined with a collection of: federal and state officials as well as firms; their strategy profiles \( S_s, S, S^{si} \); outcome functions \( u(., q^s), U(., Q), \pi(., f^{si}) \); the cartesian product of possible types of officials \( \Theta \), and firms \( \Omega \); as well as the densities over types relating to the probability of apprehension and fixed cost \( \phi(q, f) \) define a Bayesian game of incomplete information:

\[
[M + 1, N; \{S^s\}, \{S\}\{S^{si}\}; \{u(.)\}, \{U(.)\}, \{\pi(.)\}; \\
\Theta^1 \times \ldots \times \Theta^M, \Theta^F, \Omega^1 \times \ldots \times \Omega^N, \phi(q, f)]
\] (3.2)

To illustrate, figure 3.1 summarises the sequence of decisions and events, the information known to firms and officials, as well as the corresponding pay-off in terms of profits and the utility accruing to the state and federal tier (the variables of which are again denoted by capital letters).

In words, officials on both tiers and firms undergo the following subsequent stages of events:

1. Officials decide (ex-ante) about whether or not to participate in corruption based on corresponding participation constraints. Benevolent officials abstain from accepting kickbacks \((b, B = 0)\).

2. Corrupt Leviathans impose positive levels of bribe-rates \((b, B > 0)\) to seek self-enrichment under the constraints inherent in competing over a shared bribe-base and monitoring.

3. An independent monitoring system apprehends corrupt Leviathans with probability \(q, Q\).

4. When confronted with a positive bribe and contingent on profits remaining positive, firms decide (ex-post) on whether or not to exit the market.

Stage 2 determines how endemic corruption is. Thereby, the impact of single and multi-tiered constitutional structures \( \Gamma \) upon the extent of bribery will be considered in sections 3.4 and 3.5. However, unlike taxation where agents face only limited possibilities for evasion, corrupt exchange occur voluntarily. Therefore, passing a bribe must be deemed rational
from the officials’ and firms’ perspective in the first instance meaning, optimising the level of bribe-rates is embedded in the participation decisions of stages 1 and 4.

### 3.2 Participation Decision

The participation constraints inherent in stages 1 and 4 of figure 3.1 differ to the extent that officials request a bribe ahead of learning about the exact type of firms they are facing (ex-ante participation constraint) whereas firms can infer the corruptability of officials from the fact of being requested to pass a bribe (ex-post participation constraint). Hence, the participation decisions of firms depend on the proceeding decision taken by officials, which therefore needs establishing first. Above all, their cumulative decisions about engaging in corruption and exiting the market determines the endogenous number of Leviathans and operating firms, which will crucially affect benefits and costs of imposing bribes as discussed during section 3.3.
3.2.1 Officials

 Officials decide ex-ante on whether or not to engage in corrupt conduct, meaning ahead of submitting any request for bribe payments. Thereby, participation constitutes a dichotomous decision, where official \( s \) selects \( c^s \in \{0, 1\} \) given the action profile \( c = (c^1, \ldots, c^M, C) \) specifying the decisions of officials in states \( s = 1, \ldots, M \) and the government representative controlling the federal tier.

Each official has "his price" in the sense of behaving leviathan provided sufficiently high bribe-rates \( b^s \) and \( B \) offset the agony of the potential level of punishment denoted by \( p \) respectively \( P \). In particular, given that a monitoring system detects corrupt conduct with an exogenous propensity of apprehension \( q, Q \in [0, 1] \), participation on the state and federal tier remains individually rational when the expected utility attached to bribery exceeds the utility of merely receiving the official wage:

\[
\text{State } \quad u(w) < (1 - q^s)u^s(b^s, w) + q^su(p) \quad s = 1, \ldots, M \\
\text{Federal } \quad U(W) < (1 - Q)U(B, W) + QU(p) 
\] (3.3)

Uncertainties inherent in corrupt exchanges translate into expected utility via separate terms for the case of successfully extracting kickbacks and the menace of being caught and convicted. Without loss of generality, the level of utility upon which Leviathans fall back when caught accepting a bribe can be normalised to 0, e.g. \( u(p) = 0 \) and \( U(p) = 0 \).

Utility increases in both wages \( (w, W) \) and bribes \( (b, B) \). Thus, derivatives about the impact of bribes and wages on utility are: \( u_b > 0, u_w > 0 \) on the state tier and correspondingly \( U_B > 0, U_W > 0 \) on the federal tier.

Due to its clandestine character, Leviathans on both tiers must extract bribes on a joint basis. Therefore, monitoring preventing that a state official \( s \) engages in corruption likewise forecloses possibilities for misconduct of the federal official in state \( s \). Indeed, Rose-Ackerman (1999) reports an example with officials in Brazil inspecting firms at the same time in order to benefit from contradictory statutes of state and federal laws meanwhile extracting bribes.

Rearranging (3.3) yields the marginal official, faced with apprehension \( q^m \), who is indifferent in respect to participating in corruption. Such apprehension (reservation price) is defined by:

\[
q^m = \frac{u(b^m, w) - u(w)}{u(b^m, w)} \equiv F(b^m, w) 
\] (3.4)

Notice, for later use, that,
meaning increasing the level of graft ($b^m$) increases the level of monitoring required to achieve indifference as regards engaging in corruption.

Conversely, the impact of wages on participation in corruption is ambiguous,

$$F_w = \frac{u(b^m, w)[u_w(b^m, w) - u_w(w)] - u_w(b^m, w)[u(b^m, w) - u(w)]}{u(b^m, w)^2} < 0 \quad (3.6)$$

because, in contrast to bribes, increased wages affect both the level of utility achieved under honest and dishonest conduct.\(^29\)

On the federal tier, participation in dishonesty constitutes a dichotomous decision according to (3.3). Conversely, state officials facing a probability of apprehension $q^s < q^m$ will find it worthwhile to engage in corruption opposed to virtuous official $t$ with probability $q^t \geq q^m$, where monitoring successfully deters accepting kickbacks. Referring back to section 3.1, the distribution over the probability of apprehension defines the endogenous number of corrupt Leviathans ($m$) relative to the total number of state officials ($M$). Thus, the ratio ($m/M$) reflects how widespread corruption is and equals the cumulative distribution function $\Phi_q$ evaluated at the marginal official of (3.4), who is indifferent about accepting bribes, that is

$$\frac{m}{M} = \Phi_q(q^m) = \Phi_q(F(b^m, w)) \quad (3.7)$$

Based on (3.7), the number of corrupt Leviathans willing to divert rents into their own pockets

$$m(b^m, w) = \Phi_q(F(b^m, w))M \quad (3.8)$$

relates to the incentives about accepting bribes ($b^m$) and wages ($w$) as well as the effectiveness of monitoring, which pins down the marginal official, $m$, who is indifferent about accepting bribes.

**Lemma 1** With positive propensities of apprehension ($q$), the number of corrupt officials inherent in (3.8) increases in higher bribe-rates.

**Proof:** From (3.8):

$$m_{b^m} = M\phi_q(.)F_{b^m}(b^m, w) > 0$$

The result follows from $M > 0$ and the positivity of $\phi_q$ as well as (3.5). \(\square\)

According to lemma 1, higher bribes tempt more officials to accept kickbacks. Figure 3.2 depicts this relationship between bribe-rates and the endogenous number of corrupt Leviathans.
3.2.2 Firms

Based on imperfectly competitive markets, firms produce surplus and so rents, providing the source for both taxation and bribery. Following the approach laid out in Bliss and Di Tella (1997), aside from their idiosyncratic fixed cost structure, firms are alike. Firm $i$ in state $s$ maximises profits

$$\pi^s_i = \theta(\beta) - c^s_i(\beta^s_i)$$

(3.9)

given by the difference between market power ($\theta(\beta)$) - the ability to obtain supra competitive revenue - and cost.

Denoting the $m$-vector of consolidated bribe rates by $\beta \equiv (\beta^1, \beta^2, \ldots, \beta^m)$, market power increases monotonically in the extent of bribery: $\theta_{\beta} > 0$. This relationship between weak competition and bribery is entrenched in the literature about the causes of corruption (e.g. Ades and Di Tella, 1999). Albeit the regulation of entry applies to each jurisdiction, states remain interconnected to the extent that the common market encompasses all states of the federation. Therefore, overall competitive conditions relate to the vector of consolidated bribe-rates across jurisdictions and tiers, though the extent of corruption may vary across states.\(^{30}\) Notice, for later use, that the special case of a symmetric equilibrium, where states are alike and therefore superscripts can be dropped, implies

$$\theta_{\beta} = m(b, w) \frac{\partial \theta}{\partial \beta}$$

(3.10)
meaning the overall impact of bribes on market power equals the product of the partial impacts in each state multiplied by the number of corrupt Leviathans as given by (3.8). Again, the increase in market power as a response to higher bribes \( \frac{\partial \theta}{\partial \beta} \) originates in bribes imposing an artificial barrier to entry, which reduces competition and allows remaining firms to exert more market power.

The following assumptions contain some stability and regularity conditions:

**Assumption 1** In any state \( s \) the mapping of consolidated bribe-rates \( \beta \) onto competitive conditions is such that:

(a) \( 0 < \theta_{\beta} < 1 \)

(b) \( \theta(\beta) \) is weakly convex in \( \beta \)

In particular, assumptions 1 ascertain that the amount of firms the economy can support remains well behaved in bribe-rates, excluding cases of an infinite or negative number of firms. Furthermore, thanks to weak convexity the increase in market power does not fade-away in higher levels of bribes. E.g. a simple linear relationship with \( \theta = \sum_s a^s \beta^s \) with \( 0 < a < 1 \) satisfies these assumptions.

Cost consists of three components: Firstly, there are idiosyncratic fixed cost \( f \), which, following section 3.1, are uniformly distributed according to the marginal distribution function \( \Phi_f(.) \). Secondly, taxes are levied on a state \( t^s \) and federal level \( T \). Finally, provided firms are inspected by corrupt Leviathans, bribes must be paid towards state \( b^s \) and federal \( B^s \) officials. Thus, total cost of firm \( i \) in state \( s \) condition on the virtue of inspecting officials:

\[
c^{si} = \begin{cases} 
  f^{si} + \tau^s & \text{if } q^s \geq q^m \\
  f^{si} + \tau^s + \beta^s & \text{if } q^s < q^m 
\end{cases}
\]  

(3.11)

Since the present essay looks at bribery rather than taxation, henceforth consolidated tax-rates \( \tau^s \) are normalised to 0, which based on the states budget constraint (3.1) coincides with normalising wages to 0.

Participation constitutes a dichotomous decision \( e^{si} \in \{0,1\} \) of a firm \( i \) in state \( s \) about whether or not to exit the market given the action profile \( e = (e^{s1}, \ldots, e^{sM}) \) of competing firms and \( c = (c^1, \ldots, c^M, C) \) of inspecting officials. Firms participation decisions occur at an ex-post stage after officials decided whether or not to impose kickbacks. Since any uncertainty about future profits are removed, firms’ decisions about exiting the market depend only on the level of fixed cost \( f^{si} \) and the bribe-rates \( \beta^s \) they face. In particular, firm \( i \) in state \( s \) maintains production as long as profits of (3.9) are non-negative \( \pi^{si} \geq 0 \).
Within each state \( s \), the zero-profit constraint \( (\pi^m = 0) \) marks the firm with superscript \( m \) and idiosyncratic fixed cost \( f^m \) (reservation price), which is indifferent between operating and exiting the market:

\[
f^m = \theta(\beta) - \beta^s
\]

(3.12)

In states unaffected by bribery, that is \( \beta^s = 0 \), no firm needs stopping its production due to additional expenses attributed to corruption. Conversely, with strictly positive levels of graft \( \beta^s > 0 \), idiosyncratic fixed cost \( f^i > f^m \) force a firm \( i \) to declare bankruptcy whereas a firm \( j \) characterised by idiosyncratic fixed cost \( f^j \leq f^m \) remains profitably operable. Therefore, the marginal density of fixed cost \( \Phi_f(.) \) evaluated at the marginal firm of (3.12), identifies the endogenous share \( (n^s / \pi^s) \) of participating firms with nonnegative profits, a state can support:

\[
n^s = \frac{n^s}{\pi^s} = \Phi_f(f^m) = \Phi_f(\theta(\beta) - \beta^s)
\]

(3.13)

In states controlled by non-corrupt officials, (3.13) equals 1 meaning no firm is corrupted away. Conversely, strictly positive consolidated bribe-rates \( (\beta^s > 0) \) push a share of firms confined to \( 1 - \Phi_f(.) \in [0, 1] \) into bankruptcy.

The number of firms exiting the market conditions on the corruptibility of the corresponding state \( s \) and therefore depends on the joint distribution between the propensity of apprehension and fixed cost. In particular, only firms with relatively high fixed cost inspected by corrupt Leviathans will be pushed into bankruptcy. Recall from section 3.1 that the level of fixed cost and the propensity of apprehension are independently distributed, which allows splitting the joint distribution evaluated at the marginal official and firm into the product of their respective marginal distributions. Therefore, the endogenous share \( (N / \pi) \) of firms the federal economy can support is given by the product of (3.8) and (3.13):

\[
\frac{N}{\pi} = \Phi_q(F(b^m))\Phi_f(\theta(\beta) - \beta^s) = m(b^m)\Phi_f(\theta(\beta) - \beta^s)
\]

(3.14)

In essence (3.13) and (3.14) constitute the relationship between bribe-rates and the number of firms willing to operate, e.g. the demand curve facing the state, respectively federal, official with the usual properties:

**Lemma 2** For positive propensities of apprehension and fixed cost the number of firms willing to operate in the state \( (n^s) \) and federal economy \( (N) \) decreases in higher bribe-rates.

**Proof:** Following (3.13) and (3.14):
Figure 3.3: Endogenous Number of Firms

\[ n_\beta = \Pi[\phi_f(.) (\theta_\beta - 1)] < 0 \]
\[ N_\beta = \bar{N} [\Phi_q(.) \phi_f(.) (\theta_\beta - 1)] < 0 \]  \hspace{1cm} (3.15)

The inequality rests on the positivity of \( \Phi \), respectively \( \phi \), as well as \( \theta_\beta - 1 < 0 \) of assumption 1 (a).

Notably, the impact of bribe-rates upon firms’ profits is twofold: Firstly, paying kickbacks constitutes a cost burden and provides a potential cause for bankruptcy. Secondly, corruption reduces the number of firms and so increases market power and in turn profits of the remaining firms. As long as \( \theta_\beta - 1 < 0 \), the marginal cost of imposing bribes outweighs the benefits attributed to increased market power of remaining firms. Insofar as assuring that corruption causes economic damage, with the endogenous number of firms being negatively related to graft as depicted in figure 3.3, assumption 1 (a) constitute a regularity condition. Empirical results support this relationship as e.g. the economic size of countries in terms of GDP per capita conditions negatively on corruption (Mauro, 1995).

### 3.3 Corrupt Leviathans

Leviathans participating in misconduct face a tradeoff between increasing bribe-rates and infringing a commonly shared bribe-base.
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To keep the model tractable, henceforth the attention is confined to symmetric equilibria where states affected by corruption impose identical bribes ($\beta^s = \beta \quad \forall \quad s \mid q^s < q^m$). However, in states with $q^s \geq q^m$ monitoring successfully deters corrupt abuses, that is $\beta^s = 0 \quad \forall \quad s \mid q^s \geq q^m$.

Compared with taxation, corruption provides a more appropriate environment for analysing the Leviathan, since paying bribes involves ex-definitionae a shifting of rent towards representatives willing and able to abuse public power, without aiming at enhancing public welfare. However, despite all agents being driven by self-interest only, the present approach departs from the overly pessimistic Hobbesian jungle, since by virtue of ex-ante participation constraints solely an endogenous share of officials is inclined to seek self-enrichment by usurpatating their discretion. Differences in motivation and incentives induce virtuous officials to abstain from self-enrichment opposed to corrupt state and federal Leviathans seeking to maximise rents.

The rent a Leviathan manages to extract consists of the product between bribes ($b, B$) and the size of the corresponding bribe-base ($n, N$). Since paying kickbacks imposes a cost burden on firms, increasing bribe-rates affects the size of the bribe-base as given by (3.13), respectively (3.14). Thus, the rent function facing lower-tiered Leviathans with relatively modest propensities of apprehension is:

$$r(b, B|q < q^m) = bn = b\Phi_f(\theta(\beta) - \beta)\pi$$

Conversely, the federal tier encompasses the entire economy. Provided sufficiently weak monitoring, the federal Leviathan must take into account the participation decisions on the state tier meanwhile maximising rents given by:

$$R(B, b) = BN = Bm(b)\Phi_f(\theta(\beta) - \beta)\pi$$

The federation exhibits externalities to the extent that rents accruing to the state and federal tier depend among else on the bribes ($\beta$) imposed by competing Leviathans. Thereby, horizontal externalities rest on the federal economy exceeding the size of regulatory jurisdictions, meaning states. In particular, market power $\theta$ increases in the vector of bribe-rates $\beta$ across all, rather than a single state. Conversely, vertical externalities arise within the present federation since two distinct governments operate directly upon each firm, and extract consolidated bribes ($\beta$) in an uncoordinated manner. Furthermore, from the federal officials perspective bribe-rates, $b$, determine the endogenous share of corrupt states and in turn the amount of resources subject to their discretion.
In respect to rents, assumption 1 (a) together with the properties of the distribution function (Φ) imply (3.16) and (3.17) to be bounded at an upper and lower level. It is natural to assume that bribe-taking can neither exceed the size of its base $b\pi$, respectively $B\bar{N}$, nor become negative. Here, $\pi$ and $\bar{N}$ reflect the maximal size of the state respectively federal economy. Without loss of generality, $\pi$ and $\bar{N}$ can be normalised to 1 aligning the size of state with the federal tier. Furthermore, rents are assumed to be concave in consolidated bribes:

**Assumption 2** For all $\beta$ such that $\beta > 0$ second derivatives of $r(b, B)$ and $R(B, b)$ are negative e.g. $r_{bb} < 0$, respectively $R_{BB} < 0$.

In other words, rents exhibit characteristics familiar from the Laffer curve in taxation. E.g. as depicted in figure 3.4, they drop to 0 due to the lack of bribe-takers when $\beta = 0$, respectively bribe-payers when $\beta = \bar{\beta}$. For $0 < \beta < \bar{\beta}$ rents are strictly positive and, due to assumption 2, concave, which ascertains a unique interior maximum. Therefore, by virtue of assumption 2 second order conditions for a maximum are met throughout the remainder.

Both (3.16) and (3.17) exhibit the following mapping from competition among firms onto corruption:

**Proposition 1** Fiercer competition among firms represented by a decrease in market power ($\theta$), reduces the extent of corruption measured by state or federal rents regardless the parameters affecting officials participation constraint.
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Proof: Appendix.

The intuition behind proposition 1 lies in corruption requiring discretionary power and rents to coexist. Fiercer competition among firms results in rents being competed down, leaving fewer opportunities for corrupt officials to divert resources into their own pockets.\textsuperscript{33} Conversely, Ades and Di Tella (2000) find competition among firms to impact ambiguously upon corrupt rents. However, their result rests on the existence of a benevolent planner trading-off the cost of prosecution against its benefits in terms of sustaining a private sector, producing rents. Proposition 1 suggests that this ambiguity is not robust towards departing from the concept of benevolence.

3.4 Unitarian Constitutions

Before establishing the impact of federalism, the following prepares the field by analysing single-tiered government, where each official deals exclusively with his assigned territory and in consequence only one government operates upon firms. In essence, unitarian governance implies that Levis act as "monopolists" within their jurisdiction when regulating market entry.

Compared with federations, the unitarian constitution can be established either by dissolving the lower tier, giving rise to centralistic governance, or by disregarding the supreme tier, giving rise to a confederation.

3.4.1 Centralised Governance

Consider the former case of vertically integrated and completely centralised government with constitution $\Gamma^C$ and public power concentrated on the supreme tier. Such a centralistic form of government provides a natural benchmark free of inter and intra-state competition and hence subject to neither vertical nor horizontal externalities. Aside from the risk to corrupt further firms into bankruptcy, rent-seeking is only subject to the constraint (3.3), which determines the level of monitoring $Q$ required for an upper-tiered official to participate in bribery. Elsewhere (Rose-Ackerman, 1999, p.151), the dishonest centralist facing, in essence, a non-binding monitoring system has been labeled somewhat colorfully as "kleptocrat". Given a low enough propensity of apprehension ($Q$), the centralist Leviathan seeks self-enrichment according to the rent function:

$$ R(B) = BN = B\Phi_f(\theta(B) - B) $$

Deriving $R(.)$ in respect to bribes ($B$) yields the sufficient condition for a maximum:

$$ \frac{\partial R}{\partial B} = \Phi_f(\theta(B) - B) + B\phi_f(.) (\theta_B - 1) = 0 $$
This condition captures the tradeoff between increasing bribes and the corresponding shrinking of the bribe-base in a concise manner. In particular, the first term on the right hand side represents the benefit attached to increasing \( B \) incrementally in terms of extracting higher rents. Following lemma 2, the second term, \( B \phi_f(.) (\theta_B - 1) \), is negative and represents the cost associated with corrupting the marginal firm into bankruptcy. The stability and regularity conditions of assumptions 1 imply that the cost of corruption increase in higher bribe rates. Thus, a corner solution where the Leviathan permits only one firm to remain in the market will typically not yield a maximum of rents. This maybe somewhat counterintuitive result rests on the structure of the model where, unlike the approach of Keen and Kotsogiannis (2002) with freely movable capital, firms are immobile and only interconnected via competitive conditions \( \theta \), which introduces limits to their individual potential to produce rent.

Applying absolute values to the term \((\theta_B - 1)\), which by virtue of assumption 1 (a) is negative, and rearranging (3.19) into its elasticity form yields

\[
|\eta_{NB}| = \frac{1}{|\theta_B - 1|} \tag{3.20}
\]

meaning, in an optimum graft induces an equality between the elasticity of firms abundance in respect to bribes, \( \eta_{N,B} = \phi_f(.) \frac{B}{\Phi_f(.)} \), and the ratio between 1 and the excess market power created, as fewer firms operate on the imperfectly competitive market. Thus, compared with the monopolistic firm, where elasticities in a corresponding optimum equal 1, the centralist Leviathan recognises the benefit attached to constraining the abundance of firms in terms of additional disposable rents, created through the resulting increase in market power.

Equilibrium bribe-rates of the centralist Leviathan can be obtained via rearranging (3.19),

\[
B^{\Gamma C} = \Phi_f(.) \frac{1}{\phi_f(.) |\theta_B - 1|} = [P(e) |\theta_B - 1|]^{-1} \tag{3.21}
\]

where,

\[
P(e) = \frac{\phi_f(\theta(B) - B)}{\Phi_f(\theta(B) - B)} \tag{3.22}
\]

denotes the probability of inducing the marginal firm to exit the market. Due to \( \Phi_f \) and \( \phi_f \) following a uniform distribution, \( P(e) \) remains constant for positive levels of corruption. According to (3.21), equilibrium bribe-rates \( B^{\Gamma C} \) relate negatively to the probability of inducing exit \( P(e) \) but positively to the impact of firms ability to earn supra-competitive profits \( (\theta_B) \).
3.4.2 Confederation

Dissolving the supreme tier gives rise to a 
*confederation* with constitution $\Gamma^c$, where a multitude of jurisdictions located on the same tier exert public power to regulate entry. However, the confederate scenario exposes jurisdictions to horizontal externalities. In particular, extracting bribes meanwhile regulating market entry in one jurisdiction entails spillovers onto market power ($\theta$) and the level of graft in other jurisdictions. Provided engaging in corruption remains individually rational according to (3.3),

$$r(b|q < q^m) = b\Phi_f(\theta(b) - b)$$

(3.23)

constitutes the function, according to which Leviathans maximise their bribe-revenue. Before deriving optimal bribe-taking-rules, recall that under the present scenario, the level of graft for one Leviathan depends among else on decisions taken by other confederate Leviathans as market power ($\theta$) conditions on the vector $b$ of imposed bribe-rates. Furthermore, following (3.10) in a symmetric equilibrium $\theta_b = \theta_b/m(b)$ with $m(b)$ determined by (3.8). First order conditions maximising (3.23) are thus,

$$\frac{\partial r}{\partial b} = \Phi_f(\theta(b) - b) + b\phi_f(.) \left( \frac{\theta_b}{m(b)} - 1 \right) = 0$$

(3.24)

respectively rearranged into elasticity form:

$$|\eta_{N,b}| = \frac{1}{|\theta_b/m(b) - 1|}$$

(3.25)

The equilibrium bribe-rate, $b^{\Gamma c}$, imposed by confederate Leviathans can again be obtained by rearranging (3.24):

$$b^{\Gamma c} = \frac{\Phi_f(.)}{\phi_f(.)} \frac{1}{|\theta_b/m(b) - 1|} = [P(e)|\theta_b/m(b) - 1|]^{-1}$$

(3.26)

Through the term $m(b)$, the optimal bribe-taking-rule conditions on the endogenous number of corrupt officials. In particular, compared with a centralistic constitution, $\Gamma^C$, differences in the equilibrium level of graft arising in a confederation, $\Gamma^c$, rests on there being potentially more than one corrupt Leviathan inducing horizontal competition for rent across jurisdictions.

*Proposition 2* Thanks to horizontal competition, and relative to a centralistic constitution $\Gamma^C$ with equilibrium bribe-rate $B^{\Gamma C}$ and equilibrium rents $R^{\Gamma C}$, under a confederate constitution $\Gamma^c$ in an equilibrium:

(a) bribe-rates are lower, $b^{\Gamma c} < B^{\Gamma C}$;

(b) a cooperative marginal increase in equilibrium bribe-rates, $b^{\Gamma c}$, would be strictly beneficial to Leviathans allowing them to extract higher rents $r^{\Gamma c}$. 
Proposition 2 reveals the benefits attached to horizontal competition in reducing corruption. Intuitively, decentralising the regulation of entry across a multitude of jurisdictions undermines the temptation to abuse public power for private benefit. More precisely, increasing bribes in one jurisdiction corrupts firms into bankruptcy meanwhile increasing market power of the remaining firms across the entire economy. Thus, the extent of corruption in one jurisdiction spills over onto the competitive conditions for firms and in turn the rent available to all Leviathans. Thanks to such horizontal externalities, confederate Leviathans do not take fully advantage of the tradeoff between increasing bribe-rates, and corrupting a part of their bribe-base leaving them with bribe-rates and rents, which are to low (from their perspective) in a non-cooperative equilibrium. In essence, horizontal competition over rents provides a remedy against endemic corruption.

Unlike Arikan (2004), the present results rest on endogenous decisions about bribery rather than an exogenous increase in the number of corrupt states. This emphasises, how decentralisation allows taking advantage of heterogeneity among officials incentives to engage in corrupt conduct.

3.5 Federations

Federalism refers to a structure of government, ”which has been formed for common purposes, but in which the member states retain a large measure of their original independence” (Wheare, 1956, p.1). Hence, the emphasis does not lie on the mere existence of multiple tiers, but rather on a constitution established according to the federal principle in the sense of dividing power so that the federal and state authorities are not subordinate to one another, but within a frequently constitutionally assigned sphere coordinate and autonomous aiming to achieve a balance between unity and diversity, respectively independence and interdependence, by means of combining shared-rule with self-rule.34 Inevitably, within a federation two distinct governments operate directly upon firms making overlapping responsibilities unavoidable in practice, even though a great deal of the constitutional consent might be directed towards separating spheres of responsibility.

Within a federation, the decision about what level of bribes to impose interdepends with the actions taken by higher, respectively lower tiered officials. Thus, federalism calls for the Nash Equilibrium as solution concept defined by an $m \times 1$ vector of consolidated bribe-rates ($\beta$), upon which no single Leviathan can improve unilaterally:

Definition 1 A Nash Equilibrium in a federation with constitution $\Gamma$ is a constellation...
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\((b^*, B^*)\) of correctly conjectured mutual best-responses according to the best-response function of the federal \(Z(b)\) and state \(z(B)\) official, or formally:

\[
\beta \in Z(b), z(B) \tag{3.27}
\]

Depending on the process of establishment, the balance of power varies considerably among various types of federations. Especially, the balance might advantage the lower tier, where the process of establishment has involved the aggregation of previously sovereign states. Conversely, where federations have been created through a devolution process, key areas of power are likely to remain with the supreme tier. The present model addresses this distinction by considering cases where either the state or the federal tier enjoys the benefit of being first-mover alongside the simultaneous moves case reflecting a scenario of balanced power distribution.

3.5.1 Balanced Power Federation

A constitutional structure \(\Gamma^F\), which obliges corrupt Leviathans on either tier to seek self-enrichment by simultaneously maximising the state (3.16) respectively federal (3.17) rent-function, yields the undermentioned conditions:

\[
\text{State} \quad \frac{\partial r}{\partial b} = \Phi_f(\theta(\beta) - \beta) + b\phi_f\left(\frac{\theta_\beta}{m(b)} - 1\right) = 0 \tag{3.28}
\]

\[
\text{Federal} \quad \frac{\partial R}{\partial B} = m(b)\left[\Phi_f(\cdot) + B\phi_f\left(\frac{\theta_\beta}{m(b)} - 1\right)\right] = 0 \tag{3.29}
\]

On both tiers, corrupt Leviathans face the tradeoff of sections 3.4.1 and 3.4.2 between extracting additional rents from infra-marginal firms and the probability of corrupting the marginal firm into bankruptcy. Moreover, the federal Leviathan takes into account the impact of participation decisions \((m(b))\) taken by state Leviathans upon the magnitude of his bribe-base. Still, symmetric discretionary power implies congruent optimal bribe-taking-rules, which can be derived along the lines of the previous sections:

\[
\text{State} \quad b^{FF} = \left[P(e)|\theta_\beta/m(b) - 1\right]^{-1} \tag{3.30}
\]

\[
\text{Federal} \quad B^{FF} = \left[P(e)|\theta_\beta/m(b) - 1\right]^{-1} \tag{3.31}
\]

Notably, optimal bribe-rates mimic the outcome of the confederation aside from bribes in each jurisdiction consolidating with the higher, respectively lower tier.

The first order conditions (3.28) and (3.29) inhere the best-responses \((z(B))\) and \((Z(b))\), e.g. how Leviathans adapt optimal bribe-rates when anticipating a change in bribe-rates
on the other tier. On the state tier, the identity $r_b[z(B), B] = 0$ implicitly defines the best-response function as well as its slope $z_B = -\frac{r_{bb}}{r_{bb}}$, which determines the direction of the reaction when adapting the expectation of bribe-rate $B$. By virtue of assumption 2 the numerator, $r_{bb}$, is negative. As the mixed derivation of the denominator $r_{bb}$ is negative, bribe-rates across tiers constitute strategic substitutes and best-response functions slope downwards. A congruent argument applies to the federal tier.

According to definition 1, correctly conjectured mutual best responses,

$$z(B^\Gamma F) = Z(b^\Gamma F)$$

pin down the equilibrium within the present federation. Compared with the centralistic benchmark, introducing two tiers of governance impacts upon both officials ability to impose bribes and to divert rents into their own pockets.

**Proposition 3** Relative to a centralistic constitution $\Gamma^C$ with equilibrium bribe-rates $B^\Gamma C$ and equilibrium rents $R^\Gamma C$, under a federal constitution $\Gamma^F$ in an equilibrium with balanced power (simultaneous moves):

(a) consolidated bribe-rates are excessively high, $\beta^\Gamma F > B^\Gamma C$;

(b) the state Leviathan earns relatively low rents in the sense that a small but significant cooperative decrease in $\beta^\Gamma F$ would be strictly beneficial allowing to extract higher rents;

(c) the same cooperative decrease in $\beta^\Gamma F$ has an ambiguous effect on rents extracted by the federal Leviathan due to the impact of participation decisions attached to state Leviathans.

**Proof:** Appendix.

Overlapping responsibilities in federations imply that each firm is subordinate to a pair of Leviathans regulating market entry. Despite inter-state competition within the lower tier constraining bribes to some degree (see proposition 2), vertical externalities attached to intra-state competition across tiers prevail to the extent that, in an equilibrium, consolidated bribe-rates of the balanced power federation exceed those of the centralist benchmark. As regards rents on the state tier, intra-state competition likewise exhibits vertical externalities with excessively high consolidated bribe-rates entailing a corrupt overgrazing of the bribe-base with essentially more firms pushed into bankruptcy than optimal from a Leviathans perspective. Conversely, for the federal Leviathan participation constraints mitigate against this result featuring prominently in the economics of corruption (Shleifer and Vishny, 1993) as well as tax competition in federations (Keen and Kotsogiannis, 2003), since lowering bribe-rates might induce fewer officials to participate in misconduct and hence foreclose possibilities for
joint extraction of kickbacks. In essence, provided the preferences to participate in corruption differ across states, maintaining bribe-rates at a high level ensures that a large fraction of state officials find it individually worthwhile to tolerate corrupt conduct within their jurisdiction.

### 3.5.2 Asymmetric Power Federation

Introducing sequentiality between federal and state officials establishes a dominant tier assigned by the constitution $\Gamma^f$ with the role of first-mover within the federal decision process. Such sequentiality provides tiers with different levels of power in what has now become a fully sequential game. This requires the leading tier to correctly anticipate the followers reaction in terms of bribe-rates meanwhile engaging in corruption.

With states acting as first-mover, the condition $R_B(.) \dagger = 0$ pins down the reaction of the federal Leviathan. Again, (3.29) inherently defines the best-response function $Z(b)$. On the federal tier, the bribe-rate $b$ is predetermined in the sense that $Z(b)$ represents actual responses, rather than some belief about the state Leviathan’s behaviour. Since $B = Z(b)$, the state Leviathan maximises rents according to,

$$r(b, Z(b)|q < q_m) = b\Phi_f(\theta(b + Z(b)) - b - Z(b))$$

with optimality condition:

$$\frac{\partial r}{\partial b} = \Phi_f(.) + b\phi_f(.)\left[ \frac{\theta(1 + Z_b)}{m(b)} - 1 - Z_b \right] \dagger = 0$$

Rearranging (3.34) yields the optimal bribe-taking rule,

$$|\eta_{N_b}| = \frac{1}{[\theta_b/m(b) - 1]/(1 + Z_b)}$$

with the corresponding equilibrium bribe-rate of the state Leviathan:

$$b^\Gamma = [P(e)\theta/b/m(b) - 1]/(1 + Z_b)$$

Provided strategic substitutability, meaning more competitive behaviour to seek rents on the lower tier prompts less competitive behaviour on the supreme tier, best-response functions slope downward, e.g. $Z_b < 0$. Therefore, bribes of the first moving states (3.36) exceed the corresponding equilibrium level of graft (3.30) under a symmetric power distribution. Conversely, since $Z_b < 0$ and $B = Z(b)$, the federal Leviathan reacts by extracting lower bribe-rates. Furthermore, as along as bribes constitute substitutes, meaning $r(b, B)$ is strictly falling in $B$, such a first-mover advantage spills over onto rents.
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The participation decision of the following states makes the derivation of the optimality conditions with a first moving federal Leviathan somewhat more complicated. Substituting the states best-response function, obtained from (3.28), into the federalists rent function (3.17) yields:

\[ R(B, z(B)) = Bm(z(B))\Phi_f(\theta(B + z(B)) - B - z(B)) \] (3.37)

The first order condition is:

\[ \frac{\partial R}{\partial B} = m(\cdot)\Phi_f(\cdot) + B\left\{ m(\cdot)\phi_f(\cdot) \left[ \frac{\theta B(1 + z_B)}{m(\cdot)} - 1 - z_B \right] + m_z z_B \phi_f(\cdot) \right\} \frac{1}{m(\cdot)} = 0 \] (3.38)

Solving for the optimal bribe-rate yields,

\[ B^\Gamma_f = \left[ P(e)\theta B/m(b) - 1(1 + z_B) + P(c) \right]^{-1} \] (3.39)

where,

\[ P(c) = \frac{m_z z_B}{m(z(B))} \] (3.40)

denotes the propensity of additional state Leviathans participating in corrupt conduct after a marginal increase in bribe-rates.

Compared with (3.31), the effect of introducing best-response functions z(B) on the federal tier is twofold: Firstly, strategic substitution characterised by \( z_B < 0 \) translates into a first-mover advantage in terms of higher equilibrium bribe-rates. Secondly, the participation decision of lower tiered officials, reflected by the term \( P(c) \), mitigates against the first-mover advantage, as with \( z_B < 0 \) increasing bribes on the federal tier prompts lower optimal bribe-rates on the state tier tempting less officials to engage in corruption. Albeit the federal Leviathan might not benefit fully from initiating bribery, the outcome of the balance power case can always be reproduced. As long as \( z_B < 0 \) setting bribe-rates first will therefore not entail a disadvantage for the federal Leviathan.

Intuitively, the dominant tier of governance benefits from its first-mover advantage when abusing public power for private benefit. In essence, asymmetric power within a corrupt federation drives a wedge between the extent of bribery across tiers. However, as responsibilities no longer overlap, shifting public power in favour of the federal or state tier mitigates against excessively high consolidated bribes by eliminating vertical externalities.

**Proposition 4** A federal constitution \( \Gamma^f \) entitling one Leviathan with the advantage of setting bribe-rates first (asymmetric power), removes vertical externalities between the state and federal tier.
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**Proof:** The value functions evaluated at the equilibrium are \( r(b^F, Z(b^F)) \), respectively \( R(B^F, b^F) \). Now, \( r_B(b^F, z(b^F)) = 0 \) and \( R_b(B^F, Z(B^F)) = 0 \). \( \square \)

Anticipating the followers bribe-rate puts the leading tier into a position to internalise vertical externalities. Therefore, by clearly assigning spheres of responsibility, sequentiality among tiers provides a way to deal with corrupt overgrazing alternative to centralisation proposed by Shleifer and Vishny (1993). Even more, in terms of combatting corruption, such a sequential moves federation upholds the benefits attached to inter-state competition and horizontal externalities of proposition 2.

### 3.6 Comparative Considerations

Figure 3.5 draws together the participation constraint facing officials (see fig. 3.2) and firms (see fig. 3.3) as well the rent function (see fig. 3.4), which jointly determine the endogenous number of firms and Leviathans as well as the amount of resources devoted to corruption in terms of the level of bribe-rates or the rent obtained from graft.

Under centralisation (C), the Leviathan faces neither competition nor externalities meanwhile extracting rents and therefore manages to divert a maximum of resources into his pockets, as shown by the Laffer relationship of the first quadrant. Confederate (c) and fed-
eral (F) structures of government exhibit externalities, which locates their equilibrium on the upward, respectively downward sloping part of the Laffer curve leaving them with lower rents \((r, R)\). Conversely, as regards bribery, which is mapped onto the vertical axis, externalities work in the opposite direction with vertical externalities leaving federal Leviathans with excessively high bribe-rates whereas horizontal externalities leave confederate Leviathans with bribe-rates, which are too low from their perspective.

Above all, the number of Leviathans \((m(b))\) constitutes an endogenous variable determined according to participation constraints (3.3). According to the distribution of power within federations, equilibrium bribe-rates map into participation decisions on the state tier, with differences in monitoring and incentives translating into heterogenous behaviour as regards corruption:

**Proposition 5** On the state tier, the endogenous number of officials tempted into corruption \(m(b)\) relative to a balanced power federation with \(\Gamma^F\) is higher in an asymmetric power federation with \(\Gamma^f\) when states act as first mover but lower when the federal unit constitutes the first mover.

**Proof:** After Lemma 1, \(m_b > 0\). The result follows from the first-mover advantage inherent in (3.36) and (3.39).

Proposition 5 is a direct consequence of the ranking of bribe-rates in various types of federations. With the advantage of power distributed in their favour, state Leviathans manage to extract relatively high bribes. In turn, due to the heterogeneity in monitoring, endemic corruption increases the endogenous number of Leviathans on the state tier.

Conversely, on the supreme tier participation is dichotomous in the sense of a quality of monitoring \(Q > Q_m\), capable of wiping out corruption opposed to \(Q < Q_m\), rendering the entire tier subject to self-enrichment. Hence, centralising public power constitutes a double edged sword when pooling power on the supreme tier allows to combat corruption more effectively, but at the same time creates the temptation for abuse, the more the rents at stake typically exceed those available on the lower tier.

Consolidated bribe-rates relate, furthermore, to the endogenous number of firms \((N)\) constituting the only surplus generating unit within the present federation and therefore provides a possible welfare measure. Moreover, the number of firms exiting the market relates to the number of jurisdictions, \(m(b)\), affected by corruption.
Proposition 6  Relative to the centralistic Leviathan, the number of firms $N(\beta)$ the entire economy can support is higher in a confederation $\Gamma^c$ but lower in a balanced power federation $\Gamma^F$.

Proof: After Lemma 2, $N_\beta < 0$. Since after Lemma 1, $m_b > 0$ the result follows directly from proposition 2 stating that $b^{\Gamma^c} \leq B^{\Gamma^C}$ and proposition 3 stating that $\beta^{\Gamma^F} \geq B^{\Gamma^C}$. 

Whilst assessing the extent of corruption, it seems a priori not evident whether to apply bribe-rates or rents as measure: Considering rents, the centralised Leviathan prevails in diverting the largest amount of resources into his pockets meanwhile introducing any kind of competition across or within tiers, reduces the extent of corruption. However, federalism with a balanced distribution of power increases consolidated bribe-rates and hence the cost burden for firms inspected by corrupt Leviathans. Therefore, under this scenario more firms decide to exit the market.

3.7 Concluding Remarks

Excessive levels of corruption have been attributed in the economic literature to weak central government with a constitution establishing several - possibly multi-tiered - authorities to deal with the same licensing process (e.g. Shleifer and Vishny, 1993). This approach has been introduced into the analysis of federal government structures (e.g. Treisman, 1999) anticipating to find more widespread misconduct due to corrupt overgrasing. The present theoretical analysis suggests, however, a more complex mapping from federalism onto corruption with countervailing forces attributed to horizontal and vertical competition within respectively across tiers of government as well as incentives and monitoring guiding participation decisions for misconduct.

In general, discretionary power together with economic rents gives rise to the temptation for corrupt abuse. In the same manner as competition among firms decentralises rents and market power, within federations, inter-state competition decentralises public power and hence undermines the basis for self-enrichment. Conversely, when jurisdictions overlap, intra-state competition threatens to entail uncoordinated corrupt overgrasing.

In comparison to taxation, the voluntary character of bribery gives rise to corrupt exchanges being subject to individual rationality, which affects or even alters results entrenched in the literature on tax competition in federations. In particular, the effectiveness of monitoring and the equilibrium level of bribes determine the endogenous number of corrupt Leviathans. As the temptation to engage in corrupt conduct relates directly to the level of bribes at stake, the ambiguous impact of horizontal and vertical externalities carries over onto participation decisions. Thereby, political decentralisation allows exploiting differences in incentives and motivation inherent in officials participation decision to reduce the number
of Leviathans. Conversely, centralism constitutes a double-edged sword capable of wiping out corruption but also prone to potential misconduct, which would not be met by countervailing forces on other tiers. Finally, the interpretation of the results differs fundamentally, since, opposed to taxation, corruption benefits only the bribe-taker and lacks the potential of taxes to impact upon social welfare via providing public goods.

As regards policy conclusions, federal structures of government do not necessarily entail more corruption and the associated decentralisation of power might even provide a remedy against endemic government misconduct. In particular, the distribution of power within a federation, which can vary according to the process by which it was established, crucially determines the vulnerability of federations towards corruption. Above all, in order to benefit from political decentralisation meanwhile combating corruption, federations should assign clear spheres of responsibility, which give states or the federal tier a disproportionate share of power to avoid, as far as possible, overlapping responsibilities.
Appendix: Proofs of Propositions

Proof of Proposition 1: Define a parameter $\alpha$ designating the fierceness of competition (in terms of lower market power) among firms. Thus, market power is now $\theta(\beta, \alpha)$, with

$$\theta_\alpha < 0$$

Rents are, thus, given by $r = b\Phi_f(\theta(\beta, \alpha) - \beta)$ on the state tier and $R = Bm(b)\Phi_f(\theta(\beta, \alpha) - \beta)$ on the federal tier. Now, the impact of fiercer competition on rents is:

- State: $r_\alpha = b\phi(.)\theta_\alpha < 0 \quad \forall \ b > 0$
- Federation: $R_\alpha = Bm(b)\phi(.)\theta_\alpha < 0 \quad \forall \ B > 0 \ \square$

Proof Proposition 2: (a) From (3.21) and (3.26) we have:

$$\frac{B^{RC}}{b^{RC}} = \frac{P(e)}{P(e)} |\frac{\theta_b/m(b) - 1}{|\theta_B - 1|} > 1$$

Suppose not and $B^{RC} \leq b^{RC}$. As $\phi(.)$ and $\Phi(.)$ follow a uniform distribution,

$$\frac{P(e)}{P(e)} = 1$$

implying for $\frac{B^{RC}}{b^{RC}} \leq 1$ to hold, given $0 < \theta_{b,B} < 1$ of assumption 1 (a), that,

$$|\frac{\theta_b/m(b) - 1}{|\theta_B - 1|} \leq 1$$

and,

$$\theta_b/m(b) \leq \theta_B$$

As $m(b) \geq 2$ is required to initiate horizontal competition in confederations, this is only possible if $\theta$ is strongly concave in $b$, respectively $B$, violating assumption 1 (b).

(b) The value function evaluated at the equilibrium is:

$$r(b, b^{RC}) = b^{RC}\Phi_f(\theta(b) - b^{RC})$$

Given $m > 1$ and (3.10) the impact of an increase in $b$ whilst keeping $b^{RC}$ fixed is:

$$r_b(b, b^{RC}) = b^{RC}\Phi_f(\theta(b) - b^{RC})\frac{\theta_b}{m(b)} > 0$$

The positivity follows from the properties of $\phi$ and assumption 1 (a). Thanks to the envelope theorem, indirect effects of $b$ on $b^{RC}$ can be disregarded. \square
Proof Proposition 3: (a) From (3.21) and (3.30) as well as (3.31) we have:

\[
\frac{B^{\Gamma C}}{\beta^{\Gamma F}} = \frac{P(e) |\theta_b/m(b) - 1|}{2|\theta_B - 1|} < 1
\]

Suppose not, and \(B^{\Gamma C} \geq \beta^{\Gamma F}\). As \(\phi(.)\) and \(\Phi(.)\) follow a uniform distribution,

\[
\frac{P(e)}{P(e)} = 1
\]

implying for \(\frac{B^{\Gamma C}}{\beta^{\Gamma F}} \geq 1\) to hold that,

\[
\frac{|\theta_b/m(b) - 1|}{2|\theta_B - 1|} \geq 1
\]

and,

\[
\frac{1 - \theta_b/m(b)}{1 - \theta_B} \geq 2
\]

This is however impossible given that \(0 < \theta_b, \theta < 1\) of assumption 1 (a) and \(m(b) \geq 1\).

(b) With value function evaluated at the equilibrium equal to

\[
r(b^{\Gamma F}, B) = b^{\Gamma F} \Phi_f(\theta(\beta) - \beta)
\]

the impact of an increase in \(B\) is:

\[
r_B(b^{\Gamma F}, B) = b^{\Gamma F} \phi_f(\theta(\beta) - \beta)\left(\frac{\theta_b}{m(b)} - 1\right) < 0
\]

The non-positivity follows from the properties of \(\phi\) and \(0 < \theta_B < 1\) due to assumption 1 (a). Thanks to the envelope theorem, indirect effects of \(b\) on \(b^{\Gamma F}\) can be disregarded.

(c) With value function evaluated at the equilibrium equal to

\[
R(b, B^{\Gamma F}) = B^{\Gamma F} m(b) \Phi_f(\theta(\beta) - \beta)
\]

the impact of an increase in \(b\) is:

\[
R_b(b, B^{\Gamma F}) = B^{\Gamma F} \left[ m_b(b) \Phi_f(\theta(\beta) - \beta) + m(b) \phi_f(\theta(\beta) - \beta)\left(\frac{\theta_b}{m(b)} - 1\right) \right] \leq 0
\]

Based on the properties of \(m(b)\) and \(\Phi\) the first term in square brackets is nonnegative. Due to assumption 1 (a) the second term in square brackets is non-positive rendering the sign of the expression indeterminate. □
Notes

18 Aidt (2003) provides a recent overview of the literature on corruption structured around a principle-agent framework.

19 Tiebout (1956) refers to such geographic substitution somewhat colorfully as “voting by feet”. In a more general context, the benefits of decentralisation meanwhile constraining public abuses feature in Brennan and Buchanan (1977, 1980).

20 Shleifer and Vishny (1993) refer to the case of various specialised authorities regulating different aspects of a licensing process like, health, safety, taxes etc. rather than multi-tiered government. The analysis, however, carries over to the federal-state relationship.

21 Likewise, tax evasion provides a way to circumvent compulsory taxation. To some degree, avoiding taxation constitutes a counterpart to corruption as it may be defined as an abuse of private power at the expense of the public benefit. Indeed, Dreher et al. (2005) suggest corruption and tax evasion, measured by the size of the shadow economy, to be theoretically and empirically intertwined concepts.

22 Hence, the term “officials” can here be interpreted widely including bureaucrats, politicians, or even entire government authorities.

23 Whilst investigating the regulation of entry, Djankov et al. (2002) show indeed how corruption systematically relates to the number, the time, and cost involved in starting up a business without regulation having any apparent impact upon the provision of public goods.

24 Compare Besley and McLaren (1993). Aidt (2003) provides an overview of studies taking q as exogenous as well as attempts to let monitoring quality depend on the history of corruption, e.g. q(b).

25 Rose-Ackerman (1999) indeed reports numerous examples of bribery involving large public or military construction projects, administering natural resources, or collecting taxes and duties. Within a theoretical context, Acemoglu and Verdier (2000) consider a discrete distribution about disguising dishonesty, with types either talented or untalented in taking bribes.

26 Compare Bliss and Di Tella (1997) for a similar approach in modeling corruption with a univariate distribution.

27 This scenario indeed reflects the standard location model of product differentiation (Hotelling’s Beach).

28 Throughout the exposition, derivatives shall be denoted by subscripts. Meanwhile superscripts relate to a specific type of official, firm, or constitution.

29 Considering an additive separable utility function instead - e.g. the linear utility function applied in Besley and McLaren (1993) or Mookerjee and Png (1995) - removes the indeterminacy meaning paying efficiency wages decreases the level of monitoring required to prevent misconduct.

30 Horizontal competition could equally be modeled through firms dislocating across jurisdictions in order to achieve cost savings (compare Arikan, 2004).

31 Based on such decisions to engage in malfeasance, classic authors like James Madison have stressed the importance of selecting representatives upholding virtue into government, alongside monitoring and punishment to prevent endemic corruption. Within this spirit, Besley (2005) provides an approach to the political economy of selection, motivation, and incentives within a principal-agent context.

32 See Sanyal et al. (2000) for a theoretical analysis of the impact of corruption on the shape of the Laffer curve.

33 A similar reasoning features in Bliss and Di Tella (1997, pp.1012ff.) albeit their impact upon corruption is evaluated with regard to bribe-rates rather than rents. The overall effect in respect to bribe-rates is ambiguous since fiercer competition reduces the sustainable number of firms but moves the marginal firm into a region, where it is less likely to be pushed into bankruptcy.

34 An excellent comparative overview of federal systems can be found in Watts (1999). For an early treatment see Wheare (1956).
Examples for the process of aggregation include Austria, Germany, Switzerland, and the United States. Conversely, the federations of Spain and Belgium have been established more recently by means of a devolution process.

A formal proof can be found in standard textbooks on microeconomics, e.g. Varian (1999).

For a similar approach see Bliss and Di Tella (1997, pp.1012ff.).
Bibliography


Federalism divides public power between tiers of governance and modifies, therefore, an essential component upon which corruption - defined as an abuse of public power for private benefit - rests. Due to the countervailing incidence inherent in the horizontal and vertical dimension of multi-tiered governance, theoretical analysis of the previous essay suggests federalism to impact upon corruption in a complex manner:

As regards its vertical dimension, federalism implies that more than one government acts directly and within its sphere of responsibility autonomously upon each citizen entailing the risk for corrupt overgrasing (Shleifer and Vishny, 1993). Especially, vertical externalities, which rest on bribes being extracted in an uncoordinated manner across complementary tiers of governance, may result in relatively endemic corruption. Conversely, in respect to the horizontal dimension, competition among lower-tiered jurisdictions over a commonly shared bribe-base provides a remedy against abuses of public power (Arikan, 2004). As suggested in essay 1, participation decisions taken by government representatives modify these countervailing horizontal and vertical forces entrenched in the literature on tax competition in federations (e.g. Keen and Kotsogiannis, 2002, 2003) since, unlike taxation, bribery constitutes a voluntary, albeit illegal, transaction.

Owing to the ambiguous theoretical implications inherent in the mapping of federalism
onto corruption, there is scope for empirical testing. In fact, in a cross-country study on the causes of corruption, Treisman (2000) finds political decentralisation to relate positively to government misconduct, supporting theories emphasising corrupt overgrazing in federations. However, results on the effects of fiscal decentralisation (Fisman and Gatti, 2002; Arikan, 2004) argue the converse in the sense that more decentralised countries are less affected by endemic bribery and nepotism. These findings, thus, provide a puzzle insofar as federalism and fiscal decentralisation constitute closely intertwined concepts, with effective multi-tiered governance necessitating distinct tax bases for both regional and general government (see Watts, 1999, ch.4). Fisman and Gatti (2002, pp.326ff.) attribute the existence of various types of decentralisation to this puzzle. However, whilst historically grown federations differ a great deal in the extent of inter-jurisdictional competition, monitoring, and possibilities for centralised rent-seeking (see Watts, 1999), the exact theoretical and empirical justification for these countervailing results remains obscure.

Above all, countries do not adopt a federal constitution at random but rather based on attributes. According to Oates’ (1972) decentralisation theorem the benefits of providing public goods locally increase with the heterogeneity in tastes and preferences and the size of territorial subunits allowing to take advantage of economies of scale. On average, federations indeed exceed other countries in terms of country size, population, and ethnic diversity, which may represent measures for the heterogeneity in preferences and thereby the desire to provide public good locally (Panizza, 1999). Countries sharing such attributes, thus, face a higher probability to draw up a federal constitution. With attributes like ethnic diversity in turn relating systematically to corruption (Treisman, 2000), significant differences in the level of corruption between single and multi-tiered countries might simply reflect different underlying probabilities in adopting federalism rather than genuine corrupt overgrazing - e.g. regressing federalism (unconditionally) onto a corruption index might introduce a selection bias.

The contribution of the present essay lies in taking the endogenous nature of drawing up a federal constitution into account meanwhile establishing the empirical mapping between multi-tiered governance and government misconduct. This calls for econometric methods like switching regressions or propensity score matching, which identify the probability of adopting federalism during a first stage, in order to cope with estimation bias introduced by sample selectivity when evaluating the (conditional) impact of federalism upon corruption during a second stage.

As regards the first stage, results reveal a close empirical relationship between federalism and country characteristics like ethnic diversity, economic development, and size in terms of area and population. After taking into account actual characteristics shared by federations, the second stage finds federalism to be significantly and negatively related to corruption.
coinciding with the impact of fiscal decentralisation. Thus, the benefits of decentralising political power according to the federal principle seem to prevail over concerns about possible uncoordinated corrupt overgrazing, once the propensity of adopting federalism constitutes an integral part of the econometric strategy.

Furthermore, the negative relationship between federalism and corruption holds even if perception based measures of corruption - like the corruption perceptions index (CPI) - should reflect a ranking rather than a cardinal index making them somewhat unsuitable in guiding parametric regressions as dependent variable. In particular, employing propensity score matching (compare, Heckman et al., 1998; Persson et al., 2003) designed to cope with both ordinality and sample selectivity as well as a recently developed corruption index based on a structural model (Dreher et al., 2004), which is therefore more likely to exhibit cardinal properties, preserves the negative relationship between federalism and corruption.

The remainder of this essay is organised as follows: In order to introduce the variables and for the sake of comparability, section 4.1 re-estimates the empirical results on the effect of political and fiscal decentralisation onto corruption featuring in Treisman (2000), Fisman and Gatti (2002), as well as Arikan (2004) with the current more recent and extended data set. Section 4.2 discusses the endogenous nature of drawing up a federal constitution and establishes the relationship between country attributes and the probability to adopt federalism. Drawing on the estimates of 4.2, the following section 4.3 applies switching regressions respectively propensity score matching methods in order to mitigate against selection bias and potential ordinality of corruption indicators. Section 4.4 provides some concluding remarks.

4.1 Data and OLS Estimates

In order to introduce the control variables impacting upon corruption, the following reproduces the essence of the results featuring in Fisman and Gatti (2002), Arikan (2004), and Treisman (2000). The present extended and more recent data set contains cross-country observations averaged predominantly over the years 1999 - 2003. Depending on the specification, this allows including between 52 and 116 countries meaning up to about 60 more than in previous studies. Table 4.1 reports the corresponding results. Precise definitions and the sources of the variables are deferred to table 4.9 of the appendix.

4.1.1 Dependent Variable: Corruption

From an economic perspective, corruption arises whenever agents entrusted with a public position abuse their discretionary power to secure rents in a reciprocal exchange with issuing illegal rights or providing privileged treatment. The reciprocal character of the exchange contrasts corruption with other economic crimes like fraud or embezzlement. Moreover, the
element of crime distinguishes corruption from rent-seeking activities like lobbying, which do not impair prevailing rules. In particular, its clandestine character provides parties involved in bribery with every incentive to disguise their conduct making it virtually impossible to obtain reliable direct measures on the extent of corruption. Nonetheless, two ways have been proposed in order to indirectly extract comparative information about the relative extent of
corruption around the world. Columns (1) to (3) of table 4.2 contain an overview of the resulting corruption indices across the counties of the current sample:

<table>
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<th>Perception-based indices</th>
<th>Corruption perception index (CPI)</th>
<th>CPI survey sources</th>
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<td>Perception based indices result from a rating by various surveyed groups like investors, country analysts, or the general public as regards their appraisal of the extent of bribery within a country. These include the corruption perception index (CPI), which is most widely used in empirical work and compiled by Transparency International - a NGO dedicated to fighting corruption - by drawing together at least three surveys on corruption around the same mean and variance on a scale from 1 to 10. Among else, the CPI comprises the corruption survey of the Global Competitiveness Report of the World Economic Forum, the World Competitiveness Yearbook of the Institute for Management and Development in Lausanne, the World Business Environment Survey of the World Bank, and the International Country Risk Guide of the Economists’ Intelligence Unit. On its own, the index published by the International Country Risk Guide (ICRG) reflects an experts’ assessment on a scale from 0 to 5. Where necessary, indices have been reversed such that higher values mean more endemic corruption.</td>
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The caveat against survey based techniques lies in their subjective nature as culture might shape attitudes towards corruption, and current perceptions are likely to overreact towards scandals involving bribery. In essence, perception based indices provide an ordinal ranking rather than a cardinal measure of corruption around the world. In fact, the scores attached to perceptions translate neither into information on the actual extent of corruption nor into any other associated cardinally measured economic variable. E.g. a doubling of the CPI does by no means represent a doubling in the extent of bribery. The ordinal character of perception based indices reduces their information content and renders them somewhat unsuitable in guiding OLS regressions, since linear regressions treat the difference between a CPI score of 5 and 6 the same as the difference between 4 and 5, whereas in fact they represent, possibly, only a ranking.

In order to mitigate against ordinality, Dreher et al. (2004) have recently extracted a latent measure of corruption embedded in a structural model. This structural corruption index (CSI) exploits the causes and consequences of bribery by means of the Multiple Indicators Multiple Causes technique (MIMIC). Then, differences across index scores relate to underlying causal and consequential variables, most of which exhibiting cardinal properties. Nevertheless, difficulties in attributing an interpretation to the level of the index remain, which is reflected in the fact of scores having been normalised around a reference value of 0.

As reported in table 4.1, in terms of direction of impact the results of previous studies
### Table 4.2: Corruption and Decentralisation Data

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are reasonably robust towards employing alternative measures of corruption. This is not surprising given that the pairwise correlations between ICRG, CPI and CSI lie between 0.74 and 0.85. Yet, aside from maybe economic development (GDPPC) and democratic rule (DEMAGE), the choice about the corruption index may determine whether or not a variable is deemed to impact significantly upon bribery.

4.1.2 Control Variables

Meanwhile establishing the interrelationship between fiscal and political decentralisation and corruption, economic, institutional, historical, and social variables of the second panel of table 4.1 control for spurious correlations. Treisman (2000) provides a comprehensive study on the empirical factors causing countries to be more corrupt.

The size of government in terms of public expenditure as a share of GDP (GOVSHARE) controls for the amount of resources potentially subject to public abuse. Yet, GOVSHARE produces a negative entry meaning that empirical results do not suggest that a bigger public sector inevitably entails more corruption. Indeed, Scandinavian countries regularly top the list of the least corrupt countries despite their vast public sector. However, current data on the size of government relate to the 1980ies and 90ies and might, therefore, not yet reflect the impact of economic deregulation undergone by the public sector in many countries during the 1990ies.

Countries sharing a commitment to a decentralised economic system based on market exchange typically experience lower levels of government misconduct, since economic rents tend to erode on competitive markets undermining one pillar upon which corrupt exchanges rest. Ades and Di Tella (1999) employ trade openness (OPEN) to capture this impact of competitive markets upon corruption. Likewise, OECD membership involves a commitment to establish and maintain institutions underlying market based economies and provides an alternative measure to control for competitive markets.

Economic development measured by logarithmic GDP per capita (GDPPC) impacts significantly negative upon corruption. The causality of this relationship remains yet obscure insofar as corruption might prevent economic development, e.g. via impeding foreign direct investment (see essay 3), or only developed countries being in a position to afford institutions necessary to constrain government misconduct (Mauro, 1995).

Institutional quality is widely reflected by the index of civil liberties (CIVIL) ascribed to Gastil with values between 1 (least freedom) and 7 (most freedom). In particular, institutional features like a free press and the freedom to set up political associations might provide a monitoring device to denounce corrupt behaviour and thereby open up ways for provoking scandals. Likewise, education measured by school enrollment on the secondary
level (SCHOOL) might provide citizens with the knowledge to challenge government misconduct. None the less, empirically CIVIL and SCHOOL fail to produce consistently significant coefficients.

Moreover, long established democratic rule (DEMAGE) fosters institutions dedicated to transparency and accountability by means of fair and free elections. As such, the significantly negative entry of DEMAGE can be interpreted in a similar manner as the entry of CIVIL.

La Porta et al. (1999) suggest that, compared with common law, countries with a French colonial heritage and consequently adopting French civil law (LEGFRA) tend to experience a relatively worse protection of (property) rights and ultimately higher levels of corruption.\textsuperscript{42} This hypothesis only finds support with the CPI as dependent variable. However, results based on the CSI suggest countries never subject to colonial rule (NEVERCOL), and therefore governed within a relatively stable institutional setting, to suffer significantly less from corruption.

The size of a country measured in terms of population (POP) constitutes a potential source for spurious correlation not least because of its correlation with the extent of fiscal decentralisation. Equally, POP could reflect economics of scale in providing public goods including efforts to prevent corrupt abuses (Treisman, 1999).

Fearon and Laitin (1996) present and argument that local ethnic communities act as a social control mechanism exerting informal sanctions against members betraying their co-ethics. Theoretically, this suggests a negative relationship between ethnic diversity and corruption. However, when measured by the probability that two persons drawn at random from a countries population belong to different ethnicities (ETHNIC), this hypothesis does not find widespread empirical support.

The share of the population affiliated to protestant beliefs (PROT) impacts negatively upon corruption. Possible explanations lie in the non-hierarchical, or decentralised, character of Protestant institutions shaping a culture of challenging agents entrusted with public power together with Protestants traditionally having a supportive attitude towards state and government.

4.1.3 Decentralisation

As regards the impact of variables pertaining to decentralisation, which are reported in the bottom panel of table 4.1, recall that decentralisation is not exogenous but constitutes rather an endogenous choice variable about the structure of governance. Thus, corresponding OLS estimates might suffer from selection bias and be misleading. Therefore, they serve here only as an indicative result.

Alternative measures of fiscal and political decentralisation do not impact upon corrup-
Fiscal decentralisation measured by the share of government expenditure, respectively revenue, undertaken by sub-national units enters negatively and widely significantly in regressions explaining corruption. This reflects, in essence, the results reported in Fisman and Gatti (2002), as well as Arikan (2004). However, due to a lack of data on fiscal decentralisation, which are only available from the 1980ies up to the beginning of the 1990ies, these results include merely more than 60 countries. Conversely, introducing an indicator variable for federal countries in OLS regressions suggests that federations are perceived to be more corrupt (Treisman, 2000, pp.430ff.), which could be attributed to corrupt overgrasing.

Federations almost always earmark distinct tax bases to each tier (Watts, 1999, ch.4) and design arrangements of financial transfers in order to enable jurisdictions to exercise their constitutionally assigned responsibilities as well as to smooth out vertical and horizontal imbalances. According to the data of table 4.2, for the period 1980 to 1995, the share of sub-national government expenditure and revenue in federations exceeds other countries, where fiscal decentralisation averages only 16% respectively 11%, by about 15 percentage points. Moreover, federations like Canada, India, Switzerland, or the United States top the list of the most fiscally decentralised countries with local revenue and expenditure lying above 50% of the corresponding total. Insofar as fiscal and political decentralisation constitute closely intertwined concepts, their countervailing impact upon corruption featuring in Fisman and Gatti (2002) respectively Treisman (2000) provides a puzzle. However, the OLS framework employed to obtain these results, might not be suitable when federalism is not an exogenous variable, meaning there is some interdependence between adopting multi-tiered governance, the extent of corruption, and control variables. Indeed, Treisman (2000) speculates about the impact of federalism upon corruption:

"Could that apparent relationship be caused by some third factor correlated with both federal structure and corruption? Federalism is often viewed as accommodation to ethnic diversity [...]. It might be that countries with larger areas or populations are both more likely to be federal and to be relatively more corrupt (perhaps because their economies are less exposed to competition from imports).” (p.432)

Therefore, the econometric strategy employed during the remainder will go beyond the OLS framework. In order to control for the potential endogenous nature of multi-tiered governance, at first country attributes need establishing, which increase the propensity to draw up a federal constitution.
4.2 Endogenous Federalism

4.2.1 Federations around the World

Federalism refers to a structure of government, "which has been formed for common purpose, but in which the member states retain a large measure of their original independence" (Wheare, 1956, p.1). The key principle lies in a division of power over a territory, so that general and regional authorities are not subordinate to one another, but within typically constitutionally assigned spheres, coordinate and autonomous aiming to achieve a balance between unity and diversity. Following Treisman (2000), countries sharing such a combination between shared-rule and self-rule include: Argentina, Australia, Austria, Belgium, Brazil, Canada, Germany, India, Malaysia, Mexico, Nigeria, Pakistan, Russia, Spain, Switzerland, the United States, and Venezuela. As reported in table 4.2, additional federations included in the present extended sample are Ethiopia, South Africa, and Serbia and Montenegro as residual of the former Federal Republic of Yugoslavia. Notably, these 20 federations encompass highly developed and underdeveloped countries and locate on all continents. Nevertheless, compared with other countries, table 4.3 uncovers systematic differences with typical federations being wealthy countries with a large population and territory. Furthermore, multi-tiered governance can be designed in order to cope with the heterogenous preferences of an ethnically diverse population, albeit, within the present sample, the corresponding mean-difference fails to be statistically significant.

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4.2.2 Federalism and Selection Bias

Similarities across federations suggest countries to adopt multi-tiered governance according to a set of attributes rather than by historical accident. The corresponding selection process might introduce considerable selection bias in OLS regressions when some country characteristics condition on both their probability to become a federation and the extent of corruption. To see this, let $C_M$ and $C_S$ represent the vector of corruption indices pertaining to countries with multi-tiered respectively single-tiered governance. Correspondingly, the indicator variable $F = 1$, respectively $F = 0$, designates the actual choice about federalism with countries
selecting themselves into the set $M$ with politically decentralised jurisdictions respectively $S$ containing other countries, where political power is centralised on a single tier. Whether or not a country adopts multi-tiered governance conditions systematically on attributes denoted by the set $Z$, which overlaps with covariates $X$ impacting upon the extent of corruption, $Z \cap X \neq \emptyset$. The problem at hand consists of establishing the expected mean difference, $\tau$, in the extent of corruption of single-tiered countries, would they undertake constitutional reform towards multi-tiered governance - e.g. a change from $F = 0$ to $F = 1$ - conditional on covariates $X$:

$$\tau|_{F=1} = E[C_S|X, F = 1] - E[C_S|X, F = 0] \quad (4.1)$$

However, meanwhile estimating (4.1) a missing data problem emerges since every country can only be observed under one government structure at a time $C_{(i)} = (1-F)C_S + FC_M$, e.g. the first term on the right hand side is latent. A "solution" to this problem consists of simply replacing $E[C_S|X, F = 1]$ with the expected mean of actual federations $E[C_M|X, F = 1]$. Then again, attributes $Z$ entailing countries with $F = 0$ and $F = 1$ not to constitute exact counterfactuals, give rise to a selection bias:

$$B(Z) = E[C_M|X, F = 1] - E[C_S|X, F = 1] \quad (4.2)$$

Such selection bias can be circumvented by recognising that the endogenous choice of federalism relates to corruption within the following system of structural equations:

$$\text{Federalism} \quad F^* = G(Z) + \mu^* \quad (4.3)$$
$$\text{Corruption} \quad C^* = H(F, X^*) + \epsilon^* \quad (4.4)$$

Based on this econometric system of equations, the present analysis aims at evaluating the impact of $F$ on $C$, e.g. the mean effect of adopting multi-tiered governance onto corruption.

Features worth noting within this econometric model are twofold: Firstly, since each country can actually only be observed under one government structure at a time, some variables remain unobserved, or latent, as denoted by a *. Notably, this applies to the federalism selection equation, where $F^*$ can be seen as the latent difference in social utility in respect to multi-tiered governance, which after the decentralisation theorem (Oates, 1972) depends on factors like the heterogeneity of preferences, price elasticity of demand, or scale economies in respect to the provision of local public goods. Secondly, federalism and the extent of corruption inter-depend within a system of structural equations. Thus when disregarding (4.3), a selection bias $B(Z)$ might arise. Confining estimation to (4.4) by means of OLS like in Treisman (2000) or Fisman and Gatti (2002) introduces in turn the following implicit assumptions (compare Persson and Tabellini, 2004, pp.30ff.):
CHAPTER 4. FEDERALISM AND CORRUPTION - EMPIRICAL RESULTS

Recursivity: Corruption is independent of attributes Z conditional on the choice about federal governance $C \perp Z|F$.

Linearity: H is a linear relationship, so the only effect of F occurs on the intercept of H.

Cardinality: $C$ is cardinal meaning sectioning the underlying scale into regular intervals allows attaching a meaningful interpretation to the length of subsequent intervals.

As regards the assumption of recursivity, adopting the federal principle seems rather a deliberate - or in statistical terms non-random - choice made when countries draw up or amend their constitution. Due to the heterogenous probabilities to be drawn into the set $M$ with multi-tiered governance, econometric methods robust towards relaxing the assumption of recursivity at first necessitate to establish the set of attributes $Z$, which, after (4.3), determine the probability of a country to adopt federalism.\textsuperscript{44}

4.2.3 Attributes to adopt Federalism

After Wheare (1956, p.35) "federal government is rare because its prerequisites are many". This subsection endeavours nevertheless to establish some attributes $Z$ impacting systematically upon federal regime choice, which has to my knowledge not been attempted before.\textsuperscript{45} Estimation occurs by means of binary choice models based on the actual adoption of federal constitutions, which link up with the corresponding latent process (4.3) through the following index function:

$$F = \begin{cases} 1 & \text{if } F^* = Z\alpha + \mu > 0 \quad \text{Federations} \\ 0 & \text{if } F^* = Z\alpha + \mu \leq 0 \quad \text{Otherwise} \end{cases}$$

(4.5)

Considering $F$ instead of $F^*$ as well as assuming the stochastic component to be logistically distributed, $\mu \sim \lambda(Z\alpha)$, allows calculating the results of the Logit regressions reported in table 4.4.\textsuperscript{46}

Attributes inclining a country to become a federation encompass ethnic diversity, economic development, size in terms of land-surface and population, as well as legal origin:

The nexus between heterogenous preferences and the desire for decentralised decision making stands crucial in Oates’ (1972) decentralisation theorem. When ethno-linguistic communities diverge as regards tastes about public goods provision, ethnic fractionalisation ($ETHNIC$) - measured by the probability that two persons drawn from a countries population belong to different ethnicities - provides a proxy for heterogenous preferences (Panizza, 1999), which in turn creates a desire for federalism allowing to tailor the level of local public goods and regulations to communities’ tastes.\textsuperscript{47} Indeed, figure 4.1 shows an exponential increase in the propensity to adopt a federal constitution for ethnically more diverse countries.
Table 4.4: Logit Regressions onto Federations

Notes: The dependent variable is FEDERAL. Table 4.9 contains descriptions and sources of all variables. Results have been calculated by means of a Logit regression. Standard errors are in parentheses. They are heteroscedasticity robust, applying the method of White. Coefficients significant at the 10% level are labelled with *, at the 5% level with **, and at the 1% level with ***.

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<td>1.21***</td>
<td>0.96***</td>
<td>1.03***</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.28)</td>
<td>(0.29)</td>
<td></td>
</tr>
<tr>
<td>Legfra</td>
<td></td>
<td></td>
<td>-0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.76)</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-24.8***</td>
<td>-34.86***</td>
<td>-36.68***</td>
<td>-42.44***</td>
</tr>
<tr>
<td></td>
<td>(4.81)</td>
<td>(6.08)</td>
<td>(7.42)</td>
<td>(9.00)</td>
</tr>
<tr>
<td>McFadden $R^2$</td>
<td>0.37</td>
<td>0.45</td>
<td>0.47</td>
<td>0.53</td>
</tr>
<tr>
<td>N</td>
<td>168</td>
<td>167</td>
<td>164</td>
<td>160</td>
</tr>
</tbody>
</table>

Furthermore, a large population ($POP$) entails, typically, a large number of jurisdictions and potentially diverse preferences about the quantity and quality of public goods. Similar to cultural distance in terms of ethnic diversity, geographic distance in terms of a large land surface ($LAND$) tends to isolate communities and fosters diversity and regional consciousness, which underlies the preponderance of countries with a large territory among federations.

On an international level, the entry of the first three variables of table 4.4 coincide with the outcome of Strumpf and Oberholzer-Gee (2002), who find for the case of liquor control in American states that more religious diversity a larger population as well was land area create a desire for delegating the power to prohibit the consumption of alcohol to the local (county) tier.

Meanwhile, multi-tiered governance imposes a considerable cost burden on countries’ resources through inevitably overlapping responsibilities and foregoing economies of scale in supplying and administering (national) public goods. As the ”luxury” of federalism, and the benefits thereof, apparently exhibit properties of a normal good, economic development ($GDPPC$) enters the Logit regression with a positive coefficient.

Finally, legal institutions originating in the civil rather than common law tradition favour centralised governance with centrally enacted statutes being valid over the entire territory. Empirically, this relationship applies in particular to countries with French ($LEGFRA$) rather than German legal heritage (Fisman and Gatti, 2002, p.337). Although failing to produce a significant impact upon the choice about federalism, $LEGFRA$ enters (4.5) with the expected negative sign and according to figure 4.1 decreases the probability to adopt multi-tiered gov-
Figure 4.1: Probability Response of Adopting Federalism towards Ethnic Diversity and French Legal Origin

Further specifications than those of table 4.4 have been used to estimate the choice of adopting federalism. In particular, federations must reach some minimal consensus on political governance to safeguard the autonomy of jurisdictions. Indeed, the constitutions of the United States and Switzerland require states respectively cantons to be republics and Australia as well as Canada prescribe constitutional monarchy as form of government to all provinces. However, some federations only impose weak democratic institutions and the causality might run from federalism to democratic rule instead. Therefore, table 4.4 does not include control variables such as DEMAGE. Furthermore, POP could be divided by LAND to obtain a more parsimonious model with population density as covariate. However, the propensity of a country to adopt multi-tiered governance relates, as noted earlier, rather to absolute country size. Correspondingly, population density did not produce a significant entry in (4.5). Above all, considering alternative specifications of (4.5) that include covariates on democratic rule and population density did not overturn the essence of the undermentioned results.

Based on equation (4.5), the probability \( P(Z) \) of countries with attributes \( Z \) to adopt federalism - henceforth referred to as propensity score - can be inferred via the coefficients in column (4) of table 4.4 since:
\[ P[F] = P[F^*] = P[Z\alpha - \mu > 0] = P[\mu > -Z\alpha] = 1 - \Lambda[Z\alpha] \] (4.6)

Table 4.2 reports resulting propensity scores for federal and other countries. The probability to adopt multi-tiered governance ranges from less 1% to over 99% with propensity scores in federations averaging 56% exceeding those of other countries by about 50 percentage points.

4.3 Federalism and Corruption: Results from Models with Endogenous Selection of Federalism

Against the background of different countries facing different propensities to be drawn into the set \( M \) containing federations, the expected extent of corruption, \( E[C|X, Z] \), conditions on both the set of covariates, \( X \), but also the set containing attributes, \( Z \), which impact upon the choice about adopting multi-tiered governance \( F \). Hence, adopting the federal principle is a deliberate - or in terms of statistical theory non-random - choice made when countries draw up or amend a constitution. Unless the assumption of recursivity holds (Persson and Tabellini, 2004), robust inference between federalism and corruption necessitates the usage of a two-stage procedure:

The first stage establishes propensity scores, \( P(Z) \), as reported in table 4.2, which assign probability weights reflecting the endogenous choice about federalism according to (4.3). Taking into account propensity scores, the second stage evaluates the conditional expectation of corruption as regards political decentralisation along the lines of (4.4). Thereto, the set of covariates \( X \) includes \( ETHNIC, GDPPC, DEMAGE, LEGFRA, OPEN, POP, \) and \( PROT \) coinciding widely with the theoretically underpinned control variables employed in Treisman (2000) as well as Fisman and Gatti (2002) (see section 4.1). Note that the set of covariates \( X \) and the attributes of federal countries \( Z \) partly overlap but also contain separate variables such as \( OPEN, PROT, \) or \( LAND \) to identify the equations onto corruption (4.4) respectively the choice about multi-tiered governance (4.3).

Table 4.5 provides corresponding summary statistics and pairwise correlations across the common sample containing 88 countries (to save space, the statistics of nominal variables have been dropped from table 4.5).

The present employs switching regressions, which parameterise the stochastic error \( \epsilon^* \) into a normal distribution as well as nonparametric propensity score matching, to guard against the endogenous nature of federalism meanwhile establishing the empirical mapping of federalism onto corruption.
### Table 4.5: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>ICRG</th>
<th>CPI</th>
<th>CSI</th>
<th>Demage</th>
<th>Ethnic</th>
<th>L.(Gdppc)</th>
<th>L.(Land)</th>
<th>Open</th>
<th>L.(Pop)</th>
<th>Prot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Index</td>
<td>Index</td>
<td>Index</td>
<td>Years</td>
<td>%</td>
<td>US$(1995)</td>
<td>Km²</td>
<td>%</td>
<td>Integer</td>
<td>Percent</td>
</tr>
<tr>
<td>Mean</td>
<td>2.4</td>
<td>5.8</td>
<td>0.08</td>
<td>21.8</td>
<td>0.44</td>
<td>7.63</td>
<td>11.14</td>
<td>0.68</td>
<td>15.33</td>
<td>17.2</td>
</tr>
<tr>
<td>Std.</td>
<td>1.2</td>
<td>2.2</td>
<td>0.26</td>
<td>36.4</td>
<td>0.26</td>
<td>1.59</td>
<td>2.78</td>
<td>0.39</td>
<td>2.06</td>
<td>23.41</td>
</tr>
<tr>
<td>Min.</td>
<td>0</td>
<td>0.2</td>
<td>-0.9</td>
<td>0</td>
<td>0</td>
<td>4.54</td>
<td>2.99</td>
<td>0.16</td>
<td>0.16</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>4.8</td>
<td>9</td>
<td>0.35</td>
<td>200</td>
<td>0.93</td>
<td>10.97</td>
<td>16.64</td>
<td>2.83</td>
<td>20.9</td>
<td>89.5</td>
</tr>
<tr>
<td>N</td>
<td>105</td>
<td>136</td>
<td>106</td>
<td>173</td>
<td>187</td>
<td>178</td>
<td>199</td>
<td>178</td>
<td>191</td>
<td>187</td>
</tr>
</tbody>
</table>

**Correlation Matrix**

*(Based on 88 Common Observations)*

<table>
<thead>
<tr>
<th></th>
<th>ICRG</th>
<th>CPI</th>
<th>CSI</th>
<th>Demage</th>
<th>Ethnic</th>
<th>L.(Gdppc)</th>
<th>L.(Land)</th>
<th>Open</th>
<th>L.(Pop)</th>
<th>Prot</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>0.84</td>
<td></td>
<td></td>
<td>-0.64</td>
<td>-0.65</td>
<td>-0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSI</td>
<td>0.74</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demage</td>
<td>-0.64</td>
<td>-0.65</td>
<td>-0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic</td>
<td>0.43</td>
<td>0.47</td>
<td>0.48</td>
<td>-0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.(Gdppc)</td>
<td>-0.77</td>
<td>-0.88</td>
<td>-0.87</td>
<td>0.62</td>
<td>-0.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.(Land)</td>
<td>0.09</td>
<td>0.23</td>
<td>0.20</td>
<td>0.08</td>
<td>0.23</td>
<td>-0.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>-0.21</td>
<td>-0.30</td>
<td>-0.20</td>
<td>-0.02</td>
<td>-0.07</td>
<td>0.25</td>
<td>-0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.(Pop)</td>
<td>0.14</td>
<td>0.25</td>
<td>0.04</td>
<td>0.09</td>
<td>0.05</td>
<td>-0.13</td>
<td>0.61</td>
<td>-0.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prot</td>
<td>-0.47</td>
<td>-0.46</td>
<td>-0.39</td>
<td>0.41</td>
<td>-0.13</td>
<td>0.27</td>
<td>0.06</td>
<td>-0.07</td>
<td>-0.22</td>
<td></td>
</tr>
</tbody>
</table>

#### 4.3.1 Switching Regression

In order to relax the assumption of recursivity (see section 4.2.2), switching regressions\(^{48}\) separate the corruption equation (4.4) into linear versions pertaining to federations with multiple tiers \((M)\) respectively single-tiered countries \((S)\), which are supposed to be guided by different conditional distributions:

\[
F = \begin{cases} 
1 & \text{if } F^* = Z\alpha - \mu > 0 \quad \text{Federations} \\
0 & \text{if } F^* = Z\alpha - \mu \leq 0 \quad \text{Otherwise} 
\end{cases} 
\]  

\[
C_M = X\beta_M + \epsilon_M \quad if \ F = 1 
\]  

\[
C_S = X\beta_S + \epsilon_S \quad if \ F = 0 
\]

Furthermore, \(\sigma_\mu, \sigma_M, \) and \(\sigma_S\) denote the standard deviations of the error term with respect to the selection process (4.7), respectively the corruption equations (4.8) and (4.9). Covariances between \(\mu\) and \(\epsilon_M\), respectively \(\epsilon_S\), are given by \(\sigma_\mu\) and \(\sigma_M\) with corresponding correlation coefficients denoted by \(\rho_M = \frac{\sigma_{\mu M}}{\sigma_\mu \sigma_M}\), respectively \(\rho_S = \frac{\sigma_{\mu S}}{\sigma_\mu \sigma_S}\).

According to (4.8) and (4.9) conditional expectations about the extent of corruption relate to the set of covariates, \(X\), but via (4.7) also to the set of attributes, \(Z\), characterising federal countries. Thereby, the endogenous choice about adopting federalism introduces an additional term, which, based on the logistic distribution underlying (4.5), contains the probability density \((\phi(.)\)) and cumulative distribution functions \((\Phi(.)\)),...
\[ E[C_M|F = 1, X_M] = X_M \beta_M - \sigma_M \rho_M \Lambda_M \quad \text{Federations} \quad (4.10) \]
\[ E[C_S|F = 0, X_S] = X_S \beta_S + \sigma_S \rho_S \Lambda_S \quad \text{Otherwise} \quad (4.11) \]

where,

\[ \Lambda_M = \frac{\phi(Z_\alpha)}{1 - \Phi(Z_\alpha)} \quad (4.12) \]
\[ \Lambda_S = \frac{\phi(Z_\alpha)}{\Phi(Z_\alpha)} \quad (4.13) \]

Thus, the expected extent of corruption rests on the unconditional impact associated with covariates \( X \) as well as a second term conditioning on the choices about the type of governance, which relates to attributes \( Z \) via the inverse Mills-Ratio \( \Lambda_M(Z_\alpha) \), respectively \( \Lambda_S(Z_\alpha) \). Estimates of the inverse Mills-Ratios of (4.12) and (4.13) are obtained by means of the fitted values of the logit regression reported in column 4 of table 4.4. Neglecting this term as in OLS regressions of table 4.1 entails an omitted variable bias. Furthermore, the estimated coefficient pertaining to the inverse Mills-Ratio designates the extent of self-selection, which typically increases with the covariance between covariates \( X \) and attributes \( Z \). In case pure randomisation determines which countries become federations, the covariance term \( \sigma_M \), respectively \( \sigma_S \), would drop to 0 implying effects conditioning on the choice about federalism would vanish. Drawing up a federal constitution does, however, not occur by simple chance, but, after section 4.2, relates systematically to observable country attributes like ethnic diversity, economic development, country size, or legal origin.

Table 4.6 contains the results of the second stage of the switching regression onto the three corruption indices considered thus far.

Resulting coefficients coincide widely with those of OLS regressions of table 4.1 in respect to the direction of impact, although in some instances sign reversals occur. In particular, economic development \( (\text{GDPPC}) \) and established democratic rule \( (\text{DEMADE}) \) seem to systematically reduce corruption. Moreover, there is some limited support for French legal heritage \( (\text{LEGFRA}) \) to foster government misconduct meanwhile competitive markets, measured by trade openness \( (\text{OPEN}) \), the share of Protestants \( (\text{PROT}) \), and ethnic diversity \( (\text{ETHNIC}) \) seem to constrain bribery. Further, the entry of country size in terms of population, which differs according to table 4.3 substantially between federations and other countries, is characterised by altering signs across various specifications of table 4.6. Above all, estimates of (4.11) yield significant coefficients for \( \hat{\sigma} \) attributed to self-selection bias, when corruption is measured by the \( \text{ICRG} \) and \( \text{CPI} \).
Table 4.6: Results from Switching Regressions

This table presents two stage estimates of switching regressions after equations (4.10) and (4.11). Standard errors are reported in parentheses. Coefficients significant at the 10% level are labelled with *, at the 5% level with **, and at the 1% level with ***.

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Other Countries</th>
<th>Federations</th>
<th>Other Countries</th>
<th>Federations</th>
<th>Other Countries</th>
<th>Federations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnic</td>
<td>-0.251</td>
<td>-0.356</td>
<td>-0.749</td>
<td>0.437</td>
<td>-0.019</td>
<td>-0.526</td>
</tr>
<tr>
<td></td>
<td>(0.611)</td>
<td>(1.301)</td>
<td>(0.640)</td>
<td>(4.298)</td>
<td>(0.070)</td>
<td>(0.377)</td>
</tr>
<tr>
<td>Log(GDPPC)</td>
<td>-0.363***</td>
<td>-0.556*</td>
<td>-1.001***</td>
<td>-1.250</td>
<td>-0.111***</td>
<td>-0.274**</td>
</tr>
<tr>
<td></td>
<td>(0.117)</td>
<td>(0.268)</td>
<td>(0.144)</td>
<td>(0.807)</td>
<td>(0.018)</td>
<td>(0.082)</td>
</tr>
<tr>
<td>Log(Pop)</td>
<td>-0.225**</td>
<td>0.202</td>
<td>0.063</td>
<td>0.033</td>
<td>-0.024*</td>
<td>-0.072</td>
</tr>
<tr>
<td></td>
<td>(0.099)</td>
<td>(0.254)</td>
<td>(0.103)</td>
<td>(0.625)</td>
<td>(0.013)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Legfra</td>
<td>0.225</td>
<td>0.543**</td>
<td>0.174</td>
<td>1.020</td>
<td>-0.027</td>
<td>0.213*</td>
</tr>
<tr>
<td></td>
<td>(0.099)</td>
<td>(0.254)</td>
<td>(0.066)</td>
<td>(0.088)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Demage</td>
<td>-0.010***</td>
<td>-0.001</td>
<td>-0.014**</td>
<td>-0.006</td>
<td>-0.002</td>
<td>-0.0001</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Open</td>
<td>-0.282</td>
<td>-0.007</td>
<td>-0.687**</td>
<td>-0.133</td>
<td>-0.066</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.284)</td>
<td>(0.231)</td>
<td>(0.283)</td>
<td>(0.647)</td>
<td>(0.051)</td>
<td>(0.137)</td>
</tr>
<tr>
<td>Prot</td>
<td>-0.960**</td>
<td>-0.915</td>
<td>-1.704***</td>
<td>-0.618</td>
<td>-0.217**</td>
<td>-0.178</td>
</tr>
<tr>
<td></td>
<td>(0.391)</td>
<td>(1.343)</td>
<td>(5.580)</td>
<td>(3.828)</td>
<td>(0.096)</td>
<td>(0.409)</td>
</tr>
<tr>
<td>Intercept</td>
<td>10.96***</td>
<td>3.939</td>
<td>15.00***</td>
<td>15.79</td>
<td>1.446**</td>
<td>3.484</td>
</tr>
<tr>
<td></td>
<td>(2.631)</td>
<td>(6.236)</td>
<td>(3.110)</td>
<td>(17.40)</td>
<td>(0.449)</td>
<td>(2.233)</td>
</tr>
<tr>
<td>σ</td>
<td>-1.586***</td>
<td>-0.766</td>
<td>-1.292*</td>
<td>-0.918</td>
<td>0.089</td>
<td>0.553</td>
</tr>
<tr>
<td></td>
<td>(0.618)</td>
<td>(1.075)</td>
<td>(0.710)</td>
<td>(3.326)</td>
<td>(0.166)</td>
<td>(0.363)</td>
</tr>
<tr>
<td>N</td>
<td>81</td>
<td>18</td>
<td>95</td>
<td>19</td>
<td>83</td>
<td>17</td>
</tr>
<tr>
<td>Adj. R²</td>
<td>0.554</td>
<td>0.873</td>
<td>0.832</td>
<td>0.794</td>
<td>0.781</td>
<td>0.760</td>
</tr>
</tbody>
</table>

Since federalism constitutes an endogenous choice variable, its expected mean effect in terms of difference between (4.10) and (4.11) cannot be tested via imposing restrictions on the switching regression. Rather, hypothesising about the empirical mapping between federalism and corruption necessitates comparing two non-nested models.

Simulating the choice process about adopting a federal constitution undergone by a large number of resampled countries yields comparable empirical distributions of corruption as regards single and multi-tiered governance. Predictions on the extent of corruption condition on covariates $X$ as well as attributes $Z$ and rest on the fitted values of equation (4.10) for countries having opted for federalism and otherwise on (4.11), calibrated by the coefficients reported in table 4.6. Furthermore, propensity scores of table 4.2 determine the probability weight attached to adopting a federal constitution during the resampling process. The following algorithm provides further details about the subsequent steps of the simulation process:

For replications $r = 1...R$

1. Draw countries into multi-tiered, $F = 1$, and single-tiered, $F = 0$, subsets according to
their propensity score $P(Z)$,

2. Predict for each resampled country the extent of corruption based on equations (4.10) and (4.11) calibrated with the coefficients of table 4.6,

3. Compare the mean and the empirical distribution for subsets containing federal and other countries.

Figure 4.2 depicts the resulting empirical distributions across their respective support for all three corruption indices after performing 10’000 bootstrap replications. Thereby, the dotted line reflects the simulated empirical distribution as regards corruption in federations with the dashed line showing the corresponding empirical distribution in other countries. The actual distribution of the observed corruption indices is given by the solid line. Against the benchmark of actual values, figure 4.2 reveals for federations a considerable shift in probability mass towards lower levels of corruption. In fact, table 4.7 reports estimated mean differences in terms of index scores (federal-other) equaling -0.30 for the ICRG, -0.68 for the CPI, and -0.16 for the CSI, all of which being statistically significant on all conventional levels of rejection. Thus, switching regressions suggest federalism to impact negatively upon corruption.

<table>
<thead>
<tr>
<th></th>
<th>ICRG</th>
<th>CPI</th>
<th>CSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Mean</td>
<td>2.37</td>
<td>5.75</td>
<td>0.08</td>
</tr>
<tr>
<td>Simulated Mean Federalism</td>
<td>2.06</td>
<td>5.14</td>
<td>-0.06</td>
</tr>
<tr>
<td>Simulated Mean Central Governance</td>
<td>2.36</td>
<td>5.82</td>
<td>0.10</td>
</tr>
<tr>
<td>Mean Difference (Fed-Other)</td>
<td>-0.30***</td>
<td>-0.68***</td>
<td>-0.16***</td>
</tr>
<tr>
<td>t-Value</td>
<td>21.00</td>
<td>20.69</td>
<td>39.02</td>
</tr>
</tbody>
</table>

### 4.3.2 Propensity Score Matching

Results of switching regressions might be spurious when corruption indices represent an ordinal ranking rather than cardinal measures of bribery around the world. Furthermore, the relationship between $C$ and $X$ might not be linear giving rise to potential misspecification of the functional form in switching regressions. Conversely, thanks to their nonparametric nature, propensity score matching methods allow to relax all assumptions of subsection 4.2.2, that is linearity and cardinality meanwhile guarding against potential self-selection.

Propensity scores, which are reported for each country in the final column of table 4.2, concisely map similarities across countries in respect to a multidimensional set of attributes,
Figure 4.2: Empirical Distributions of Federations and other Countries
Z_i), into one dimension P(Z). Within this context, matching rests on the idea of pairing each single-tiered country with similar federations in terms of propensity score. Rosenbaum and Rubin (1983) have established the conditions necessary to match exclusively onto one-dimensional propensity scores, instead of multi-dimensional attributes Z:

**Propensity Score Theorem:** Let P(Z) denote the probability to opt for multi-tiered governance, as defined by (4.6). Assume that 0 < P(Z) < 1 as well as Pr(S_1, S_2, ..., S_n) = \prod_{i=1}^{n} P(Z_i)^{S_i}(1 - P(Z_i))^{1-S_i} for the n countries in the sample. Then:

\[ C_M, C_S \perp F \mid Z \Rightarrow C_M, C_S \perp F \mid P(Z) \quad (4.14) \]

In words, the propensity score theorem requires that P(Z) genuinely reflects countries probability to opt for multi-tiered governance and that the propensity score, P(Z), must lie strictly between 0 and 1, which is referred to as the common support condition. Then, conditional on propensity scores, P(Z), the extent corruption C is independent of a countries choice about adopting multi-tiered governance according to attributes Z. Note that according to the common support condition, every country should potentially consider to adopt federalism.

Figure 4.3 depicts the distribution of propensity scores showing a relatively large proportion of countries with low propensity scores, e.g. a probability to draw up a federal constitution below 25%. Clearly, the share of actual federations increases with propensity scores and federal countries like the United States, Canada, South Africa, or Brazil score among the highest probabilities. However, despite rather modest propensity scores, countries like Austria, Pakistan, or Ethiopia have adopted multi-tiered governance, which suggest historical circumstances to preserve some randomness about the choice of federalism as required by the common support condition.

Above all, conditional on the propensity score, matched country-pairs face about the same probability of adopting federalism, which mimics to some extent experimental conditions with pure randomisation. Since there remains no systematic difference in opting for federalism within these pairs, different levels of bribery may then be attached to multi-tiered governance. The average mean difference, \( \tau \), across pairs of countries matched in terms of propensity scores is

\[ \tau \mid_{F=1} = E[ E[C_M \mid P(Z), F = 1] - E[C_S \mid P(Z), F = 0] \mid F = 1] \quad (4.15) \]

where the outer expectation is over the distribution of P(Z) | F = 1.

In practice, the following issues emerge meanwhile estimating \( \tau \mid_{F=1} \): The stochastic nature of the propensity scores and the limited number of observed countries prevent finding perfect matches. Instead, establishing estimated mean effects \( \hat{\tau} \) requires assigning weights, w.
and $W$, to all potential matches between the observed federations $N_M$ and other countries $N_S$:

$$\hat{\tau}_{F=1} = \sum_{i \in S} w_{N_C,N_M}(i) \left[ \sum_{j \in M, j \neq i} W_{N_S,N_M}(i, j) C_{Mj} - C_{Si} \right]$$  \hspace{1cm} (4.16)

Here, multi-tiered federations $j \in M$ matched onto single-tiered countries $i \in S$ are in a neighbourhood $A_i = \{ j \in (F = 1) \| P(Z_j) \in S(P(Z_i)) \}$ where $S(P(Z_i))$ is the neighbourhood of a particular single-tiered country. The underlying idea of matching in terms of comparing relatively similar observations manifests in attaching more weight $W_{N_S,N_M}$ to pairs with relatively similar propensity scores. As such, matching methods differ in assigning specific weights. E.g. nearest-neighbour matching sets $S(P(Z_i)) = \{ P(Z_i) \| P(Z_i) = \min_j \| P(Z_i) - P(Z_j) \|, j \in (F = 1) \}$ and $W_{N_S,N_M}(i, j) = 1 \in A_i$ and $W_{N_S,N_M}(i, j) = 0$ otherwise meaning, each single-tiered country is only matched on its most similar multi-tiered counterfactual. Alternatively, single-tiered controls could be matched onto more than one federation, which mitigates against overusing specific observations. E.g. federations can be matched within a 10 percentage point radius, $r$, around single-tiered states. Finally, following Dehejia and Wahba (1999) countries can be split into a number of regularly partitioned strata in terms of propensity scores. The stratification method proceeds by adding up the mean difference
weighted by $w_{NS,NM}(i)$ across all strata.\(^{50}\)

Moreover, the potential ordinal scaling of corruption indices might prevent attaching a meaningful interpretation to the average mean difference. Instead, the vector of paired differences across countries $i \in S$ can be transformed into ranks, on which standard Wilcoxon signed-rank tests can be applied in order to assess the significance of the mean difference.\(^{51}\)

$$\hat{\tau}^{rank}_{F=1} = sign\left(\sum_{i \in S} w_{NS,NM}(i)\left[ \sum_{j \in M, j \neq i} W_{NS,NM}(i,j)C_{Mj} - C_{Si} \right]\right)$$

$$\times rank\left(\sum_{i \in S} w_{NS,NM}(i)\left[ \sum_{j \in M, j \neq i} W_{NS,NM}(i,j)C_{Mj} - C_{Si} \right]\right)$$

(4.17)

Critical values for significance level $p$, denoted by $T_{crit,p}$, for rank sums over 20 pairs\(^{52}\) are calculated after,

$$T_{crit,p} = z_p \sqrt{\frac{m(m+1)(2m+1)}{6}}$$

(4.18)

where $z_p$ is the ordinate of the standard normal density function evaluated at significance level $p$, and $m$ represents the number of matched pairs. The advantage of signed-rank tests lies in their robustness towards assumptions on stochastic distributions (distribution free tests) and ordinally scaled data.

Results summarised in table 4.8 reveal predominantly negative mean differences across matched pairs. This is to say, on average, single-tiered countries would experience lower levels of corruption would they undertake constitutional reform towards federalism. The result holds for all matching methods and corruption indices but nearest-neighbour matching and the CPI, which finds a slightly positive average mean difference. However, due to overusing the observation of Ethiopia, standard deviations are rather large and positive mean-differences fail to be significant.\(^{53}\) Conversely, depending on the matching method and in particular for tests based on signed-ranks, mean differences turn out to be mostly negative and statistically significant. Significant values of mean-differences in table 4.8 amount to -0.59 for the ICRG, -1.03 for the CPI, and -0.51 for the CSI, all of which exceeding the corresponding impacts of federalism upon corruption in switching regressions reported in table 4.7.

Above all, both switching regressions and propensity score matching find decentralisation of political power according to the federal principle to significantly constrain practices of bribery and nepotism suggesting the contrary result featuring in Treisman (2000) to be subject to selection bias, misspecification of the functional form, and/or suffering from restrictive assumptions on the cardinality of the CPI.
CHAPTER 4. FEDERALISM AND CORRUPTION - EMPIRICAL RESULTS

Table 4.8: Results from Propensity Score Matching
Federations are matched onto single-tiered countries. $\hat{\tau}_{F=1}$ refers to the mean-difference of (4.16). $\hat{\tau}_{F=1}^{\text{rank}}$ is the corresponding mean difference in terms of signed ranks according to (4.17). Critical values of rank signed tests are calculated after (4.18). The radius $r$ equals 10%, respectively 0.1, and $m$ denotes the number of matched pairs respectively strata. Mean differences significant at the 10% level are labelled with *, at the 5% level with **, and at the 1% level with ***.

<table>
<thead>
<tr>
<th>Nearest-Neighbour:</th>
<th></th>
<th>Nearest-Neighbour:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\tau}_{F=1}$</td>
<td>-1.22</td>
<td>$\hat{\tau}_{F=1}^{\text{rank}}$</td>
</tr>
<tr>
<td>Std.</td>
<td>(5.13)</td>
<td>Std.</td>
</tr>
<tr>
<td>$m$</td>
<td>82</td>
<td>T_{crit,5%}</td>
</tr>
<tr>
<td>Ranks</td>
<td></td>
<td>Ranks</td>
</tr>
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<td>-------------------</td>
<td>------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>$\hat{\tau}_{F=1}$</td>
<td>-0.59**</td>
<td>$\hat{\tau}_{F=1}^{\text{rank}}$</td>
</tr>
<tr>
<td>Std.</td>
<td>(0.22)</td>
<td>T_{crit,5%}</td>
</tr>
<tr>
<td>$m$</td>
<td>81</td>
<td>$T_{crit,5%}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nearest-Neighbour:</th>
<th></th>
<th>Nearest-Neighbour:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\tau}_{F=1}$</td>
<td>-1.13</td>
<td>$\hat{\tau}_{F=1}^{\text{rank}}$</td>
</tr>
<tr>
<td>Std.</td>
<td>(1.10)</td>
<td>Std.</td>
</tr>
<tr>
<td>$m$</td>
<td>82</td>
<td>T_{crit,5%}</td>
</tr>
<tr>
<td>Ranks</td>
<td></td>
<td>Ranks</td>
</tr>
<tr>
<td>-------------------</td>
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<td>-------------------</td>
</tr>
<tr>
<td>$\hat{\tau}_{F=1}$</td>
<td>-0.88</td>
<td>$\hat{\tau}_{F=1}^{\text{rank}}$</td>
</tr>
<tr>
<td>Std.</td>
<td>(0.24)</td>
<td>T_{crit,5%}</td>
</tr>
<tr>
<td>$m$</td>
<td>82</td>
<td>$T_{crit,5%}$</td>
</tr>
<tr>
<td>Radius:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4 Concluding Remarks

The predominance of affluent, ethnically diverse, and large countries among federations suggests federalism to be an endogenous choice variable when countries decide about their structure of government, which stands crucial meanwhile establishing the empirical impact of federalism upon corruption.

By taking the endogenous nature of corruption into account, the present analysis shows that multi-tiered governance relates negatively to government misconduct in a statistical significant manner. Propensity score matching and switching regressions are employed to guard against self-selection bias by proceeding along two stages:

Conducting discrete choice regressions during the first stage reveals that country attributes like ethnic diversity, economic development, a large population or land surface increase the probability of adopting federalism. These empirical dimensions widely reflect the economic priors inherent in Oates’ decentralisation theorem suggesting that the benefits of a local provision of public goods increase with the heterogeneity in tastes and the size of jurisdictions. Furthermore, economic development relates positively to the propensity to adopt a federal constitution. Relative to the benefits of decentralisation, affluent countries seem to be in a better position to bear the cost burden associated with multi-tiered governance, where overlapping responsibilities and foregone economies of scales increase the cost of public goods provision.

During the second stage, controlling for covariates like democratic rule, legal heritage, reli-
gious affiliation, and trade openness, the average mean difference between countries, weighted according to their propensity to become federations, is negative suggesting political decentralisation according to the federal principle to reduce corruption. This result holds for various corruption indices and thanks to employing nonparametric matching methods is robust even if indices should exhibit ordinal rather than cardinal properties. Thus, in federations the benefits from horizontally competing jurisdictions seem empirically to prevail over concerns about corrupt overgrazing (Shleifer and Vishny, 1993).

An OLS framework does not account for the endogenous nature of adopting federalism. Therefore, the puzzle of the countervailing impact of decentralisation upon corruption with fiscal decentralisation entering negatively (Fisman and Gatti, 2002) and federalism entering a similar regression positively (Treisman, 2000), can be attributed to the restrictive assumptions like recursivity, linearity, and ordinality underlying the OLS approach.

Fiscal and political decentralisation are promoted among others by the IMF and the World Bank as a possible strategy to combat corruption. The present study indeed suggests that by dispersing political power, federalism provides a way to undermine endemic corruption. Yet, considering the differences between countries like Switzerland and Nigeria, the observed levels of corruption in federations cover a wide range of index values meaning, federalism in isolation does not ensure low levels of bribery. However, countries fostering an economy based on decentralised market exchange, established democratic rule, and characterised by rather non-hierarchical belief systems like Protestantism alongside fiscal decentralisation and federalism, tend to suffer far less from abuses of public power for private benefit.
### Data Appendix

Table 4.9: Description of the Data Set

This table summarises the data set collected for up to 150 countries as averages over the years 1999-2003 unless stated otherwise. The listing starts with corruption indices followed consecutively by variables related to decentralisation and other control variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>Composite corruption perceptions index based on subjective assessments about the extent of bribery and nepotism by business people, country experts, and the general public. In order to make results more intuitive, the original scaling has been reversed with scores ranging from 0 (least corrupt) to 10 (most corrupt).</td>
<td>Transparency International.</td>
</tr>
<tr>
<td>CSI</td>
<td>Latent measure of corruption extracted from its underlying causes and consequences on the basis of a structural model calculated for the period 1990-97. Values have been standardised around 0 with higher values indicating higher levels of corruption.</td>
<td>Dreher et al. (2004).</td>
</tr>
<tr>
<td>CIVIL</td>
<td>Average for the years 2000 and 2003 of the Gastil index of civil liberties taking into consideration such issues as the freedom of press, of political association, and trade unions association. Index values ranging from 1 to 7 have been reversed to make results more intuitive with higher values indicate more civil liberties.</td>
<td>Freedom House.</td>
</tr>
<tr>
<td>DEMAGENT</td>
<td>Years of uninterrupted democratic rule in 2000. Democracy is defined by a regime with an Executive Index of Electoral Competitiveness (EIEC) ≥ 6 not run by a military officer.</td>
<td>Beck et al. (2001).</td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
<td>Source</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>ETHNIC</td>
<td>Ethnic fractionisation computed for the years 1965 - 1995 as one minus the Herfindahl index of ethnic group shares ($Ethnic = 1 - \sum s^2$) reflecting the probability that two randomly selected individuals belong to different ethnolinguistic groups.</td>
<td>Alesina et al. (2003).</td>
</tr>
<tr>
<td>Log(GDPPC)</td>
<td>Logarithm of the real gross domestic product per capita with base year 1995 in terms of US$.</td>
<td>World Development Indicators (WDI), World Bank.</td>
</tr>
<tr>
<td>Log(LAND)</td>
<td>Size of a country in terms of (logarithmic) land surface.</td>
<td>WDI, World Bank.</td>
</tr>
<tr>
<td>Log(POP)</td>
<td>Size of a country in terms of (logarithmic) population.</td>
<td>WDI, World Bank.</td>
</tr>
<tr>
<td>LEGFRA</td>
<td>Indicator variable for French civil law heritage.</td>
<td>La Porta et al. (2003) and CIA World Factbook.</td>
</tr>
<tr>
<td>NEVERCOL</td>
<td>Indicator variable for countries never subject to colonial rule.</td>
<td>Lederman et al. (2005), CIA World Factbook.</td>
</tr>
<tr>
<td>OECD</td>
<td>Indicator variable for OECD-membership representing countries sharing a strong commitment to democratic government and market economy.</td>
<td>OECD.</td>
</tr>
<tr>
<td>OPEN</td>
<td>Trade in goods as share of GDP.</td>
<td>WDI, World Bank.</td>
</tr>
<tr>
<td>SCHOOL</td>
<td>School enrollment on secondary level as share of the corresponding cohort.</td>
<td>WDI, World Bank.</td>
</tr>
</tbody>
</table>
Notes

38 See www.transparency.org for a comprehensive description of the CPI.
39 E.g. for Argentina the score of the CPI increased dramatically from an average of 2.9 during the years 1997-1999 to 7.5 in the year 2003. It seems somewhat unclear whether this reflects a genuine increase in corruption or can partly be attributed to the turbulent political situation during this period.
40 Indeed, Transparency International itself states that its CPI "ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. [...] It reflects the views of business people and analysts from around the world, including experts who are locals in the countries evaluated." (emphasis added, source: www.transparency.org).
41 Causal variables coincide widely with the political, historical, and socio-economic controls introduced during this section. GDP, capital control restrictions, the development of the financial sector, as well as the consumption of cement serve as measure for the economic consequences of corruption. Whilst the first three variables are self explanatory, the consumption of cement seems to reflect opportunities to extract large bribes by creating so called "White Elephants", meaning overengineered public infrastructure or military construction projects.
42 The overlap between colonial and legal origin is close but not perfect. E.g. despite British colonial heritage, Jordan, Egypt, Iraq, Malta, and Mauritius adopted civil law systems.
43 When founding the dominion of South Africa in 1910, a federal union was rejected on grounds of high cost involved in multi-tiered governance (Wheare, 1956, p.53). Nowadays however, South Africa is widely seen as a federal country (Griffith and Nerenberg, 2002).
44 Instead of establishing the probability to adopt federalism ($F$), an instrumental variable that is highly correlated with $F$ but uncorrelated with the stochastic error term $\mu$ of equation 4.4 could likewise be employed to reestablish recursivity. Within the present context, finding a suitable instrument proofed, however, to be difficult. Moreover, instrumental variables estimates could yield the implausible prediction of the probability to adopt federalism lying outside the interval $[0, 1]$. Due to the dangers associated with employing weak instruments (Staiger and Stock, 1997) this approach has not been pursued further.
45 Some related work on factors contributing to fiscal centralisation can, however, be found in Panizza (1999).
46 Normally distributed errors and the corresponding Probit model provide an alternative to the Logit which yields almost identical results, but allows for slightly less diverse outcomes due to allocating comparatively less probability mass in its tails.
47 However, ETHNIC does not relate directly to the distribution of ethnic communities over territory. E.g. a given value of ETHNIC does not allow to discriminate between a scenario of an ethnic minority populating one area and a diaspora spread over the entire state territory.
49 Matching was introduced into economics whilst analysing labour markets (see e.g. Heckman et al., 1998). Persson et al. (2003) first use propensity score matching whilst evaluating the causes of corruption.
50 Variances of matching estimators increase dramatically whenever one federation is matched many times onto other countries. In particular, the variance of nearest-neighbour matching is given by: $Var_{NN} = (1/N_S) [Var(C_S) + \sum_{M \in M} (W_{NS,N_M}^{(i,j)})^2 Var(C_M)]$. Aside from weighting, variances of the radius method coincide with the nearest-neighbour case. The variance for stratification is: $Var_{S} = (1/N_S) [Var(C_S) + \sum_{m} N_{S,m} \sum_{N_{S,m}} Var(C_M)]$, where $m$ denotes the number of strata.
51 For the sake of simplicity, the present version of rank sums disregards the possibility of tied ranks. However, without loss of generality, (4.17) could be restated into a form allowing for tied ranks.
52 For values below 20, tabulated values for $T_{crit,p}$ can be found in introductory textbooks on statistics.
53 In order to assure the common support condition, some authors (e.g. Persson and Tabellini, 2004) suggest to drop values below and above the minimum respectively maximum propensity score among $F = 1$ countries.
Like this, all mean effects ($\tau$) would become negative. Due to the associated loss in degrees of freedom as well as its arbitrary character of this approach, the results of table 4.8 employ the full sample of countries.
Bibliography


Chapter 5

THIRD ESSAY
Cross Border Acquisitions, Corruption, and the Quality of Institutions - An Event Count Study

"Little else is requisite to carry a state to the highest degree of opulence from the lowest barbarism but peace, easy taxes, and a tolerable administration of justice: all the rest being brought about by the natural course of things."

As suggested by the introductory quote ascribed to Adam Smith, institutions devised to create and safeguard a set of rules in a transparent manner, which thereby lower transaction cost, facilitate domestic and international exchange and ultimately foster economic development. Conversely, endemic corruption and nepotism inherently undermine rules and result in institutional decay, obstructing domestic and foreign investment.

Within this context, Mauro (1995) has pointed out the negative empirical relationship between economic growth and bribery attributed to lower private investment in endemically corrupt countries, even after controlling for regulatory quality. Likewise, Wei (2000) finds a detrimental impact of corruption upon flows of foreign direct investment (FDI). In particular, compared with taxation, bribery and nepotism seem to put-off international investors to a far bigger extent.

Multinational enterprises (MNEs) constitute an increasingly more important vehicle to undertake FDI when a firm creates or expands subsidiaries into another country involving not only a transfer of resources, but also the acquisition of control. In form of cross-border
acquisitions (CBAs) activity, the 1990ies have witnessed indeed a dramatic expansion of FDI, which partly reflected a shift away from greenfield investment (Di Giovanni, 2005). During the first year of the new millennium, CBA activity has shown an equally dramatic downturn (UNCTAD, 2005). Still, CBAs accounted for about 80% of FDI (by value) in the year 2000 (UNCTAD, 2001).

The present chapter endeavours to establish the impact of institutional quality upon a country’s ability to host CBAs. In terms of the distribution and growth of deal values, the empirical determinants of international mergers - in particular the role of financial deepening - have recently received attention from Di Giovanni (2005). Furthermore, Rossi and Volpin (2004) have analysed the impact of corporate governance variables like accounting standards or shareholder protection in source countries, and find positive relationships with regard to the volume of merger activity, stock as a method of payment, attempts for hostile takeovers, takeover premiums, and domestic investment. They conclude that acquiring firms typically locate in countries with higher investor protection and might, thus, urge target firms to enhance their standards of corporate governance.

The present analysis contributes to this literature by adopting a much broader view on institutional quality referring to a set of humanly devised rules to lower transaction cost (compare North, 1990), which manifest e.g. in the prevalence of democratic rule, regulatory quality, the proliferation of property rights, as well as the control of corruption. Notably, this coincides widely with proposed dimensions to measure the quality of government within an economic context (La Porta et al., 1999). The impact of weak institutions upon international merger activity has to date received relatively scant attention even though CBAs ex-definitionae involve entering a foreign market, and the theory of the MNE originates in the question as why the same company decides to locate plants in different countries, presuming that local firms have the competitive advantage of being familiar with the local institutional setting and business customs.

Aside from adopting a broader view on institutional quality, the present empirical strategy differs in several ways from previous studies into international merger activity:

Firstly, the gravity framework entrenched in the analysis of goods and asset trade, and employed among else by Di Giovanni (2005), is replaced by the empirical approach of Carr et al. (2001). Thereby, the desire to establish subsidiaries in foreign markets rests on the knowledge-capital theory where MNEs exploit scale economies (horizontal CBAs) and international differences in relative factor costs (vertical CBAs) provided trade and investment costs are sufficiently low.

Secondly, the present essay aggregates cross-border acquisitions reported by Thomson Financial Securities Data (SDC) into an event count rather than employing affiliate sales data or the cumulative value of deals. The resulting panel contains up to 67 source countries,
147 host countries, and spans over 7 consecutive years between 1997 and 2003, implying institutional divergence can be traced across countries and time. Employing count data offers the following advantages:

- Event counts relate to a well-defined class of discrete distributions such as the Poisson or the negative binomial distribution which account for the fact that international merger deals across many country-pairs constitute rather rare events.

- Merger counts allow for an intuitive interpretation in terms of the number of deals struck during a given time domain and exhibit a close correspondence to the theory of the MNE, which analyses the decisions of entering foreign markets but not directly the amount of foreign direct investment involved or targeted sales.

- Due to a lack of compulsory information disclosure, the value of a deal goes frequently unreported implying conditional distributions in studies such as Volpin and Rossi (2004) or Di Giovanni (2005) to suffer from potential bias should mergers with unobserved attributes share similarities, or disclosure requirements differ systematically across countries. Conversely, aggregating observed CBAs reported by SDC into event counts allows to attain an almost exhaustive coverage of international merger activity.

- SDC reports Standard Industry Classification (SIC) codes of merging firms, which allows, in principle, to isolate merger deals driven by market access considerations and estimate the model separately for horizontal and vertical CBAs - a distinction that stands crucial within the knowledge capital theory.

There are, however, some caveats against employing count data: Unlike value data, merger counts do not allow to discriminate between deals involving different levels of investment. Meanwhile treating all CBAs equally as one event might offer some robustness in terms of data coverage and econometric specification, the magnitude of the international flow of financial resources involved in CBAs remains inevitably obscured.

Results suggest institutional quality to act as an important determinant of CBAs, though differences between its dimensions remain. In particular, institutional quality dimensions like investment cost proposed by Carr et al. (2001) or common law heritage, which features prominently in the finance and development literature (La Porta et al. 1997, 1998, 1999) exhibit a comparatively modest impact upon CBA-activity. Conversely, dimensions like democratic accountability, modest regulation, or the control of corruption seem to be more important to attract CBAs. Finally, there is no fundamental difference as regards the importance of institutional quality variables between horizontal and other CBAs.
The remainder is organised as follows: The next section reviews some recent developments on the theory of the MNE. Section 3 introduces and discusses the methods employed to analyse merger counts. Section 4 sets out the baseline model whilst the following section 5 introduces and discusses institutional quality variables. Finally, section 6 provides some concluding remarks.

5.1 Theoretical Background - Horizontal and Vertical Motives for International Merger Activity

Dunnings’ (1977, 1981) OLI framework provides a first attempt to explain the emergence of MNEs attributing their advantages over single plant firms to ownership - the possession of intangible firm specific knowledge and skills -, location - comparative advantage and access to customers -, and internalisation - superiority while maintaining long-term and complex relationships necessitating specific investment without being exposed to opportunistic behaviour by incompletely contracted partners. Albeit the OLI theory refers to imperfectly competitive conduct, it allegedly fails to model the market structures giving rise to MNEs. Thereto, the rationales underlying firms’ desire to maintain several plants in several countries have subsequently been integrated into an industrial economics framework where horizontal (e.g. Markusen, 1984) as well as vertical (e.g. Helpman, 1984; Helpman and Krugman, 1985) motives explain the desire to invest abroad. As a specific manner to undertake FDI, these theories carry over to international merger activity.  

Benefits of horizontal merger activity arise when firms seek to place production closely to its customers in order to avoid transportation cost and tariffs. Meanwhile, substituting trade for setting up a local plant to access a market still allows to take advantage of firm-specific scale economies. In particular, firm-level fixed cost may be distributed - in form of joint inputs - over several plants when production is replicated in multiple locations.

In general, due to the significance of economic size while exploiting scale economies, theory suggests horizontal merger activity to arise predominantly as counterpart to intra-industry trade among developed countries, and in particular when:

1. Countries are similar in size and factor endowments;
2. Physical, institutional, and legal trade cost are high;
3. Industries are characterised by firm-specific (not plant-specific) fixed cost and internal scale economies.

Conversely, when merging vertically, MNEs outsource stages of production across space. This fragmentation by stages of production implies that affiliates must trade with other
parts of the firm meaning intra-firm exchange partly replaces inter-firm exchange. In doing so, vertical MNEs seek to exploit relative differences in factor cost by shifting upstream and downstream activities necessitating the intensive usage of a production factor towards locations well endowed with it. Examples include manufactures relocating production towards countries disposing off a large unskilled labour force, whilst headquarters remain in places abundantly endowed with skilled labour, or mining companies locating extraction in countries well endowed with natural resources. In essence, vertical merger activity constitutes a counterfactual to comparative advantage driven, inter-industry trade and will dominate when:

1. Countries differ in relative factor endowments translating into unequal factor prices;  
2. Industry’s stages within the chain of production and distribution differ in technologies (factor intensities) as regards input combinations of capital, energy, natural resources, as well as skilled and unskilled labour.

Markusen and coauthors (e.g. 2001, 2002) have integrated motives pertaining to internal scale economies and unequal factor prices into the knowledge capital model (KK), where horizontal and vertical MNEs arise endogenously. Focusing on the effect of skilled labour endowment, knowledge is assumed to be geographically mobile - hence the name of the model - and constitutes, in terms of headquarter services, a joint input to multiple production facilities. Alongside multinationals, the KK-model allows for national firms, which take full advantage of plant level economies of scale by producing in one location and shipping commodities to foreign markets. Such national firms prevail when:

1. Domestic markets are relatively large;  
2. Physical, institutional, and legal trade cost are relatively low;  
3. Industries are characterised by plant-specific fixed cost and scale economies.

Due to the hybrid structure of the KK-model, direction and form of FDI activity vary along two dimensions. Translated into a CBA context, simulations reported in Carr et al. (2001) suggest an increase in vertical CBAs in diverging relative factor endowment opposed to a decrease in horizontal merger activity in diverging economic size. Whilst the economic size effect follows roughly an inverted U-shape, the impact of factor endowment is asymmetric insofar as small but skilled labour abundant countries should see highest relative cross-border merger activity.
5.2 An Econometric Method to Analyse Mergers as Event Count

5.2.1 Counting International Merger Deals

Opposed to ongoing flows in international finance, FDI undertaken as merger project marks the occurrence of an event in time based on a discretionary decision taken by e.g. the firms' board. Therefore, international merger activity may concisely be aggregated into an event count, $CBA_{ij,t}$, in terms of the number of deals between acquiring firms located in source country $i$ and target firms located in host country $j$ during time domain $t$ (e.g. a year). Previous studies, like Di Giovanni (2005) or Rossi and Volpin (2004), rely instead on the cumulated value of international merger deals, the caveat against which lying in the restricted information disclosure by many merging companies. Indeed, even SDC of Thomson Financial, which claims to achieve an almost exhaustive coverage of merger and acquisitions (M&A) activity, reports for more than 50% of recorded deals no information beyond: (i) the announcement date, (ii) target and acquirer names, (iii) target and acquirer countries of origin, (iv) target and acquirer SIC code, (v) the percentage of shares sought, acquired, and owned after a deal.\textsuperscript{56} However, SDC covers virtually all deals around the world undertaken after 1990, which involve at least a 5% change in ownership.

Based on deals resulting in an ownership of at least 50%,\textsuperscript{57} mergers recorded in SDC have been counted between 67 source countries and 147 host countries for each of the 7 years between 1997 and 2003. Source countries listed in table 5.1 saw typically more than 50 deals in total (column 1) and financed at least 8 CBAs during the period under consideration (column 2), which cumulatively cover almost 98% of international mergers observed around the world (column 4). Due to a lack of necessary economic or institutional prerequisites to undertake CBAs, observations from remaining source countries were dropped. Many of these countries did, during the period under consideration, not finance cross-border merger deals or did not even see any merger activity at all. Source countries locate on all continents. However, OECD countries in general as well as the United States, the United Kingdom, Canada, and Germany in particular account for a vast number of deals. As regards the percentage of international as opposed to domestic merger activity, the last column of table 5.1 uncovers substantial differences, with small and developed countries like the Netherlands, Sweden, Switzerland, or Luxembourg accounting for a relatively large fraction of CBAs, which partly supports the predictions of the KK-model.

Table 5.2 summarises recorded deals according to 208 recipient countries around the world. Albeit to a large extent the ranking continues to reflect economic size, emerging markets like China, Brazil, or India host considerably more CBAs than they finance whilst the converse holds for countries like the United States, the United Kingdom, Canada, Hong Kong, the
Table 5.1: Overview of Merger Counts (Source Countries)

This table summarises M&A activity by source countries. Data relate to cumulative event counts for the period 1997 to 2003. Countries are ranked according to CBA-counts.

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Table 5.2: Overview of Merger Counts (Host Countries)

This table summarises CBA activity by host countries. Data relate to cumulative event counts for the period 1997 to 2003. Countries are ranked according to CBA-counts.

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<td>37</td>
</tr>
<tr>
<td>67</td>
<td>Sri Lanka</td>
<td>36</td>
</tr>
<tr>
<td>68</td>
<td>Morocco</td>
<td>36</td>
</tr>
<tr>
<td>69</td>
<td>Pakistan</td>
<td>33</td>
</tr>
<tr>
<td>70</td>
<td>Papua New Guinea</td>
<td>33</td>
</tr>
</tbody>
</table>

This table summarises CBA activity by host countries. Data relate to cumulative event counts for the period 1997 to 2003. Countries are ranked according to CBA-counts.
The nonlinearities inherent in the KK-theory of the MNE indeed predict such asymmetric merger activity as small and wealthy countries engage heavily in foreign investment in order to offset the disadvantages of having a small domestic market and high labour costs. Then again, more than one third of the countries around the world are hardly involved in the international market on corporate control in the sense of receiving, on average, not more than one deal per year during the seven years between 1997 and 2003.

5.2.2 Regression onto Merger Counts

Cumulated merger events constitute a discrete dependent variables insofar as containing ordered, nonnegative, and integer counts with a preponderance of zero-valued observations. Imposing linearity onto the mean specification \( E[CBA_{ij,t}|x_{ij,t}] \) seems inappropriate and yields potentially inefficient, or even inconsistent estimates for the expected number of international mergers, conditional on covariates \( x_{ij,t} \). Moreover, imposing normality might result in negatively fitted merger counts \( CBA_{ij,t} \). Plainly, as regards the conditional mean specification and underlying probability distribution, any conventional linear model applied to merger counts is likely to suffer from misspecification.

Instead, count regressions, which rest on probability distributions of the Poisson family, account more genuinely for the discrete and ordered character of aggregated merger events after introducing the following assumptions about the functional form and underlying probability densities:

The expected number \( \lambda_{ij,t} \) of cross-border acquisitions between source country \( i \) and host country \( j \) per year \( t \) conditions on the \( k \) vector of covariates \( x_{ij,t} \) and the shift parameter \( \delta_{ij,t} \) through the exponential function:

\[
\lambda_{ij,t} = E[CBA_{ij,t}|x_{ij,t}, \delta_{ij,t}] = \exp(x_{ij,t}'\beta + \delta_{ij,t}) = \exp(x_{ij,t}'\beta) \exp(\delta_{ij,t})
\]

for:

\[
i = 1...N : \quad \text{Source country index.}
\]
\[
j = 1...M : \quad \text{Host country index.}
\]
\[
t = 1997 - 2003 : \quad \text{Time domain in terms of years.}
\]

with:
CHAPTER 5. CBA, CORRUPTION, AND INSTITUTIONS

$CBA_{ij,t}$: Count of cross-border acquisitions between country $i$ and $j$ in year $t$.
$x_{ij,t}$: Covariates attributed to country $i$ and $j$ in year $t$.
$\beta$: Vector of coefficients to be estimated.
$\alpha_{ij,t}$: Country-pair specific effect in year $t$.
$\delta_{ij,t}$: Shift parameter equal to $\ln(\alpha_{ij,t})$.
$\lambda_{ij,t}$: Expected merger count between country $i$ and $j$ in year $t$ unconditional on country-pair specific effects $\alpha_{ij,t}$.
$\tilde{\lambda}_{ij,t}$: Expected merger count between country $i$ and $j$ in year $t$ conditional on country-pair specific effects $\alpha_{ij,t}$.

Employing an exponential mean function allows excluding cases of negatively fitted merger counts.

Although the conditional mean specification (5.1) relates CBAs systematically to explanatory variables, $x_{ij,t}$, it does not fully describe the count distribution. Thereto, a probability-mass-function, $Pr(CBA_{ij,t}|x_{ij,t}, \alpha_{ij,t})$ needs specifying. In their simplest form, count regressions place a probability, which is Poisson distributed with parameter $\lambda_{ij,t}$, onto merger counts conditional on covariates $x_{ij,t}$ and country-pair specific effects $\alpha_{ij,t}$:

$$Pr(CBA_{ij,t}|x_{ij,t}, \alpha_{ij,t}) \sim P[\tilde{\lambda}_{ij,t} = \alpha_{ij,t}\lambda_{ij,t}] = \frac{e^{-\lambda_{ij,t}\alpha_{ij,t}}(\lambda_{ij,t}e^{\alpha_{ij,t}})^{CBA_{ij,t}}}{CBA_{ij,t}!} \tag{5.2}$$

Event counts exhibit typically overdispersion meaning - unlike equidispersion underlying the Poisson distribution - the conditional variance exceeds the conditional mean. Introducing additional randomness via the specific effect $\alpha_{ij,t}$ accounts for such overdispersion. Then, the Poisson parameter $\lambda_{ij,t}$ constitutes a random variable with realisation $\tilde{\lambda}_{ij,t}$ implying $E[CBA_{ij,t}|x_{ij,t}]$ may differ across country-pairs sharing the same covariates $x_{ij,t}$. Since $\alpha_{ij,t}$ relates to unobserved components, it needs integrating out in order to obtain the corresponding marginal distribution of (5.2):

$$Pr(CBA_{ij,t}|x_{ij,t}) = \int e^{-\lambda_{ij,t}\alpha_{ij,t}}(\lambda_{ij,t}e^{\alpha_{ij,t}})^{CBA_{ij,t}}g(\alpha_{ij,t})d\alpha_{ij,t} \tag{5.3}$$

Assume the mixing distribution $g(\alpha_{ij,t})$ to follow a Gamma distribution with precision parameter $\theta$ so that $E[\alpha_{ij,t}] = 1$ and $V[\alpha_{ij,t}] = 1/\theta$. Then, $g(\alpha_{ij,t}) \sim \Gamma(\theta)$ and (5.3) results in a negative binomial distribution,

$$Pr(CBA_{ij,t}|x_{ij,t}) = \frac{\Gamma(\theta + CBA_{ij,t})}{\Gamma(CBA_{ij,t} + 1)\Gamma(\theta)}q_{ij,t}^{CBA_{ij,t}}(1 - q_{ij,t})^{\theta} \tag{5.4}$$

where,

$$q_{ij,t} = \frac{\lambda_{ij,t}}{\lambda_{ij,t} + \theta} \tag{5.5}$$
Present merger counts exhibit a panel structure to the extent that the same 67 × 147 = 9'849 country-pairs \( ij \) are observed over 7 consecutive years. Meanwhile dealing with panel data, controlling for heterogeneity across country-pairs \( ij \) remains crucial e.g. in order to reduce serial correlation. Following Hausman et al. (1984), the specific effect \( \alpha_{ij} \) may account for the corresponding heterogeneity across country-pairs, which introduces yet again intrinsic randomness in addition to the Poisson process. Disregarding the time dimension, within this random effects Poisson model \( \alpha_{ij} \) reflects country specific heterogeneity rather than overdispersion attributed to unobserved components. Since there is only one draw of \( \alpha_{ij} \) for the seven years between 1997 and 2003, aggregated observations over time are negative binomial distributed,\(^59\)

\[
Pr(CBA_{ij,1997} \ldots CBA_{ij,2003}) = \frac{\prod_t \lambda_{ij,t}^{CBA_{ij,t}} \Gamma(\theta + \sum_t CBA_{ij,t})}{\Gamma(\theta) \prod_t CBA_{ij,t}! \left(\sum_t CBA_{ij,t}!\right)} Q_{ij}^{\theta} (1 - Q_{ij})^{\sum_t CBA_{ij,t}}
\]

where,

\[
Q_{ij} = \frac{\theta}{\theta + \sum_t CBA_{ij,t}}
\]

Aggregating over contributions of all observations \( i,j,t \) respectively country-pairs \( ij \) yields the likelihood function of the negative binomial,

\[
L(\beta) = \prod_{ij} \prod_t Pr(CBA_{ij,t})
\]

respectively the random effects Poisson model,

\[
L(\beta) = \prod_{ij} Pr(CBA_{ij,1997} \ldots CBA_{ij,2003})
\]

by means of which coefficients \( \beta \) can be estimated.

As regards moments, the expected number of cross-border deals per year of a count regression with underlying negative binomial distribution coincides with the Poisson distribution implying an equality between the mean expectation regardless the mixing distribution \( g(\alpha_{ij,t}) \):

\[
E[CBA_{ij,t}|x_{ij,t}] = E[CBA_{ij,t}|x_{ij,t}, \alpha_{ij,t}] = \lambda_{ij,t}
\]

However, the mixing distribution \( g(\alpha_{ij,t}) \) introduces overdispersion as a precision parameter \( \theta < \infty \) induces the variance to increase quadratically in the conditional mean (5.10):\(^60\)

\[
Var[CBA_{ij,t}|x_{ij,t}, \alpha_{ij,t}] = E[CBA_{ij,t}|x_{ij,t}] + \frac{E[CBA_{ij,t}|x_{ij,t}]^2}{\theta} = \lambda_{ij,t} + \frac{\lambda_{ij,t}^2}{\theta}
\]
The caveat against estimating (5.1) by means of maximum-likelihood (ML) lies in restrictive and to a wide extent arbitrary assumptions about the mixing distribution \( g(\alpha_{ij,t}) \). In particular, Gourieroux et al. (1984) show maximum likelihood estimates like (5.8) and (5.9) to be inefficient or even inconsistent should \( g(\alpha_{ij,t}) \) not follow a Gamma distribution and propose to restrict the focus on first and second moments instead to obtain estimates consistent with a wider range of mixing distributions. Within this spirit, Brännäs and Johansen (1996) propose an approach based on the method of moments (MM), which rests on rearranging the exponential mean specification (5.1) respectively (5.10) into the orthogonality condition:

\[
E[CBA_{ij,t} - \exp(x'_{ij,t}\beta)|x_{ij,t}] = 0 \quad (5.12)
\]

Given instruments \( z_{ij,t} \), \( \dim(z_{ij,t}) = \dim(x_{ij,t}) \), a consistent estimator for \( \beta \) minimises the sample moment condition in its quadratic form,

\[
Q(\beta) = \sum_t \sum_{ij} \left((CBA_{ij,t} - \exp(x'_{ij,t}\beta))z_{ij,t}\right)' W \sum_t \sum_{ij} \left((CBA_{ij,t} - \exp(x'_{ij,t}\beta))z_{ij,t}\right) \quad (5.13)
\]

where \( W \) denotes a symmetric weighting matrix.

Based on ML and MM-estimation techniques, the remainder revisits the evidence on the determinants of cross-border merger activity and subsequently introduces dimensions related to institutional quality.

### 5.3 A Baseline Specification of International Merger Activity

#### 5.3.1 Econometric Specification and Data

To date, empirical studies on FDI rely heavily on the gravity framework introduced by e.g. Frankel et al. (1996). In particular, whilst analysing the impact of corruption upon FDI respectively modeling international merger activity, Wei (2000), Braconier et al. (2005), and Di Giovanni (2005) find exchanges to increase in economic size (GDP) but to decrease in distance between country-pairs \( ij \). Despite achieving a good fit to the data, gravity models lack a clear theoretical underpinning as why MNEs enjoy cost advantages over local firms. Therefore, the following baseline specification follows Carr et al. (2001), where explicit cost advantages inherent in horizontally respectively vertically integrated MNEs guide the choice of covariates \( x_{ij,t} \):
\[ E[CBA_{ij,t}|x_{ij,t}] = \exp(\beta_0 + \beta_1(\sum GDP_{ij,t}) + \beta_2(\Delta GDP_{ij,t})^2 + \beta_3(\Delta WAGE_{ij,t}) + \beta_4(\Delta WAGE_{ij,t}) \times (\Delta GDP_{ij,t})) + \beta_5 DISTANCE_{ij} + \beta_6 LANGUAGE_{ij} + \beta_7 INV COST_{ij} + \beta_8 EXR_{ij,t} + \beta_9 STOCK_{i,t} + \beta_10 CU_{ij,t} + \beta_11 FTA_{ij,t} + \beta_12 SERV AGREE_{ij,t} \] 

Table 5.8 of the appendix reports summary statistics for all variables meanwhile table 5.7 contains their exact definition and source. The common sample covering 67 source and 147 host countries as well as spanning over 7 years from 1997 to 2003 encompasses almost 48,000 observations.

Variables pertaining to economic size account for scale economies to reflect the rationale for horizontal respectively market access driven CBAs. More specifically, the sum of GDP between source country \( i \) and host country \( j \) \((\sum GDP_{ij,t})\) proxies for the firms desire to seek access to economically large markets and is expected to yield a positive entry. Conversely, the squared difference in GDP \((\Delta GDP_{ij,t})^2\) is supposed to impact negatively upon merger counts when more dissimilar sized markets benefit single plant (or national) firms locating only in the larger country and shipping commodities to foreign markets in order to fully take advantage of scale economies accruing to the plant level. Jointly, this first pair of variables should reflect the inverted U-shape of horizontal merger activity across positive and negative differences in economic size predicted by the KK-theory of the MNE.

Turning towards vertical motives, where MNE outsource stages of production across countries to reach the benefits of comparative advantage, \((5.14)\) employs data on relative costs rather than endowments of various types of labour. Meanwhile direct measures on the endowment of skilled and unskilled labour would produce a closer correspondence to theory, the distortions arising on imperfectly competitive labour markets due to national regulations, or differences in preferences and technology could drive a wedge between relative factor abundance and cost (Braconier et al., 2005). Following Di Giovanni (2005) real GDP per capita proxies for wage costs. Then, increasing differences in wage cost \(\Delta WAGE_{ij,t}\) across country-pairs are expected to entail vertical merger activity from skilled labour abundant countries towards unskilled labour abundant countries. Moreover, the nonlinearities inherent in the KK-theory associate with the interaction between factor endowments and country size and necessitate the inclusion of a corresponding variable \((\Delta GDP_{ij,t} \times \Delta WAGE_{ij,t})\), a negative entry of which would reflect the predicted disproportional share of vertical merger activity.
undertaken by small but skilled labour abundant countries.

Variables such as the geographic distance between capital cities ($DISTANCE_{ij}$) or the cultural distance in terms of the existence of a common language between country $i$ and $j$ ($LANGUAGE_{ij}$) control for trade costs. Due to the various motives underlying CBAs, the theoretical impact of trade costs is ambiguous. In fact, horizontal MNEs provide a vehicle to access markets and circumvent trade barriers$^{63}$ meanwhile any barrier obstructing intra-firm trade reduces potential cost savings from vertical integration. Furthermore, the number of procedures to set up a business ($INV\text{COST}_j$) has been borrowed from Djankov et al. (2002) to proxy for the regulatory burden when investing in host country $j$. The expected coefficient is negative since, under a scenario of low trade but high investment cost, firms might wish to serve foreign markets through exports rather than building up production capacity abroad.

Owing to their volatility, financial market variables constitute the main candidates to provide an explanation for the pronounced increase and subsequent downturn of CBAs during the period under consideration. Thereby, Di Giovanni (2005) suggests financial deepening in terms of domestic stock market capitalisation relative to GDP ($STOCK_{i,t}$) to initiate merger projects when managers suffer from hubris as companies share-prices continue to rise. Merger waves seem to coincide indeed widely with burgeoning stock markets.

Exchange rate fluctuations provide another channel through which financial markets might alter the return on FDI relative to domestic investment. In particular, Froot and Stein (1991) present an argument that a real appreciation of the domestic currency (increase in $EXR_{ij,t}$) entails relative wealth effects reducing the cost of acquiring firms abroad. However, in case foreign affiliates are primarily set up in order to reimport commodities back into the source country the converse relationship might occur. Furthermore, unlike assets such as bonds, firm specific assets - e.g. headquarter services considered within the KK-model - might be geographically mobile and their input value might therefore remain widely unaffected by fluctuations in currencies or inflation. Overall, theories on the link between FDI and exchange rate fluctuations suggest, thus, an ambiguous relationship (see Blonigen, 1997).

Aside from economic factors, Frankel et al. (1996) have proposed various forms of preferential trading agreements (PTA) as a determinant for international exchange such as trade in goods, services, and finance. Once more, the theoretical impact remains a priori ambiguous as FDI might substitute or complement trade.
5.3.2 Baseline Results

Looking first at the empirical distribution of international merger activity in respect to economic size and wages, figure 5.1 scatters CBA-counts observed during the years 1997-2003 into 400 groups according to relative differences in GDP and GDP per capita between source country \( i \) and host country \( j \). Thereby, positive and negative divergence between country-pairs has been normalised by their sum of GDP respectively wages to restrict values on the interval between 1 and -1. The relatively high importance of CBAs in small but wealthy countries predicted by the KK-theory manifests in the accumulation of CBAs in the right corner of figure 5.1. Conversely, the empirical distribution of CBA-activities around the world does not seem to exhibit the expected inverted U-shape along the axis of differences in economic size as suggested by the KK-model. However, figure 5.1 refers to relative rather than absolute size, which constitutes the basis for scale economies determining whether firms desire to access foreign markets through exports from a single plant or duplicating production across multiple plants.

Column (1) and (2) of table 5.3 contain estimates of the baseline model (5.14) by means of maximum likelihood with an underlying negative binomial respectively random effects Poisson model along the lines of (5.4) and (5.6). With a pseudo \( R^2 \) above 0.8 and most coefficients being significant on the 1% level, the baseline specification attains a close fit to the data.
Table 5.3: Baseline Model

This table reports estimates of (5.14). Standard errors are in parentheses. Coefficients significant at the 10% level are labelled with *, at the 5% level with **, and at the 1% level with ***. Column (3) replaces $\Delta WAGE_{ij,t}$ and $\Delta WAGE_{ij,t} \Delta GDP_{ij,t}$ by $|\Delta WAGE_{ij,t}|$ and $|\Delta WAGE_{ij,t}| |\Delta GDP_{ij,t}|$ after Blonigen et al. (2003). Column (4) restricts the sample to CBAs within the OECD.

<table>
<thead>
<tr>
<th>Method:</th>
<th>Negative Binomial</th>
<th>Random Poisson</th>
<th>Random Poisson</th>
<th>Tobit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. Var.:</td>
<td>$CBA_{ij,t}$</td>
<td>$CBA_{ij,t}$</td>
<td>$CBA_{ij,t}$</td>
<td>$Value_{ij,t}$</td>
</tr>
<tr>
<td>Variables</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>$\sum GDP_{ij,t}$</td>
<td>$1.81^{***}$</td>
<td>$0.34^{***}$</td>
<td>$0.35^{***}$</td>
<td>$7.88^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(0.03)$</td>
<td>$(0.01)$</td>
<td>$(0.01)$</td>
<td>$(1.26)$</td>
</tr>
<tr>
<td>$(\Delta GDP_{ij,t})^2$</td>
<td>$-0.11^{***}$</td>
<td>$-0.003^{***}$</td>
<td>$-0.003^{***}$</td>
<td>$-0.07^{***}$</td>
</tr>
<tr>
<td></td>
<td>$(0.003)$</td>
<td>$(0.0002)$</td>
<td>$(0.0002)$</td>
<td>$(0.03)$</td>
</tr>
<tr>
<td>$\Delta WAGE_{ij,t}$</td>
<td>$0.01^{***}$</td>
<td>$0.002^{***}$</td>
<td>$0.002^{***}$</td>
<td>$-0.11$</td>
</tr>
<tr>
<td></td>
<td>$(0.0001)$</td>
<td>$(0.0004)$</td>
<td>$(0.0004)$</td>
<td>$(0.16)$</td>
</tr>
<tr>
<td>$\Delta WAGE_{ij,t} \Delta GDP_{ij,t}$</td>
<td>$-0.001^{***}$</td>
<td>$-0.0005^{***}$</td>
<td>$-0.0007^{***}$</td>
<td>$-0.01^{**}$</td>
</tr>
<tr>
<td></td>
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<td>$(0.0004)$</td>
<td>$(0.0004)$</td>
<td>$(0.005)$</td>
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<tr>
<td>$DISTANCE_{ij}$</td>
<td>$-0.13^{***}$</td>
<td>$-0.02^{***}$</td>
<td>$-0.02^{***}$</td>
<td>$-0.69^*$</td>
</tr>
<tr>
<td></td>
<td>$(0.004)$</td>
<td>$(0.001)$</td>
<td>$(0.001)$</td>
<td>$(0.35)$</td>
</tr>
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<td>$LANGUAGE_{ij}$</td>
<td>$1.41^{***}$</td>
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<td>$0.2^{***}$</td>
<td>$18.85^{***}$</td>
</tr>
<tr>
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<td>$(0.05)$</td>
<td>$(0.01)$</td>
<td>$(0.01)$</td>
<td>$(5.26)$</td>
</tr>
<tr>
<td>$INV\text{COST}_{ij,t}$</td>
<td>$-0.1^{***}$</td>
<td>$-0.02^{***}$</td>
<td>$-0.02^{***}$</td>
<td>$-0.51$</td>
</tr>
<tr>
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<td>$(0.001)$</td>
<td>$(0.001)$</td>
<td>$(0.49)$</td>
</tr>
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<td>$STOCK_{i,t}$</td>
<td>$0.72^{**}$</td>
<td>$0.17^{**}$</td>
<td>$0.17^{**}$</td>
<td>$3.57$</td>
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<tr>
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<td>$(0.01)$</td>
<td>$(0.01)$</td>
<td>$(3.2)$</td>
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<tr>
<td>$EXR_{ij,t}$</td>
<td>$-0.29^{***}$</td>
<td>$-0.04^{***}$</td>
<td>$-0.06^{***}$</td>
<td>$-4.33$</td>
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<td>$(0.007)$</td>
<td>$(0.005)$</td>
<td>$(5.5)$</td>
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<td>$CU_{ij,t}$</td>
<td>$0.72^{**}$</td>
<td>$0.14^{***}$</td>
<td>$0.14^{***}$</td>
<td>$2.94$</td>
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<td>$(0.04)$</td>
<td>$(7.78)$</td>
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<tr>
<td>$FTA_{ij,t}$</td>
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<td>$0.2^{***}$</td>
<td>$0.2^{***}$</td>
<td>$0.32$</td>
</tr>
<tr>
<td></td>
<td>$(0.08)$</td>
<td>$(0.02)$</td>
<td>$(0.02)$</td>
<td>$(6.76)$</td>
</tr>
<tr>
<td>$SERVAGREE_{ij,t}$</td>
<td>$0.47^{***}$</td>
<td>$-0.0002$</td>
<td>$0.01$</td>
<td>$-1.61$</td>
</tr>
<tr>
<td></td>
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<td>$(0.03)$</td>
<td>$(0.03)$</td>
<td>$(6.97)$</td>
</tr>
<tr>
<td>$\theta$</td>
<td>$0.3^{***}$</td>
<td>$0.3^{***}$</td>
<td>$0.3^{***}$</td>
<td>$3.690$</td>
</tr>
<tr>
<td></td>
<td>$(0.02)$</td>
<td>$(0.03)$</td>
<td>$(0.03)$</td>
<td>$(6.76)$</td>
</tr>
<tr>
<td>N</td>
<td>$47'995$</td>
<td>$47'995$</td>
<td>$47'995$</td>
<td>$812$</td>
</tr>
<tr>
<td>(Pseudo) R²</td>
<td>$0.83$</td>
<td>$0.93$</td>
<td>$0.93$</td>
<td>$0.05$</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>$-24'995$</td>
<td>$-9'266$</td>
<td>$-9'275$</td>
<td>$-3'690$</td>
</tr>
</tbody>
</table>

The entry of virtually all coefficients match up with economic priors: To recapitulate, the count of international merger deals between country $i$ and $j$ increases in their economic size, their similarity of economic size, differences in wage cost, lower investment cost, and stock market capitalisation. As regards theoretically ambiguous coefficients, estimates of table 5.3 suggest merger activity to increase significantly in case lower trade cost...
(DISTANCE\textsubscript{ij}, LANGUAGE\textsubscript{ij}), a customs union (CU\textsubscript{ij,t}), free trade agreement (FTA\textsubscript{ij,t}), or a service agreement (SERV\textsubscript{AGREE}\textsubscript{ij,t}) facilitate international exchanges. CBAs seem, thus, to complement rather than substitute for trade. Finally, an increase in EXR\textsubscript{ij,t} designating a real appreciation decreases outward merger activity implying that the associated additional cost of reexporting commodities seem to offset relative wealth effects.

Blonigen et al. (2003) have challenged econometric specifications like (1) and (2) of table 5.3 on grounds of sign reversals inherent in difference-terms like \(\Delta WAGE\) or \(\Delta GDP\), which render the interpretation of coefficients somewhat awkward. Meanwhile increases in positive differences translate into a divergence in economic size or factor prices, the opposite holds for negative differences. In order to relax linear constraints associated with difference-terms as well as facilitate interpretation, Blonigen et al. (2003) propose to apply absolute values \(|\Delta WAGE\textsubscript{ij,t}|\) and \(|\Delta WAGE\textsubscript{ij,t}|\Delta GDP\textsubscript{ij,t}|\) instead of \(\Delta WAGE\textsubscript{ij,t}\) and \((\Delta WAGE\textsubscript{ij,t})(\Delta GDP\textsubscript{ij,t})\). Results of this absolute value model, reported in column (3) of table 5.3, coincide widely with the original specification involving difference-terms. Above all, unlike Blonigen et al. (2003), applying absolute values does not result in sign reversal. The caveat against the absolute value model lies in its inconsistency with any theoretical model underlying MNE activity as well as imposing an implausible assumption about symmetric merger activity between country-pairs \(ij\) and \(ji\) (Carr et al., 2003).

For the sake of comparability, column (4) of table 5.3 contains estimates of a Tobit regression onto cumulative values of merger deals (VALUE\textsubscript{ij,t}) akin to Rossi and Volpin (2004) as well as Di Giovanni (2005). However, the preponderance of zero-valued observations, which amount to over 95%, highlights the problem of undisclosed deal-values discussed during section 5.2.1 and manifests in a poor fit of Tobit estimates, a large number of iterations until conversion and even a breakdown of ML-estimates. Therefore, estimates of column (4) rest on aggregated data across time, restricted to OECD economies, which lowers the share of zero-valued observations to about 40%. Despite widely coinciding directions of impact, the empirical fit of corresponding coefficients falls well short of count regressions.

Finally, column (5) of table 5.3 employs the MM as estimation strategy, which mitigates against potential inconsistency, should merger counts, \(CBA\textsubscript{ij,t}\), conditional on covariates, \(x\textsubscript{ij,t}\), not follow a negative binomial distribution. The direction of impact and the significance of resulting coefficients remain broadly unaffected by employing this alternative estimation strategy. Compared with ML, coefficients obtained by the MM tend, however, to be somewhat larger.
5.4 Introducing Institutional Quality

Following North (1990), the term "institution" refers here to a set of humanly devised constraints - be they formal constitutions and laws or informal customs and conventions - which structure the framework wherein MNEs take-over target firms. Institutions crucially shape incentives to undertake FDI, with quality referring to their capability to lower transaction cost. Despite being embedded in highly persistent formal and informal constraints, institutions change incrementally like society itself. Above all, as modus operandi of any economy and depending on their quality, the present section endeavours to establish both direction and degree, to which specific institutional features facilitate or obstruct international merger activity. Thereby, institutions might comprise an array of conventions, codes of conduct, norms of behaviour, laws, and political and legal contracts, which go well beyond the governance variables like shareholder protection and accounting standards in source countries featuring in Rossi and Volpin (2004). Moreover, the present panel count data allow to take into account the effects of institutional evolution and decay meanwhile analysing differences in the amount of CBAs across countries.

5.4.1 Four Dimensions of Institutional Quality

Whilst the importance of institutional quality meanwhile undertaking FDI is hardly controversial, the dimensions which allow to measure its empirical impact upon CBA-activity are far from obvious. In particular, investment cost of the base model (5.14), which rests on Carr et al. (2001), may only account for one of several components inherent in institutional quality. However, institutional evolution is likely to manifest in additional dimensions, which impose formal and informal constraints when MNEs invest in other firms or deal with government authorities to access a foreign market. In particular, the following 7 variables reflecting 4 broad groups of institutional quality, might impinge on MNEs decision to acquire firms abroad:

(a) Democratic Accountability

1. $DEMOCRACY_{jt}$: Formal democratic rule with effective electoral competition, which constraints political abuses.

2. $VOICE_{jt}$: Voice and accountability, which accompanies formal democratic rule and encompasses dimensions like civil liberties, political rights, or the independence of the media.

(b) Proliferation of Property Rights

1. $PROPRIGHT_{jt}$: Legal protection against expropriation by well established and secure property rights.
2. \( \text{LEGGBR}_{ij} \): Countries with British or common law heritage.

(c) Regulatory Quality and Investment Cost

1. \( \text{INVCOST}_{ij} \): Cost of doing business measured by the number of procedures officially required to start up a business.

2. \( \text{REGULATION}_{ij,t} \): Regulatory quality promoting necessary economic policies like e.g. an adequate supervision of banks whilst avoiding market unfriendly interventions like price controls.

(d) Corruption

1. \( \text{CORRUPTION}_{ij,t} \): Enforcement of rights by an uncorrupted government and bureaucracy.

The top panel of table 5.4 provides summary statistics about institutional quality variables with precise definitions and exact sources being deferred to table 5.7 of the appendix. Thereby, \( \text{CORRUPTION}_{ij,t}, \text{DEMOCRACY}_{ij,t}, \text{PROPRIGHT}_{ij,t}, \text{REGULATION}_{ij,t}, \) and \( \text{VOICE}_{ij,t} \) evolve over time and differ across countries whereas \( \text{LEGGBR}_{ij} \) and \( \text{INVCOST}_{ij} \) vary only across countries. Institutional quality variables relate to host countries meaning the absolute value of transaction cost to take-over the potential target determines investment opportunities as well as a country’s capability to attract FDI, regardless the institutional quality of specific source countries. Finally, variables of table 5.4 coincide widely with dimensions of La Porta et al. (1999) to assess the nexus between the quality of government and economic and financial development.

<table>
<thead>
<tr>
<th></th>
<th>DEMO.</th>
<th>VOICE</th>
<th>PROPR.</th>
<th>LEGGBR</th>
<th>INVCOST</th>
<th>REGUL.</th>
<th>CORRUPT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.68</td>
<td>-0.02</td>
<td>3.08</td>
<td>0.34</td>
<td>9.69</td>
<td>-0.02</td>
<td>5.33</td>
</tr>
<tr>
<td>Std.</td>
<td>0.47</td>
<td>0.99</td>
<td>1.2</td>
<td>0.47</td>
<td>3.33</td>
<td>0.98</td>
<td>0.47</td>
</tr>
<tr>
<td>Min.</td>
<td>0</td>
<td>-2.32</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3.99</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>1</td>
<td>1.72</td>
<td>5</td>
<td>1</td>
<td>19</td>
<td>2.27</td>
<td>9.6</td>
</tr>
<tr>
<td>N</td>
<td>89’392</td>
<td>98’124</td>
<td>79’994</td>
<td>103’600</td>
<td>72’520</td>
<td>95’904</td>
<td>47’730</td>
</tr>
</tbody>
</table>

Correlation Matrix (Based on 44’178 Common Observations)

<table>
<thead>
<tr>
<th></th>
<th>DEMO.</th>
<th>VOICE</th>
<th>PROPR.</th>
<th>LEGGBR</th>
<th>INVCOST</th>
<th>REGUL.</th>
<th>CORRUPT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOICE</td>
<td>0.54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROPR</td>
<td>0.26</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEGGBR</td>
<td>-0.01</td>
<td>-0.007</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INVCOST</td>
<td>-0.15</td>
<td>-0.37</td>
<td>-0.38</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REGUL.</td>
<td>0.27</td>
<td>0.8</td>
<td>0.83</td>
<td>0.1</td>
<td>-0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CORRUPT.</td>
<td>-0.21</td>
<td>-0.76</td>
<td>-0.83</td>
<td>-0.15</td>
<td>0.37</td>
<td>-0.81</td>
<td></td>
</tr>
<tr>
<td>(CBA_{ij,t})</td>
<td>0.03</td>
<td>0.1</td>
<td>0.11</td>
<td>0.04</td>
<td>-0.05</td>
<td>0.1</td>
<td>-0.11</td>
</tr>
</tbody>
</table>
The correlation matrix of the bottom panel of table 5.4 reveals the (unconditional) relationship among institutional quality variables, some of which being well established in the literature.

As regards democracy, Lederman et al. (2005) suggest government structures fostering political transparency and electoral competition to create an environment of accountability, where firms and the state tend to engage less in practices of bribery. Likewise, according to Djankov et al. (2003, pp.28ff.) political systems with more open access to public power, greater constraints on the executive power, and granting more political rights - in brief having the prerequisites of democratic rule - impose less cumbersome regulation of entry.

La Porta et al. (1998) find no strong effect of countries to compensate a limited offer of property rights towards shareholders and creditors by better enforcement. Against this background, the control of CORRUPTION\(_{j,t}\) and PROPRIGHT\(_{j,t}\) exhibit a surprisingly close correlation amounting to -0.83. This might partly be attributed to Germanic and Scandinavian legal heritage, which tends to create institutions enforcing rights in a rather effective and virtuous manner, in spite off affecting economic activities by vast government intervention.

In respect to regulatory quality, Djankov et al. (2003, pp.22ff.) suggest extensive state intervention to reflect government failure rather than attempts to correct market failure, particularly in form of creating opportunities to extract bribes. La Porta et al. (1997, 1998) have established the merits of legal systems rooted in the common law tradition to proliferate property rights as opposed to civil law heritage of French origin, which tends to bring about higher state intervention and more cumbersome regulation. Indeed, they see legal origin as a broad measure of investor protection. Consequently, the negative correlation between PROPRIGHT\(_{j,t}\) and INVCOST\(_j\) might originate to some extent in the legal system.

Above all, aside from CORRUPTION, PROPRIGHT, and REGULATION, which exhibit a rather close correlation above 0.8, other pairs show modest correlation coefficients. This suggests that the proposed four dimensions account for various aspects of institutional quality within a complex system of checks and balances.

### 5.4.2 Empirical Impact of Institutional Quality

Columns (1) to (5) of table 5.5 report subsequently the individual and joint impact of the four dimensions of institutional quality proposed during the previous section upon cross-border merger counts. Due to being the most widely used count model, estimates rest on the negative binomial framework. Employing an alternative estimation strategy - like moment based methods - does, however, not alter the essence of the results. In any case, variables of the baseline specification (5.14) control for spurious correlation.
Table 5.5: Count Regressions with Institutional Quality Variables
This table introduces institutional quality variables into (5.14). Coefficients are estimated by ML with an underlying negative binomial distribution (5.4). The dependent variable is merger counts $CBA_{ij,t}$. Standard errors are in parentheses. Coefficients significant at the 10% level are labelled with *, at the 5% level with **, and at the 1% level with ***.

<table>
<thead>
<tr>
<th></th>
<th>Hor. Full Sample</th>
<th>Vert. CBA CBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) (2) (3) (4)</td>
<td>(5) (6) (7)</td>
</tr>
<tr>
<td><strong>DEmOCRACy</strong></td>
<td>0.1*</td>
<td>0.17***</td>
</tr>
<tr>
<td>$j$</td>
<td>(0.06)</td>
<td>0.14*</td>
</tr>
<tr>
<td><strong>VOICE</strong></td>
<td>0.62***</td>
<td>0.24***</td>
</tr>
<tr>
<td>$j,t$</td>
<td>(0.03)</td>
<td>0.26***</td>
</tr>
<tr>
<td><strong>PROPRIGHT</strong></td>
<td>0.62***</td>
<td>0.22***</td>
</tr>
<tr>
<td>$j,t$</td>
<td>(0.02)</td>
<td>0.23***</td>
</tr>
<tr>
<td><strong>LEGGBR</strong></td>
<td>-0.11***</td>
<td>-0.05</td>
</tr>
<tr>
<td>$j$</td>
<td>(0.04)</td>
<td>-0.1**</td>
</tr>
<tr>
<td><strong>INV COST</strong></td>
<td>0.008***</td>
<td>-0.007</td>
</tr>
<tr>
<td>$j$</td>
<td>(0.0004)</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>REGULATION</strong></td>
<td>0.76***</td>
<td>0.18***</td>
</tr>
<tr>
<td>$j,t$</td>
<td>(0.03)</td>
<td>0.19***</td>
</tr>
<tr>
<td><strong>CORRUPTION</strong></td>
<td>-0.25***</td>
<td>-0.07***</td>
</tr>
<tr>
<td>$j$</td>
<td>(0.01)</td>
<td>-0.04**</td>
</tr>
</tbody>
</table>

Control Variables: yes yes yes yes yes yes yes

Pseudo. $R^2$: 0.833 0.831 0.833 0.829 0.830 0.762 0.777

Democracy refers here to its broad definition requiring, aside from political competition at the ballot box, voice and accountability within a transparent political process. Following Lederman et al. (2005), countries with effective electoral competition ($DEmOCRACy_{j,t}$) share an Executive Index of Electoral Competitiveness (EIEC), compiled by the World Bank (2002), above 5 and are not run by a military officer. Thereby, $DEmOCRACy_{j,t}$ constitutes an indicator variable with democratic regimes scoring a value of 1 as opposed to dictatorships designated by a value of 0. Since the period under consideration (1997-2003) did not fall into a wave of democratisation, only a few countries such as Ghana, Indonesia, or the Philippines saw a change in $DEmOCRACy_{j,t}$. Secondly, $VOICE_{j,t}$ has been extracted as latent variable from a structural model and reflects the extent to which effective voice and accountability shapes political rule before and after the elections.

The effect of democratisation on institutional quality is twofold: Firstly, electoral control allows to hold misbehaving or incompetent politicians accountable at the poll. Secondly, due to electoral competition, relatively more competent representatives could be selected into power. Above all, as suggested by the significant positive entry of variables pertaining to democratic accountability, transparent governance reduces uncertainty and transaction cost, and thereby allow hosts to attract more CBAs.64
International mergers rest on entrenched and safeguarded property rights, which give the acquirer the power to extract returns on investment from the target firm, and thereby uphold incentives to enter a foreign market. In order to establish the empirical effect of property rights, the Heritage Foundations’ rating on a scale from 1 to 5 is employed, where higher values refer to a lower risk of expropriation.65

As suggested by the significant positive entry of \( PROPRIGHT_{j,t} \), entrenched property rights protect shareholders and creditors from expropriation by insiders or the state and raise the willingness of MNEs to take-over control of firms in host country \( j \). Contrasting the literature on finance and development (La Porta et al., 1997, 1998), which emphasises common law countries to be more conductive to investment, present results on CBA activity do not support this result. One explanation might be that civil law countries do not constitute a homogenous group. In particular, countries with a German or Scandinavian legal heritage likewise support well established and safeguarded property rights, which could be better reflected within \( PROPRIGHT \). Furthermore, a variable like legal heritage does not allow for dynamic improvements or decay in securing property rights.

Undertaking merger projects involves obtaining permission by various regulators like the clearance by competition or financial services authorities. Clearly, less burdensome regulation, measured by the number of procedures66 required to legally set up a firm (\( INV\text{COST}_j \)) as well as a latent index of regulatory quality (\( REGULATION_{j,t} \)), fosters cross-border merger activity within host countries \( j \). However, only the latent measure of regulatory quality produces consistently significant results.

Finally, an endemically corrupt bureaucracy or judiciary jeopardises the enforcement of the soundest regulation or most extensive property rights. Indeed, corruption - defined as the abuse of public power for private benefit - infringes prevailing laws and inherently undermines institutional quality. In essence, the significant negative entry of \( CORRUPTION_{j,t} \), measured by a composite index on basis of the perception of country experts, business people, and the general public, uncovers enforcement as a separate dimension of institutional quality. Then again, this corruption perception index (CPI) compiled by Transparency International on a yearly basis, accounts for the possibility of institutional evolution. Yet, with values of the correlation matrix for the years 1997 - 2003 exceeding 0.95, considerable persistence seems to characterise the ranking of corruption around the world.

Remaining columns (6) and (7) of table 5.5 attempt to split CBAs into horizontal and vertical deals meanwhile uncovering the impact of institutional quality variables. In particular, an equality of SIC code between acquirer and target firm identifies deals on the same stage of production, respectively distribution, which therefore are likely to be driven by horizon-
tal, market access considerations. Conversely, merger counts including deals with different SIC codes between acquirer and target, and thereby involving an investment across stages of production, contain deals, which are rather vertical or conglomerate in nature. SIC codes of almost any deal are reported in SDC Platinum. Based on employing 2 digit SIC codes, during the period under consideration, 48% of all deals where horizontal in nature with remaining 52% either being vertical or conglomerate CBAs. Results of columns (5), (6), and (7) do not show any qualitative difference, suggesting that poor institutional quality affects horizontal and vertical CBA activity alike.

Finding statistical significance on variables proxying for institutional quality does not per se coincide with economic significance, e.g. sufficiently large coefficients affecting the distribution and growth of a considerable number of cross-border deals across countries and time. Due to nonlinearities, the coefficients $\beta$ of count regressions do, however, not directly represent responses towards incremental changes of covariates. Rather after subsequently differentiating (5.1) and rearranging, the marginal impact $x_k$ upon the expected number of CBAs is given by,

$$\frac{\partial E[CBA|x]}{\partial x_k} = \exp(x'\beta_k)$$

(5.15)

where for the sake of exposition subscripts $i, j, \text{ and } t$ have been dropped. The marginal response $\frac{\partial E[CBA|x]}{\partial x_k}$ depends, thus, on the actual values of covariates $x$ and therefore differs across country-pairs and time. In order to measure marginal responses regardless, (5.15) can be evaluated for an average host country e.g,

$$\frac{1}{N} \sum_j \frac{\partial E[CBA|x]}{\partial x_k} = \frac{1}{N} \sum_j \beta_k \exp(x'\beta)$$

(5.16)

where $\beta_k \exp(x'\beta)$ may designate the mean or the median of covariates across host countries and years. Table 5.6 evaluates (5.16) in respect to the 7 institutional quality variables.

<table>
<thead>
<tr>
<th>Marginal Response</th>
<th>Democ.</th>
<th>Voice</th>
<th>Propr.</th>
<th>Leggbr</th>
<th>Invcost</th>
<th>Regulation</th>
<th>Corruption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Covariates averaged according to the mean</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>25</td>
<td>23</td>
<td>-5</td>
<td>-1</td>
<td>19</td>
<td>-7</td>
</tr>
<tr>
<td>Horizontal</td>
<td>7</td>
<td>14</td>
<td>12</td>
<td>-5</td>
<td>0</td>
<td>9</td>
<td>-2</td>
</tr>
<tr>
<td>Vertical</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>2</td>
<td>-1</td>
<td>7</td>
<td>-4</td>
</tr>
<tr>
<td><strong>Covariates averaged according to the median</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>16</td>
<td>14</td>
<td>-3</td>
<td>0</td>
<td>12</td>
<td>-5</td>
</tr>
<tr>
<td>Horizontal</td>
<td>5</td>
<td>9</td>
<td>8</td>
<td>-4</td>
<td>0</td>
<td>6</td>
<td>-1</td>
</tr>
<tr>
<td>Vertical</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>-2</td>
</tr>
</tbody>
</table>
Results suggest that during the period under consideration the typical host country could have attracted up to 25 more mergers from abroad by improving institutional quality variables incrementally (signs in table 5.6 are negative when variables measure weak institutions rather than institutional quality). Thereby, simulations based on the median across covariates of host countries produce somewhat smaller effects. However, against the benchmark that according to table 5.2 about half of the countries around the world - many of which with rather weak institutions - have attracted less than 10 merger deals between 1997 and 2003, these effects appear to be of considerable magnitude. Economically large benefits accrue in particular to improving democratic rule, safeguarding property rights, and keeping regulation modest. Conversely, institutional quality variables widely advocated in previous studies like investment cost (Carr et al, 2001) or common law origin (La Porta et al. 1997, 1998, 1999) not only fail to be statistically significant after table 5.5, but also seem to deter cross-border merger deals to a rather small extent.

Some caution needs however applying when interpreting the evaluated marginal effect of institutional quality variables in table 5.6. In particular, these results have been obtained for the benchmark of an average host country as regards economic, geographic, and financial control variables. However, countries around the world differ a great deal in terms of economic and financial development, as well as their geographic location in respect to large markets for corporate control. Therefore, these average results might not be meaningful when looking at institutional changes within a specific country.

Finally, results do not differ fundamentally when the sample is cut according to whether or not acquiring and target firms share the same SIC code. Considering that the resulting split divides the sample almost equally into what are likely to be rather horizontal and vertical, respectively conglomerate driven CBAs, table 5.6 identifies somewhat higher impacts of voice and accountability, property rights, and regulatory quality on horizontal CBAs. Conversely, vertical CBAs seem relatively more affected by investment cost, and corruption. Finally, common law origin produces an opposing albeit relatively small impact.

5.5 Concluding Remarks

The present event count study has introduced institutional quality as a determinant of international merger activity alongside established variables like economic size, differences in factor prices respectively endowment, trade and investment costs, or financial deepening. Thereby, institutional quality - defined as a set of humanly devised rules designed to lower the cost of transactions - manifests in established democratic rule, low investment cost, modest regulation, entrenched property rights, and the control of corruption. According to results based on panel count regressions, institutional quality variables impact upon the number of cross-border merger deals in a widely significant manner, both statistically and economically.
However, variables like common law origin or investment cost, which feature prominently in the literature on finance and development respectively measuring the knowledge capital model, fail to produce significant impacts. Furthermore, there does not seem to be any large difference in the impact upon horizontal and vertical CBA activity.

As regards policy, this result suggests countries should endeavour to establish government based on principles of accountability, safeguarding property rights, modest regulation, and the control of corruption in order to attract FDI in form of international merger deals to benefit fully from globalisation.
Data Appendix

Country Coverage

The baseline specification of table 5.3 contains data on the following countries:

As Source and Host: Argentina, Australia, Austria, Bahamas, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Kuwait, Latvia, Lithuania, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Oman, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Venezuela, Zimbabwe.

### Table 5.7: Description of the Data Set

Variables are collected for 67 source countries, \( i \), 145 host countries, \( j \), and consecutive years, \( t \), between 1997 and 2003. The top panel contains the CBA variables followed by a list of control and institutional quality variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>( CBA_{ij,t} )</td>
<td>Count</td>
<td>Number of international merger deals between source and host country for each year. Based on whether or not SIC codes between acquiring and target firms are equal, CBA counts can be split into a horizontal respectively vertical and conglomerate dimension.</td>
<td>Compiled from Thomson Financial.</td>
</tr>
<tr>
<td>( VALUE_{ij,t} )</td>
<td>Hundred US$</td>
<td>Cumulated value of international merger deals between source and host country for each year.</td>
<td>Compiled from Thomson Financial.</td>
</tr>
<tr>
<td>( \sum GDP_{ij,t} )</td>
<td>Bio. US$</td>
<td>Real Gross Domestic Product in US$ with base year 1995 added over source and host country.</td>
<td>Compiled from World Development Indicators (WDI), World Bank.</td>
</tr>
<tr>
<td>( \Delta GDP_{ij,t} )</td>
<td>Bio. US$</td>
<td>Real Gross Domestic Product in US$ with base year 1995 in terms of difference between source and host country.</td>
<td>Compiled from WDI.</td>
</tr>
<tr>
<td>( \Delta WAGE_{ij,t} )</td>
<td>Thousand US$</td>
<td>Wage difference between source and host country measured by the corresponding difference in real GDP per capita with base year 1995.</td>
<td>Compiled from WDI.</td>
</tr>
<tr>
<td>( DISTANCE_{ij} )</td>
<td>Thousand Km.</td>
<td>Great circular distance between capital cities of source and host country.</td>
<td>Compiled.</td>
</tr>
<tr>
<td>( LANGUAGE_{ij} )</td>
<td>Indicator</td>
<td>Indicator variable designating a common official language between host and source country.</td>
<td>Compiled from CIA World Factbook.</td>
</tr>
<tr>
<td>( STOCK_{i,t} )</td>
<td>Percent</td>
<td>Average market capitalisation as percent of GDP in source country ( i ).</td>
<td>Compiled from WDI.</td>
</tr>
<tr>
<td>( EXR_{ij,t} )</td>
<td>Ratio</td>
<td>Real exchange rate in terms of price conversion factor multiplied with the nominal exchange rate.</td>
<td>WDI.</td>
</tr>
<tr>
<td>Variable</td>
<td>Type</td>
<td>Description</td>
<td>Source</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>( CU_{ij,t} )</td>
<td>Indicator</td>
<td>Indicator variable designating a customs union between source and host country.</td>
<td>Compiled from WTO.</td>
</tr>
<tr>
<td>( FTA_{ij,t} )</td>
<td>Indicator</td>
<td>Indicator variable designating a free trade agreement between source and host country.</td>
<td>Compiled from WTO.</td>
</tr>
<tr>
<td>( SERVAGREE_{ij,t} )</td>
<td>Indicator</td>
<td>Indicator variable designating a service agreement between source and host country.</td>
<td>Compiled from WTO.</td>
</tr>
<tr>
<td>( DEMOCRACY_{j,t} )</td>
<td>Index Score</td>
<td>Average over the 1990ies of an interactive indicator for regimes with democratic characteristics in country ( j ) in terms of an Executive Index of Electoral Competitiveness (EIEC) above a score of 5, not run by military officer. Fully democratic regimes score a value of 1 opposed to persistent dictatorships scoring a value of 0.</td>
<td>World Bank (2000) and Lederman et al. (2005).</td>
</tr>
<tr>
<td>( VOICE_{j,t} )</td>
<td>Latent Variable</td>
<td>Rating of voice and accountability meanwhile selecting a government. Voice and accountability captures a multitude of features such as civil liberties, political rights, or the independence of the media. The variable has been extracted from an unobserved components model for the years 1996, 1998, 2000, 2002. For missing years 1997, 1999, 2001, 2003 observations from previous years have been taken. Higher values mean more voice and accountability.</td>
<td>Kaufman et al. (2005).</td>
</tr>
<tr>
<td>( PROPRIGHT_{j,t} )</td>
<td>Index Score</td>
<td>Rating of property rights in country ( j ). Original values have been reversed on a scale from 1 to 5 with higher values indicating more secure property rights.</td>
<td>Heritage Foundation.</td>
</tr>
<tr>
<td>( LEGBR_{j} )</td>
<td>Indicator</td>
<td>Indicator variable for countries with British common law heritage.</td>
<td>CIA World Factbook.</td>
</tr>
<tr>
<td>( INVCOST_{j} )</td>
<td>Count</td>
<td>Regulatory quality instrumented by the number of procedures officially required to set up a firm in country ( j ).</td>
<td>WDI and Djankov et al. (2002).</td>
</tr>
<tr>
<td>( REGULATION_{j,t} )</td>
<td>Latent Variable</td>
<td>Regulatory quality in terms of the absence of market unfriendly policies like price controls, inadequate bank supervision, or excessive government intervention. The variable has been extracted from an unobserved components model for the years 1996, 1998, 2000, 2002. For missing years 1997, 1999, 2001, 2003 observations from previous years have been taken. Higher values mean higher regulatory quality.</td>
<td>Kaufman et al. (2005).</td>
</tr>
<tr>
<td>( CORRUPTION_{j,t} )</td>
<td>Index Score</td>
<td>Composite Corruption Perception Index (CPI) in country ( j ) based on at least 3 surveys among country experts, business people, or the general public. Original values have been reversed on a scale from 1 to 10 with higher values indicating higher corruption.</td>
<td>Transparency International.</td>
</tr>
</tbody>
</table>
5.5.2 Summary Statistics

Table 5.8: Summary Statistics of Control Variables

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.43</td>
<td>0.67</td>
<td>2.46</td>
<td>7.07</td>
<td>12.31</td>
<td>7.4</td>
<td>9.69</td>
<td>1.07</td>
<td>0.67</td>
</tr>
<tr>
<td>Std.</td>
<td>5.47</td>
<td>1.53</td>
<td>11.39</td>
<td>17.58</td>
<td>44.61</td>
<td>4.41</td>
<td>3.33</td>
<td>1.54</td>
<td>0.72</td>
</tr>
<tr>
<td>Min.</td>
<td>0</td>
<td>0.004</td>
<td>0</td>
<td>-58.7</td>
<td>-252.1</td>
<td>0.06</td>
<td>2</td>
<td>0.00001</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>438</td>
<td>18.39</td>
<td>89.55</td>
<td>59.11</td>
<td>306.3</td>
<td>19'84</td>
<td>19</td>
<td>46.55</td>
<td>5.95</td>
</tr>
<tr>
<td>N</td>
<td>107'744</td>
<td>81'425</td>
<td>81'425</td>
<td>70'257</td>
<td>69'538</td>
<td>88'529</td>
<td>72'520</td>
<td>70'018</td>
<td>87'984</td>
</tr>
</tbody>
</table>

Correlation Matrix
(Based on 47'995 Common Observations)

<table>
<thead>
<tr>
<th></th>
<th>CBA$_{ij,t}$</th>
<th>$\sum GDP$</th>
<th>$\Delta GDP^2$</th>
<th>$\Delta WAGE$</th>
<th>$\Delta W . \Delta GDP$</th>
<th>DIST.</th>
<th>INVCO.</th>
<th>EXR</th>
<th>STOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sum GDP$</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta GDP^2$</td>
<td>0.2</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta WAGE$</td>
<td>-0.01</td>
<td>0.07</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta W . \Delta GDP$</td>
<td>0.05</td>
<td>0.84</td>
<td>0.83</td>
<td>0.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIST.</td>
<td>-0.07</td>
<td>0.06</td>
<td>0.07</td>
<td>-0.01</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INVCO.</td>
<td>-0.09</td>
<td>-0.08</td>
<td>-0.06</td>
<td>0.3</td>
<td>0.004</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXR</td>
<td>-0.01</td>
<td>-0.001</td>
<td>-0.01</td>
<td>-0.36</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STOCK</td>
<td>0.08</td>
<td>0.12</td>
<td>0.11</td>
<td>0.32</td>
<td>0.09</td>
<td>-0.001</td>
<td>-0.0001</td>
<td>-0.1</td>
<td></td>
</tr>
</tbody>
</table>
Notes

54 Conglomerate mergers constitute a third and unaccounted possibility with distinctive motives pertaining to risk diversification whilst investing across industries and stages of production.

55 Such internal economies of scale occur when the cost per unit decreases in the size of the individual firm. By way of contrast, external economies of scale, which relate to the size of the industry in a specific location, typically do not entail MNE activity. Instead, local firms tend to cluster in specialised regions in order to take advantage of agglomeration effects. External economies of scale have gone widely unnoticed in the literature on international economics and finance. Krugman (1993) constitutes an exception.

56 In particular, Di Giovanni (2005) drops 56.3% of all deals due to undisclosed values.

57 The motivation for introducing this threshold is twofold: Firstly, FDI in general and CBAs in particular involve an element of change in control. Secondly, Rossi and Volpin (2004, p.279) conjecture that the coverage of transfers with minority stakes (those below 50%) depends on country-specific disclosure requirements and might, therefore, suffer from sample selectivity.

58 Applying a logarithmic transformation to merger counts would mitigate against negatively fitted values. However, the preponderance of zero-valued counts necessitates introducing an arbitrarily chosen small constant, or dropping a substantial part of the sample. Alternatively, Wei (2000) employs a two-stage model including a threshold, which identifies the realm of positive FDI flows endogenously.

59 Alternatively, Hausman et al. (1984) consider splitting up unobserved heterogeneity into components pertaining to time \( \alpha_i \) and cross sectional dimensions \( \alpha_{ij} \) to account more comprehensively for the panel structure, which yields the random effects negative binomial model. In this case, the mixing distribution \( g(\cdot) \) relates to two parameters and is typically assumed to be Beta distributed. A second alternative lies in specifying a fixed effects negative binomial model necessitating quasi differencing event counts to circumvent the incidental parameter problem when the cross sectional dimension becomes large. Resulting distributions are akin to the multinomial logit model. Details can again be found in Hausman et al. (1984) as well as Cameron and Trivedi (1998, ch.9).

60 This property distinguishes the present negative binomial model of type II from the type I specification, where the variance increases linearly in \( E[CBA_{ij,t}|x_{ij,t}] \).

61 The new trade theory (see e.g. Helpman and Krugman, 1985), where firms compete imperfectly and pursue strategies of product differentiation, partly predicts the basic gravity relationship. However, the new trade theory neglects the fact that industries characterised by corresponding scale economies are often dominated by MNEs (Markusen, 1995).

62 Considering literacy rates as measure for skilled labour regardless, does not alter the essence of the results. To save up space, corresponding estimates are not reported here.

63 In respect to protectionist measures, this traditional argument for FDI is sometimes referred to as "tariff jumping".

64 Furthermore, the positive entry of democratic rule could partly pick up the impact of trade sanctions put in place against ideologically opposed regimes for political reasons. E.g. the US upholds trade sanctions against countries like Cuba, Myanmar, or North Korea essentially ruling out foreign investment. For an analysis of economic sanctions onto FDI within a gravity framework, see Elliot and Hufbauer (1999).

65 Likewise to the cost of doing business, the number of procedures and the time required to register property rights provides a quality measure. The World Bank publishes corresponding data (www.doingbusiness.org), which, however, do not allow to control for dynamic change of institutional quality. Once again, considering the official number of procedures respectively time to register property regardless, does not alter the essence of the results.

66 Both the time and cost to set up a business constitute alternative measures for regulatory quality. Presently, the number of procedures has been chosen as it most concisely represents the tollbooth theory
of corruption, where regulators design a multitude of complementary permits in order to maximise their bribe revenue (Shleifer and Vishny, 1993).

Equation (5.16) could also be evaluated for specific countries within the sample. E.g. a marginal reduction in corruption in the UK would have increased the expected number of CBAs between 1997 and 2003 by about 14 deals (evaluated at the mean of the data). With actual incoming international merger activity standing at 4'336 deals during that period (see table 5.2), this is negligible suggesting that corruption does not constitute a major obstacle for attracting foreign investment into the UK.
Bibliography


Part III

Concluding Remarks on the Causes and Consequences of Corruption
The present thesis has endeavoured to shed some more light into what causes endemic corruption to persist in some countries whilst others maintain a government system relatively clean of practices like bribery and nepotism, and establish some of the economic consequences thereof. Meanwhile, the analysis revisited most of the causal and consequential factors entrenched in the literature on the economics of corruption.

According to its most common definition, corruption constitutes an abuse of public power for private benefit. In particular, whenever agents, like bureaucrats or politicians, are entrusted with discretionary power over allocating considerable amounts of economic rent and cannot be monitored perfectly, there is scope for opportunistic behaviour in terms of engaging in corruption. Since almost any government intervention fulfills these criteria, no society can probably claim not to have witnessed cases of corruption within its political or bureaucratic system. Therefore, even government intervention aimed at correcting market failure bears the risk of producing government failure instead when agents behave cynically, let alone the possibility of the political elite as a principal designing a government system, which suits them best in seeking self-enrichment.

An understanding of the differences across the elements upon which bribery rests - like the discretionary power available to the government, economic rents, as well as the monitoring and penalty system - stands crucial in assessing the differences in corruption around the world.

Firstly, decentralising power across agents and territory might render its abuse less likely. Above all, the first and second essay of the present thesis have considered the potential of political decentralisation in terms of countries adopting federal constitutions, which indeed proliferates lower levels of corruption. Other mechanisms decentralising power include the market economy, where resources are exchanged on basis of the price system rather than allocated through an economic plan, but also non-hierarchical belief systems like Protestantism.

Secondly, in countries with large and open markets, where firms face fierce domestic and international competition, economic rents will be competed down rapidly and therefore provide fewer opportunities to engage in practices like directly unproductive profit seeking. Furthermore, modest regulation and low taxes limit the rents at the discretion of the public sector.

Finally - aside from these rather economic features - other disciplines typically focus on the effectiveness of the monitoring and penalty system as a device to deter corrupt abuses. However, every bureaucrat, judge, or police officer can likewise be tempted into bribery in exchange for giving the accused a favourable verdict. Effective monitoring rests on there being at least one honest agent. This is more likely to occur within a complex system of checks and balances necessitating institutions like democratic rule, an independent judiciary
and media, but also civil and political liberties, which allow citizens to challenge government power. All these institutions endeavour to hold trustees of power accountable or to select agents into positions of power, which are likely to place public interest ahead of self-interest.

Countries around the world show a great deal of heterogeneity across institutions capable of constraining corruption. However, creating the prerequisites necessary to effectively combat public misconduct like political decentralisation, a competitive market economy, democratic rule, or an independent judiciary seems to be a formidable task, which has taken countries decades if not centuries. For countries with a rather short history in institution-building, reducing the extent of corruption towards bearable levels might therefore not be achievable within the short-term.

Whilst institutional reform towards less corruption is tedious, the economic benefits thereof might be substantial. The third essay has shown how bribery shapes an environment impeding investment by reducing a country’s capability to attract FDI in terms of cross-border merger deals. Other studies have found an equally detrimental effect upon FDI in general, as well as economic performance variables like GDP per capita. Endemic corruption seems to constitute a considerable obstacle for some countries to benefit fully from globalisation. Intriguingly, government effectiveness in terms of a transparent regulation not subject to the arbitrariness of bribery, seems to be a much more promising way in fostering economic development than reducing the size of government via deregulation.