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Causes of Corruption
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Acknowledgement

The fact that this thesis has been written is due to so many different events and people that it statistically never should have materialised. The path that brought me to where I am today has been long and winding. All things that have happened to me and the people I have met are instrumental for me being here, but space is scarce and allows me to bring up but a few.

A string of improbable events, including a strained ankle at the Karlskrona naval base ended up in me choosing to study economics and later meet Prof. Börje Johansson. Who encouraged me to take on a career as a Phd. student and also thought me much of what I know about economics and thesis writing (which still remains scant little compared to him).

Then we have the long arm of coincidence that brought the other Phd. students and faculty members to the Economics department. All, who, on the Friday seminars chaired by Prof. Åke E Andersson and in the coffee room, has lent both encouragement and fair criticism of ideas as well as finished papers. At JIBS I also had the fortune of meeting phd. students with whom I have co-written papers, one which appears in this thesis; Elena Raviola, Erik Åsberg and Andreas Johnsson. They all taught me much and provided excellent company at conferences.

Further, the school happened to be part of a graduate program network that allowed me to take courses at different Swedish and Foreign Universities. At Göteborg University I was privileged to be taught by Prof. Ola Olsson which later also arranged for me to present at seminars at the Economics department. Both the courses and seminars helped enormously in writing this thesis. Although born in Canada my excellent discussant at the final seminar, Heather Congdon-Fors, also works at Göteborg University, her comments were very useful for completing the thesis.

Then we have the friends from far and near, by chance encountered at different stages in my life, which have been there in times of need and times of joy. They are so many and should all be mentioned, but in fear of forgetting some, I choose to be a coward and mention none.

How likely was it that my father and mother would meet and later give birth to me? They gave me a loving childhood, teaching me how to behave and instilling the solid belief that everything is possible if you try hard enough. Without them I would certainly not be here today.

Finally, we have the stroke of luck that I choose to dabble in theatre for a period of time, if not for that I would never have met Anna. A girl that has stayed by my side for 12 years, and given me so much more than I deserve. This thesis has probably been harder on her than on me. So, I hope that we will be together for a long time yet, so that I have enough time to pay her back.
I argue that the probability of all of the above happening and hence this thesis ever being written was slim to say the least.

Tobias Dahlström
August, 2009
Abstract

This thesis consists of an introductory chapter and four essays. Although possible to read individually they all analyse the causes of corruption and hence complement each other.

The four essays collectively illustrate the complex nature of corruption. Often many interrelated factors work together in causing corruption. Hence, discovering how these factors, individually and together, cause corruption is vital in combating corruption.

The first essay helps to explain the path dependency of corruption. It shows that even if the legal system and enforcement level in a corrupt country or organisation is altered to become identical to that in a non corrupt, the level of corruption may not converge.

The second essay analyses how the decision making structure influences corruption. It is found that even though the profits of corruption may be monotonically related to changes in the organisational structure the incidence of corruption is not necessarily so.

The third essay looks on how corruption may spread between different organisations or countries as they interact with each other, with corrupt/non-corrupt behaviour being more likely to be transmitted from successful to non successful entities than vice versa.

The fourth and final essay investigates how the freedom of information can impact on corruption. Looking on both regulatory and technical constraints on information flows, the conclusion is that relaxation of both constraints simultaneously is needed to combat corruption.
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Chapter 1
Introduction and summary of the thesis

I

Introduction

Corruption has been present for a long time; there are historical accounts of corruption in all of the ancient empires: Babylonia, Egypt, Greece and Rome\(^1\) (see, among others, Noonan, 1984, Porter, 1993, p. 101, Van de Mieroop 2004, p. 74 or Taylor, 2006). Persistently, corruption has been seen as something that damages society; with laws drafted against corruption already in ancient Babylonia\(^2\). Fear of corruption also exerted an important influence on the creation and transformation of the American Constitution (Wallis, 2004 and White, 2003). Corruption is in fact one of only two crimes that the American constitution mentions, the other being treason (Noonan, 1984, p.xvi). The negative view of corruption persists today\(^3\), with the World Bank\(^4\) calling corruption “the biggest obstacle for poverty reduction”\(^5\) and the OECD

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\(^1\) There are even written accounts on how the Oracle of Delphi was bribed as to ensure the support of the Spartans in the effort to liberate Athens (see Aristotle, Ath. Pol 19.4).

\(^2\) Some claim that the earliest legal edict with a secular punishment for corruption is the Edict of Hormheb (Horamhab) from 1300 BC (see Noonan, 1984, p11 and Pfluger, 1946). Hammurabi himself also took a hard stance against corruption and drafted legislation to suppress it (King and Hall, 2005).

\(^3\) In addition to the OECD convention against bribery created in 1997 there are numerous other international conventions against bribery. The Council of Europe has two main conventions with the aim to fight corruption and the European Union has one to protect European communities’ financial interests, one to overcome bureaucratic corruption and one for corruption in the private sector. Further, the United Nations has the Convention Against Corruption (UNCAC), which was the first international legally binding anti-corruption treaty, to mention but a few.


\(^5\) This phrasing is more moderate than the one that could be found on the WB webpage for some years. It had the following wording “the single greatest obstacle to economic and social development. It undermines development by distorting the rule of law and weakening the institutional foundation on which
saying that "corruption undermines good governance and economic development" (Convention on combating bribery of foreign public official in international business, OECD, 1997, p.3).

Today corruption is a burgeoning field of research in economics; the majority of the work however, has been done during the last 10 years. To exemplify, the number of peer reviewed articles on the topic of corruption recorded in the ISI web of Science Social Citation Index are displayed for each year between 1970 and 2008 in table 1 below. Up until the early 90s research on corruption by economists was rare and that done was mostly theoretical in nature. This was mainly due to lack of data, but with more and better data available from the late 90s and onwards, empirical research on corruption has progressively increased. The seminal quantitative work on corruption was produced by Paulo Mauro in 1995 using data from the Business Intelligence group (BI). His data however only covered 67 countries; today data available from the Non Governmental Organisation (NGO) Transparency International (TI) covers 180 countries and each year more countries are added to the data set.

![Figure 1 Published peer reviewed articles on Corruption](image)

It is not only the increased availability of data that has spurred interest in corruption among economic scholars. Increasing awareness among scholars economic growth depends”. This is no longer found on the webpage but is quoted in for example Ciocchini et al (2003).
I. Introduction and summary of the thesis

as well as policy makers of corruptions debilitating effect on an economy and its
development motivates and necessitates research on corruption.

Even though corruption research has increased over the last few years,
as can be seen in table 1, it is still a relatively undeveloped field in economics. I
compare it with research on for example Foreign Direct Investment (FDI) over
the last fifteen years in table 2 below. In 1994 there were more than six times as
many peer review articles published on FDI compared to corruption. However
as can be seen this gap decreases over time and in 2008 there were only twice as
many articles on FDI compared to corruption, but the total number of articles
published since 1980 are still 3 to 1 in FDI’s favour. So there is still need of
more research on corruption.

Figure 2 Number of FDI to Corruption Peer reviewed articles published

The four essays of this thesis do not treat the consequences of
corruption. Sufficient research has been done on the consequences to show that
the corruption is unwanted and thus, research concerning the causes of
corruption is warranted. Instead the thesis examines the nature of corruption,

* In a series of papers Wei (2000), Wei and Shleifer 2000 and
Smarzynska and Wei (2000)) find that corruption significantly reduce investments.
Corruption also distorts public projects, with projects chosen not on the grounds of
net present value but instead on the easy of getting kick-backs or bribes (Tanzi and
Davoodi, 1997 and Mauro, 1998). Where corruption is prevalent the stringency of
environmental policies are also weakened (Damania et Fredriksson, 2003 and
Fredriksson and Svensson, 2003) and the air more polluted (Welch, 2004). Further,
multiple studies have found that development is hampered by corruption (see
and the circumstances under which corruption spreads and detracts. The focus is hence on explaining why corruption appears, how it evolves and, if possible, find ways to improve anti-corruption work. More specifically, the thesis will concentrate on the following topics: in the first essay, the impact of already existing corruption on the possibility to deter individuals from engaging in corruption. In the second essay, a co-author and I investigate how changes in the decision-making system influence corruption. The third essay looks on how and why corrupt behaviour may spread between organisations or countries that interact. The fourth essay analyses how freedom of information, from both a regulatory as well as technical perspective, affects corruption.

This introductory chapter is structured as follows. First there is a section on corruption as a concept and how this concept has evolved over time. This is followed by a section on the most common empirical measures of corruption. After which a simple conceptual model of corruption is presented. Then I dwell briefly on whether corruption is necessarily always harmful. Finally the essays of the thesis and their main contributions are presented.

2 Defining Corruption

Corruption as a concept has been around for a long time; unfortunately the meaning has not been constant over time. Or, perhaps it is more correct to say that the main usage of the concept has not remained unaltered. Even though it is a simplification, it is possible to make a distinction between the classical and modern use of corruption. The classical use, think Aristotle, was of treating corruption as a process while the modern use is to treat it as behaviour.

Modern discussions of corruption focus most often on the individual’s decision of engaging in corruption or “playing by the book”. Corruption is treated as behaviour, often defined by something in line with the World Bank definition: “abuse of public power for private gain”. In most cases the public is seen as the state hence it is frequently referred to as bureaucratic corruption. The definition however does not preclude what is called private to private corruption. The public would in that case be a company; here we would encounter agents such as purchasers at companies. No matter how we define the public, this type of definition makes corruption suitable to discuss in an extended Principal-agent framework, as is done below.

Bribing is unarguably the behaviour most associated with corruption today. However, in classical texts (Greece, Latin, Egyptian or Hebrew) there is no word for a corrupt gift, the term used in those texts can be employed both for a lawful gift as well as for a corrupt gift (Taylor, 2006). In English the word

bribe was closely connected to stealing but changed meaning to the modern day meaning of a corrupt gift during the early 16th century first in various translations of the bible but also in plays by Whetstone and Shakespeare (Noonan, 1984). The first attested usage of it is from 1535 in Miles Coverdale's translation of the bible, where in some instances the word gift has been replaced by the word bribe (brybe) (Online Etymological Dictionary and Noonan, p.316).

Exchange of gifts and favours is a part of everyday life and has been so for a long time. Bribes are formed on the grounds on reciprocity and although it is nowadays viewed as illegal to give a gift even after a service has been rendered (Cars, 2001) this has not always been the case. In the famous play "The Merchant of Venice" which has its fair share of discussion on corruption it is not seen as a bribe if the gift is given after a verdict, while it is a bribe if it is given before (for a discussion of this see Noonan, 1984, pp.323). The same kind of argument, that the gift was received after the ruling and thus not a bribe, was put forth by Francis Bacon during his trials, which resulted in him being convicted for corruption (Noonan, 1984).

In classical texts however corruption is discussed, not as behaviour but as the process of going from a virtuous state to a degenerated one. Polybius (Book 6, section 4) regarded the forms of government as cyclical phenomenon. Each of the pure forms, where replaced by a degenerate or corrupted version, which was then replaced by a pure form and so on. He thus saw corruption as the manner in which one institutional setting replaces the next. Further, the focus in classical texts is often on the system or political body and not only on the individual. This is of course not saying that corruption in the modern sense was not around or discussed. In Roman politics accusations of corruption were frequently flung at political opponents (see for example the case Cicero against Verres). Politicians also used laws that tried to limit corruption to get a mandate and public support for broader institutional reforms. It has been argued that the Lex Sempronia of Gaius Graccus that was drafted to reduce corruption was instrumental in him getting public support for his reform movement in which, for the first time, theoretical influences from Greece can be found (Encyclopædia Britannica, 2008, and Sherwin-White, 1982). A later example can be found in 17th century England where charges of corruption were employed to attack the policies of James I as well as Charles I. Members of the

7 kingship-despotism-aristocracy-oligarchy-democracy-mob rule was the complete cycle (Polybius).

"The use of corruption as an accusation and example of why someone should be removed from office is still by the way very much "à la mode". Kabila's replacement of Mobutu in Zaire (now the Democratic republic of Kongo) as well as the coup d'état in Sierra Leone in 1997 were both vindicated as movements against corruption (Stephen P. Riley, "The Political Economy of Anti-Corruption Strategies in Africa," European Journal of Development Research 10, no. 1 (1998). Stephen P. Riley, "The Political Economy of Anti-Corruption Strategies in Africa," European
Long Parliament used corruption charges as an excuse to cause institutional change: reducing patronage and removing monopolies that did cost over £1 000 000 every year (Peck, 1993).

In many ways all of the early liberalism can be seen as a reaction against corruption (Hill, 2006). It is nothing strange that the prevalence of corruption in Great Britain affected the political theorists of that age. These theorists included people such as Locke, Hume and Smith. This reaction, however mostly blamed the system and not the individuals. Smith (Wealth of Nations, book 5, chapter 1) when he reviews the different trading companies, in Wealth of Nations (WN), has a rather cynical view of the East India Company and in later revisions (1784) he observes how it has become even worse. One of his conclusions is that monopolies have a tendency to cause corruption “[a monopoly will] enable the company to support the negligence, profusion, and malversation of their own servants”.

In fact, Smith was in many ways critical to the mercantilist system and specifically that monopoly on trade was granted since they caused corruption (WN, Book 4, chapter 7). However, Smith did not blame the individuals who behaved corruptly but rather his problem was with the system as such (WN, Book 4, chapter 7). This makes his view on corruption very different from the classical one of an individual’s moral failing. His view of corruption was a systemic view of corruption. Thus, in effect he does not condemn the action but rather laments the system and argues that it is the system that must change. This is not to say that he never strayed from that particular view. In his earlier work, “The Moral Sentiments”, he discussed commercialism and corruption in its classical sense (see for example Hanley, 2008). Although, the views regarding self-interest of Mandeville and Smith are contrasting there is still agreement on what is responsible for corruption. While Smith argued for a certain virtuous self-interest, Mandeville saw self-interest as a vicious streak in human nature. However, it was this vicious streak that made progress possible (see Mandeville’s Fable of the Bees). Thus, corruption is a by-product of this self-interest. Removing this self-interest would reduce corruption but also eliminate progress. Thus, Mandeville would probably agree with Smith that corruption is due to a faulty system and that it is not the individuals who should be blamed. This
stands in stark contrast to the views of Rousseau. He is, in “A discourse on political economy”, evidently aware of the dangers of corruption (in the modern sense) and lists that as one of the reasons for why the “bureaucracy” should not become too large. But, as is Machiavelli in Discourses on Livy (book 16-18), he is also pessimistic that laws can help to avert corruption and states that the only way to avoid corruption is by having virtuous bureaucrats (Magisters). Rousseau’s view is thus that it is the moral failing of man that must be amended, not the failings of the system as in Mandeville and Smith’s view.

“Books and auditing of accounts, instead of exposing frauds, only conceal them; for prudence is never so ready to conceive new precautions as knavery is to elude them. Never mind, then, about account books and papers; place the management of finance in honest hands: that is the only way to get it faithfully conducted”

(Rousseau, Discourse on Political Economy)

In the American political discourse during the 19th century corruption was ever present and exerted influence over the institutional framework. Corruption was however primarily viewed in a systemic way and the focus was on limiting the possibilities of politicians and bureaucrats to influence the institutional framework so as to later be able to extract bribes and favours (Wallis, 2004). Fear of government corruption or favouritism played a role in the choice of passing general incorporation laws in the 1840s (McCormick, 1979, Jones, 1979 and Tarr, 2001 p.14). The case of special incorporation meant that it required an act of state legislators to form a corporation. Corporations in Great Britain and the United States had existed up until then in this form. This gave much power to officials and was a breeding ground for corruption. General incorporations did not need this charter and thus made it easier to finance new ventures.

Glaeser and Shleifer (2003) argue that the rise of the regulatory state in the US in the late 19th century was in part due to public pressure that arose in response to corruption in the legal system in cases between large corporations and individuals.9

One of the earliest modern papers published on corruption (Adams, 1898), discusses the corruption that happens when an elected official favours his constituency. By keeping the behaviour he had before he was elected, i.e. helping and supporting his friends and neighbours he becomes corrupt. This may cause problems if the constituency has difficulties defining the limits of his public and private roles. Here the focus has shifted to the behaviour of

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9 A good recount of the widespread corruption stemming from the transcontinental railroad companies during this period can be found in Richard White’s “Information, Markets, and Corruption: Transcontinental railroads in the Gilded Age” (2003).
individuals. With the focus being on the act of using public power for private gains, corruption as a concept is narrowing.

Then in 1909, corruption is defined by Brooks as “the intentional misperformance or neglect of a recognized duty, or the unwarranted exercise of power, with the motive of gaining some advantage more or less directly personal”. This definition is not very different from the one commonly used today “the use/abuse/misuse of public office for private gain” (Triesman, 2000, World Bank, Tanzi, 1998).

As can be seen from the preceding paragraphs the way of talking about corruption has changed over time. Partly this is due to the concept being thought of in different ways at different periods in time. However, even if corruption would, since the beginning of time, have been defined according to the World Bank definition we are still dependent on the dichotomy public/private. If this distinction does not exist or at least that what is assumed to belong in the different spheres differs over countries then certain actions cannot be labelled as being universally corrupt. This would be dependent on the particular distinction of private/public in a culture. It is an inherent problem in treating corruption as behaviour. This causes some difficulties when it comes to empirical work on corruption since the most frequently used data are indices constructed from surveys. In some cases the respondents are country experts or business men and in most cases they are from Western Europe. Hence, such an index will exhibit a cultural bias in the sense that it will reflect whether a country is considered corrupt or not from a Western European perspective.

When there is a transition in the institutional setting in a way such that a stronger division between public and private is created, there is a risk that the amount of corruption increases. The change in the institutional setting may be fast on paper but people’s behaviour is bound to change more slowly, thus corruption might increase. A good example of this is Greece where the introduction of the parliamentary system, and its accompanying stronger division between public and private, entailed an increase in corruption during the 19th century (Moschopoulos, 2003). This was an increase not due to changed behaviour but because the distinction between private and public changed.

In economic research the most common explicitly stated definition of corruption is “abuse of public power for personal gain”. However, of the thirty most cited papers on corruption only eight explicitly define corruption. Among the theoretical papers, corruption is most often implicitly defined as bribery.

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10 This is based on reviewing the 30 most cited papers on corruption according to the ISI web of science social citation index. I searched on corruption and refined the search to papers in economics and then manually removed papers where the main topic was not corruption. A list of the papers can be found in table A.1 in the appendix.
I. Introduction and summary of the thesis

This might seem somewhat sloppy but there are actually two reasonably good reasons for this lack of definition. First, in empirical papers the researcher is restricted by how the creators of the index of corruption have defined corruption. Further, the most frequently used index composed by TI is also composite index using numerous sources. Not all of these sources have the exact same definition, thus the index will only measure what is in general terms thought of as corruption. Hence, there is less reason to spend space precisely defining corruption since the empirical measure used does not only capture behaviour within this definition. Secondly, in theoretical works the individuals are normally given the opportunity to either play by the book or be corrupt. The analysis would remain the same no matter how exactly the researcher chooses to define corruption since the researcher is not trying to understand what corruption is but is rather interested in seeing what happens if the individual chooses to not play by the book.

For the rest of the thesis when corruption is discussed, unless otherwise specified, it will be with the modern concept of corruption as behaviour in mind.

3 Measuring corruption

To be able to study corruption empirically using econometrical techniques it has to be quantified. Given the nature of corruption this has turned out to be difficult. Objective measures such as the number of convictions in a country are possibly biased and subjective measures such as corruption indices based on surveys also suffer from a number of shortcomings. Since essay three and four employ country level data on corruption this section will shortly discuss the most common measures of corruption used in empirical studies.

In most empirical studies corruption is measured using indices such as Transparency International’s Corruption Perception Index (TI), Kaufmann and Kraay’s index (KK) or International Country Risk Group’s index (ICRG). Preferably, it would be possible to measure corruption in a direct way. However, since corruption is illegal or at least unfavourably looked upon it is a clandestine phenomenon and hence this turns out to be problematic. Therefore, evidence of whether companies or individuals are engaged in corrupt behaviour is hard to collect. Of course there frequently surfaces anecdotal evidence in the form of trials and investigative journalism. These however do not create a representative picture of the concept. As with research on collusion it is the unsuccessful cases that are displayed. These may give a correct picture of corruption but may just as likely represent a biased selection.

Only two of the thirty most cited papers on corruption use micro data, Johnson et al. (2000) and Svensson (2003) while thirteen uses indices.
Using objective measures such as the number of convictions entails some problems. If corruption is prevalent in a country we expect this to be reflected in the number of convictions. However, different legal systems have different penal codes; hence, it may be more difficult to convict someone in one country compared to another even though the same evidence is available. There may also be different levels of enforcement; the resources available can differ. If there is a constraint on the resources devoted to enforcement of corruption legislation, it may be that only part of the corruption cases may be followed through. Hence, cross-country comparisons based on convictions may give a skewed picture.

Moreover, if corruption is prevalent it probably also exists in the judiciary. Police and judges may be bribed as to avoid fines or imprisonment. Thus, if corruption is prevalent it does not necessarily mean that the number of convictions is greater as it may be possible to avoid punishments by engaging in corruption.

There are thus reasons to actually prefer indices based on subjective views by country experts and businessmen. Below is a short description of three of the most commonly used indices.

### 3.1 ICRG

This is the data set with the most depth although it is also the one with least breadth; it has been recorded since 1984 and covers 141 countries\(^\text{12}\). The scale is from 0 to 6 with less corruption yielding a higher score. It measures the corruption in the political system (bureaucratic corruption) and is constructed by country specialists at the Political Risk Service by converting political and economical data into risk points (source for the whole paragraph is PRS’s webpage [www.prsgroup.com](http://www.prsgroup.com)).

### 3.2 KK

The Kaufmann and Kraay (KK) index is the broadest data set but also the shortest; it has been recorded every other year from 1996-2002 and yearly since 2003. It covers over 213 countries and is computed from more than 40 data sources. It ranges from -2.5 to 2.5 with a higher value indicating less corruption. The measure has a broader definition of corruption including but not limited to bureaucratic corruption (source for whole paragraph is Kaufmann, Kraay and Mastruzzi (2008)).

\(^{12}\) There are more countries in the data set (145) if countries that does not “exist” today such as West Germany or Czechoslovakia are counted
1. Introduction and summary of the thesis

3.3 TI

The most widely used measure of corruption is probably Transparency International’s measure. It has been recorded since 1995 with more and more countries included each year. In 2007 there were 187 countries included in the data set. Similar to the KK index it is based on many different sources, and each country must have been recorded in at least three different sources to be given an index score while in the KK index it suffices with one source. The index ranges from 0 to 10 with a higher score indicating less corruption. It is supposed to capture corruption according to the definition of abuse of public power for private gain (source for the whole paragraph is Transparency International’s webpage www.transparency.org).

Table 1 Correlation between corruption indices

<table>
<thead>
<tr>
<th></th>
<th>KK</th>
<th>TI</th>
<th>ICRG</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-K</td>
<td>1.000</td>
<td>.966**</td>
<td>.887**</td>
</tr>
<tr>
<td>TI</td>
<td>.966**</td>
<td>1.000</td>
<td>.873**</td>
</tr>
<tr>
<td>ICRG</td>
<td>.887**</td>
<td>.873**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed)

As can be seen in the table the correlation between the indices is high. For KK and TI this is not surprising since both are composite indices and to a large extent include the same surveys even though the weighting may differ. That KK and ICRG are more correlated than TI and ICRG is not unsurprising given that ICRG is included in KK while it is not in TI. However, all indices seem to be largely in agreement on which country is corrupt and which is not.

It should be noted however that these indices are not uncontroversial and have been criticised of not correctly measuring corruption. Common objections raised are: having a Western European focus, only measuring the perception of corruption and not actual corruption, being hard to replicate since the source data is not available, to mention just a few. Good reference material on the difficulties on measuring corrupt are Knack (2006), Oslo Governance Center and UNDP (2008), and Jones et al. (2006). Since the indices rely on experts’ opinion of the corruption level, the measurement may become value-laden since an action does not need to be illegal to be regarded as corrupt by an observer. What is breached does not necessarily need to be a law or a formal rule; it can also be a moral rule. There are historical examples of this from France as well as Great Britain. In Britain during the 17th century
monopolies and proliferation of offices were frequently included under the heading of corruption together with bribery and sale of office. The first two were by no means illegal while the second two were (Peck, 1993). The same can be said for France, where the sale of office was regarded by the public as corrupt, although according to the Cahiers it was legal\footnote{See for example the Cahier of 1789, The Clergy of Blois and Romorantin \url{http://history.hanover.edu/texts/cahiers1.html} or Cahier of 1789, The Third Estate of Versailles, \url{http://history.hanover.edu/texts/cahiers3.html}.}

Despite all of these problems they still remain the most common tool for empirical economist although micro studies are becoming more and more frequent, Johnson et al. (2000) and Svensson (2003) being the most cited, others being Svensson and Reinikka (2004 and 2005), Fisman and Svensson (2007) Smarzynska and Wei (2000) and Gorodnichenko and Sabirianova (2007), to mention a few.\footnote{Svensson and Reinikka (2006) presents some possible techniques to collect micro data on corruption.}

4 A conceptual treatment of corruption

This part puts forth a simple conceptual model of corruption. It is done as to facilitate an understanding of when and how corruption appears. It is how I think about corruption and thus it is indirectly the foundation of the next four chapters in this dissertation.

Conceptually corruption can be displayed as an extended principal agent problem since it involves an additional agent. To make the terminology in line with the third chapter we have a principal, a decision maker and an agent, where the decision maker would correspond to the agent in the simplest principal agent framework.
In many cases the principal in a corruption problem is the state, but that does not always need to be the case, it could equally well be a sport organisation. Correspondingly, the decision maker is often portrayed as a bureaucrat, but could equally well be a tennis player and the agent is often a business man but could also correspond to a professional gambler. So, corruption could be a bureaucrat granting a monopoly to a businessman or a gambler paying a tennis player to lose. The decision maker thus abuses the power granted by the principal, the public power, for personal gain.

The action of corruption takes place between the agent and the decision maker, and is a voluntary exchange between the two with no threat of extra legal punishment. There is thus mutual consent of engaging in corruption. However, this does not mean that corruption is always profitable, it suffices that the other options available yield an even lower payoff.

It is the transaction between the decision maker and the agent which is corruption. However, as was mention in a previous section, historically in the US, the corruption that was focused upon in the 18th and 19th century was the action of the agent changing the rules in order to reap personal benefits afterwards (Wallis, 2004). Hence, the focus was not on the transaction between the agent and the decision maker, but rather on the opportunity of the decision maker changing the institutions in order to improve his chances of engaging in the transaction. Under my definition this is not seen as corruption since the action only involves the decision maker but rather it is treated under the heading of red-tape creation.

The choice of the decision maker and agent is based on whether the net benefit, $\Pi$, of engaging in corruption is positive or negative. If it is positive they will be willing to engage in corruption but if it is negative they will abstain. For

Figure 3 Extended principal-agent framework
a corrupt transaction to occur it has to be positive for both the agent as well as the decision maker.

The expected benefit, $\chi$, of the agent is normally the value of the service rendered, $\Omega$, by the decision maker, while it would typically be the value of the bribe, $\eta$, for the decision maker. The expected cost, $C$, includes the punishment if found out, $P$, the probability of being detected, $\mu$, and for the agent normally the size of the bribe, $\eta$, but this could also be a transfer in-kind or a favour granted. For simplicity I will talk about “the bribe” when I refer to $\mu$ even though it may be other things. The punishment can in principal be divided into a monetary cost, $\delta$, and a social cost, $\theta$. The monetary cost would be the fine if sentenced for corruption or the forgone salary if fired from the job. The social cost would include the shame if found out and the change in people’s behaviour towards you i.e. the stigmatisation of being found out. In some countries you may become something of a social pariah if you are found out as being corrupt. This is expressed succinctly in equation (1) below.

$$\Pi_t = \chi_t - C_t, t \in \text{(agent, decision maker)}$$

with

$\chi_a = \Omega$

$\chi_d = \eta$

$P = (\delta + \theta)\mu$

$C_a = P + \eta$

$C_d = P$

The size of the bribe in a corrupt transaction is dependent on the value, $\Omega$, that the agent puts on the service rendered by the decision maker. The higher the value is the more the agent is willing to pay. The net value of the service, $\Omega - \eta$, is what remains after the agent has paid the necessary bribes. The actual amount that goes to the decision maker is dependent on the power of the decision maker as well as the power of the agent. It is reasonable to assume that the revenue of corruption is split according to the relative power of the decision makers and the agent. The deterrent effect of the punishment $P$ is not only dependent on the monetary and social cost but also the probability of detection. A low chance of detection will mean that the social and monetary cost will have relatively little impact on the decision of being corrupt.

Thus, anti-corruption policies should reduce the revenue from corruption, increase the chance of detection and increase the punishments, both monetary and social. If the model is predictive we should see more corruption where the revenue is greater, the chance of detection is lower and where the monetary and social costs are lower. These are no controversial statements and there are previous studies that give some support to these assertions. A higher bureaucratic salary is found by van Rijckeghem and Weder (1997) and Herzfeld and Weiss (2003) to reduce corruption since a higher salary makes it more expensive to be fired. It has also been found that unstable political systems
experience more corruption (Lederman et al., 2005) which may be because bureaucrats and politicians can expect to remain in power for a shorter time and hence the monetary punishment of being found out would be lower. Stronger courts, and hence higher probabilities of getting caught, are found by Ali and Ise (2003) to reduce corruption. Bonaglia et al. (2001) as well as Herzfeld and Weiss (2003) find that more natural resource endowments increase corruption since they create large rents, thus increasing the revenues of corruption. The same reasoning is put forth by Krueger (1974) relating trade licences and corruption. The social cost of corruption is lower in countries with more hierarchical religions as Islam and Catholicism since it is less accepted to challenge those above you in the hierarchy than in religions such as Protestantism (Triesman, 2000). Husted (1999) also finds countries where individuals accept that power is distributed unequally have higher levels of corruption because individuals are more likely to view questionable business transactions as ethical.

To this model we can link the four essays in this thesis. The first essay focuses on the probability of detection of a corrupt individual. Specifically it looks at how the corruption level affects the probability of detection even if the law enforcement is assumed not to be corrupt. The second essay explains how the decision making system affects the distribution of the benefits from corruption. Differences in the decision making system affects the distribution of power between the agent and the decision maker. Part of the benefit goes to the decision maker in the form of a bribe and part goes to the agent. The greater the agent’s relative power is the less he will need to share with the decision maker in the form of a bribe. The essay demonstrates how the principal can influence the amount of corruption by changes in the decision making system. The third essay looks at how the freedom of information influences the amount of corruption. It can do this both by reporting on corruption and highlighting areas where corruption is prevalent. This in turn makes it easier to pinpoint areas where corruption is a problem, which in turn increases the probability of detection. Freedom of information can also increase the probability of detection directly through investigative journalism. Further it can increase the social cost of corruption by informing the public of corruption scandals. The final essay looks at how corrupt or clean behaviour may be transmitted between individuals. By observing individuals who are not corrupt but more successful a corrupt individual may reassess the perceived expected net benefit of being corrupt by lowering it. It is argued that a corrupt individual may reason that if another individual is not corrupt but more successful then it is probably less profitable to be corrupt than not. This may induce the corrupt individual to reduce the expected net benefit of being corrupt. Two of the essays deal with the probability of detection, and two essays with the benefit of corruption and one essay deal with the social cost of corruption. They all thus give insight into how corruption can be reduced by influencing an individual’s incentives.
Is corruption always harmful?

It is not uncommon to hear people say that some corruption just helps to grease the wheels and hurts no one. This view warrants a short discussion and should not be dismissed right away not least because of its frequent voicing.

According to standard economic theory we know that individuals will only engage in corruption if their net benefit is positive. Thus, for a given setting individuals act in order to maximise their utility. The principal would however take this into account when constructing the institutional framework and thus construct the most optimal institutional framework given the objective function of the principal. If we believe all agents are rational we would only have corruption if it is tied to the best achievable outcome for the principal. In an institutional setting we would have a trade-off between market failures and corruption. The regulations created to amend market imperfections could cause corruption, and without regulations corruption would not exist. However, the cost of the market imperfections may be greater than the cost of corruption hence the optimal outcome could be a mix of the two. This line of reasoning is put forth in Acemoglu et al (2000). Sadly however, the construction of an institution may be extremely complicated, as can be seen in recent advances in contract theory. Further, even if the institutions are optimal at one point in time they are not likely to remain so unless society is assumed to be static. Hence, in many cases corruption will not be the outcome of an optimal institutional setting but rather the result of a suboptimal institutional setting. This however, does not mean that the answer is necessarily to deregulate. By blind deregulation we may still end up in a situation that is worse even if corruption would decrease since a regulated market with corruption could still be superior to an unregulated market if the negative externality is large enough.

This type of reasoning should not be confused with the theory of corruption as grease money. Above corruption is considered to be a negative externality of regulation. The grease money theory claims that corruption may actually lessen the cost of regulations by allowing individuals to sidestep them by a small payment. Corruption would thus be a way to lessen the negative effects of regulations. Hence, regulations in this case are implicitly assumed to be suboptimal for society.

Cutting through red tape might speed up decisions of investments benefiting both the respective agents as well as society at large. However, in such a system the bureaucrats themselves have an incentive to increase the amount of red tape as to increase income from bribes. There is empirical evidence from Indonesia that seems to point in this direction (see Winters, 1996 or Flatters and Macleod, 1995). Thus if even corruption would be

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15 The most frequently cited references discussing grease money are Huntington (1968) and Leff (1964).
I. Introduction and summary of the thesis

Efficient in the short run since bribes makes it possible to side step cumbersome regulations, in the long run the effect could be even more regulations.

That corruption indeed hinders growth and development however has been validated by numerous studies (see Easterly, 2002, Mauro, 1998 and 2002, Bardhan, 1997, and Fisman and Svensson, 2007, among others) and refuted by no empirical studies known to the author. This does not mean that it is not possible to create plausible theoretical example where corruption may be conducive to growth. However, on an aggregate level this has never been possible to affirm. Two papers which have tried to test explicitly the “grease the wheel” hypothesis are Meon and Sekkat (2005) and Kaufmann and Wei (1999) but neither find support for it.

6 Summary of the essays and presentation of the main contributions

As has been stated before the unifying theme of the essays in this thesis is that they all deal with the causes of corruption. This is important since a keen understanding of the causes is needed to be able to successfully combat corruption. In section four it was demonstrated how the four essays were linked to an extended principal agent model of corruption. However, below a more thorough description of the essays and their respective contributions are presented.

The first essay is theoretical in nature and shows how existence of corruption may hinder anti-corruption work even if the institutional setting that created corruption has been successfully amended. A model where an investigator is allowed to screen an individual before investigating is presented. The screening is not perfect hence an honest individual may wrongly be thought to be corrupt and a corrupt individual may be thought to be honest. A more efficient institutional system would mean that the signal of the screening process would be more accurate. The individuals have the choice of either being corrupt or honest, and will choose the action which yields the highest net benefit.

The equilibrium consists of two pure strategies: all individuals choose to be corrupt or all individuals choose to be honest, and one mixed. The mixed strategy is unstable and has little practical significance. It turns out that the effectiveness of the screening needed to keep an “honest” equilibrium is lower than the effectiveness needed to switch from a “corrupt” to an “honest” equilibrium. Thus, even if an economy that is currently corrupt successfully adopts an institutional setting (effectiveness of screening) present in an honest economy, this may not be sufficient to remove the corruption. Further, it is shown that the marginal effect of an improvement in the screening effectiveness
is larger in an honest economy compared to a corrupt economy, even, as is assumed, if the investigator is not corrupt.

These results help to, at least partly, explain the difficulty of anti-corruption work. Corruption may be hard to remove even if a corrupt country adopts the same institutional setting as a non corrupt country. It shows how difficult it is to remove corruption once it has taken hold of an economy. Corruption seems to be path dependent and in many cases it may be difficult to spot what is causing corruption because two countries that are currently identical may have different levels of corruption due to past differences. Further, it is true that a main reason why it is so hard to decrease corruption is due to the fact that those enforcing the laws are also corrupt. It is however often implicitly assumed that if this is corrected then it will be as easy to decrease corruption in a more corrupt economy as in a less corrupt economy. The chapter shows that this is sadly not true.

The second essay looks at how the decision making system influence the presence of corruption. The decision making system is modelled in two dimensions, complexity and concentration. Complexity stands for the number of different decisions needed for something to be approved of and concentration stands for the number of different decision makers that can take each decision. This type of setting makes it possible to model not only bureaucratic corruption but also private corruption. Since the decision making system can fit both as rough description of purchasing management in a company as well as a bureaucracy’s system for granting trade licenses.

In order to make it tractable the decision making system was modelled only in two dimensions. Already with such a low degree of complexity however, the results are non-monotonicities regarding the existence and degree of corruption. Hence, increasing complexity may cause corruption to appear in a previously non-corrupt system but may also remove corruption in a corrupt system. With concentration we have similar types of intricate relationships with corruption.

This essay further shows the difficulty of anti-corruption work. Without intimate knowledge of the specific situation it may be hard to combat corruption. It is not always possible to apply a cook book approach in anti-corruption work. What may increase corruption under some circumstances may in others reduce corruption.

This essay concludes the purely theoretical part of the thesis. The following essay puts forth a simple macro model of transmission of corrupt behaviour between countries. It is inspired by the micro theory of cultural transmission employed in both economics as well as in evolutionary biology and anthropology. The model is then tested using country level data on corruption from Transparency International. The idea is that corruption is behaviour that can be acquired, as is the choice of not using corruption. As all behaviour this can be influenced by the behaviour observed in others. That we acquire the
behaviour may be more likely if those exercising the behaviour are viewed as being successful.

In that vein it is argued that when a country is exposed to corruption cultures that are different from the domestic corruption culture it is possible that the foreign corruption culture influences the domestic culture. If this behaviour is more likely to be acquired by the less successful of the two countries, then this transmission of behaviour would be unilateral instead of bilateral with the poorer country imitating the culture of the richer country.

The empirical tests seem to suggest that there indeed may be some measure of cultural transmission regarding corruption but that this transmission is mainly unilateral going from richer to poorer countries.

The final essay is purely empirical, and looks at the role of information in anti-corruption work. It has for a long time been argued that freedom of information is important in combating corruption. Previously however, freedom of information has solely been measured by press freedom. Press Freedom is mainly a regulatory constraint on freedom of information, this is not the only type of possible constraint on information. Technical constraints may also exist such as low internet coverage or a low availability of television sets. The essay takes both the regulatory and technical constraint into account as well as the moderating effect each may have on the other’s impact on corruption. It may be that press freedom for example only works when there a well working informational infrastructure in a country, while the impact on corruption of an improvement of said informational infrastructure is unaffected by the level of press freedom in a country.

Using country level data on corruption from ICRG as well as TI, two different press freedom measures and data on the quality of the informational infrastructure in a country this are tested. The results are hardly surprising but have this far been overlooked in the literature. There is an important interaction effect between the two constraints on information. Neither of the two have any impact on corruption if the level of the other variable is low. Hence, it may not be sufficient to only demand a freedom of expression if the goal is to lessen corruption. This has to be complemented with a working informational infrastructure. The result thus highlights the importance of a working informational infrastructure in anti-corruption work.

Understanding corruption is of course a stimulating academic activity but my hope is that insight in the nature of corruption and understanding of when corruption spreads and detracts will be of help in anti-corruption work. If the research on corruption and development are right, then anti-corruption work may very well help millions of people to escape poverty.
7 References


I. Introduction and summary of the thesis


1. Introduction and summary of the thesis


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I. Introduction and summary of the thesis


Online encyclopaedias

## Appendix I

**Table A.1** The 30 most cited papers on corruption

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mauro</td>
<td>1995</td>
<td>16 Andvig and Moene</td>
<td>1990</td>
</tr>
<tr>
<td>2 Shleifer and Vishny</td>
<td>1993</td>
<td>17 Banfield</td>
<td>1975</td>
</tr>
<tr>
<td>3 Bardhan</td>
<td>1997</td>
<td>18 Fissman and Gatti</td>
<td>2002</td>
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<tr>
<td>4 Triesman</td>
<td>2000</td>
<td>19 Banerjee</td>
<td>1997</td>
</tr>
<tr>
<td>5 Djankov et al</td>
<td>2002</td>
<td>20 Huang and Wu</td>
<td>1994</td>
</tr>
<tr>
<td>6 Wei</td>
<td>2000</td>
<td>21 Johnson et al</td>
<td>2000</td>
</tr>
<tr>
<td>7 Ades and Di Tella</td>
<td>1999</td>
<td>22 Cadot</td>
<td>1987</td>
</tr>
<tr>
<td>8 Tirole</td>
<td>1996</td>
<td>23 Acemoglu and Verdier</td>
<td>2000</td>
</tr>
<tr>
<td>9 Wade</td>
<td>1982</td>
<td>24 Bliss and Di Tella</td>
<td>1997</td>
</tr>
<tr>
<td>11 Svensson</td>
<td>2000</td>
<td>26 Svensson</td>
<td>2003</td>
</tr>
<tr>
<td>12 Mauro</td>
<td>1998</td>
<td>27 Lopez and Mitra</td>
<td>2000</td>
</tr>
<tr>
<td>14 Jain</td>
<td>2001</td>
<td>29 Rauch and Evans</td>
<td>2000</td>
</tr>
<tr>
<td>15 Ades and Di Tella</td>
<td>1997</td>
<td>30 Khwaja and Mian</td>
<td>2005</td>
</tr>
</tbody>
</table>

Note: The search was made with "Corruption" as topic and confined to papers in economics. Paper's whose main topic was not corruption were excluded. This is just to give a taste and should not be taken as a definite list.

Source: ISI web of Science’s Social Citation Index
Chapter 2
Detection of corruption

Author: Tobias Dahlström

Abstract
One often mentioned reason for why it seems very hard to change the amount of corruption in an economy is that those enforcing the laws might also be corrupt. It seems as if the general belief is that if this problem of law enforcement is solved, combating corruption will be as easy to do in heavily corrupt economies as in less corrupt economies. The paper investigates this often implicit assumption by testing two similar propositions; first whether the amount of people being corrupt in a country has any effect on the probability of getting caught given the same legal system and enforcement. Second, whether it is harder to influence the probability of detection in a country with a high level of corruption than in a country with a low level of corruption given the same legal system and enforcement level. This is done in two ways; first through an analysis of a simple case and then through numerical simulation of a more extensive case. It is shown that the number of people being corrupt has both a direct negative impact on the likelihood of getting detected as well as an indirect negative impact, since it lowers the positive marginal effect that an increase in the degree of enforcement has on the probability of detection.

JEL Classification:

Key Words:
I Introduction

It is common to believe that it is the corruption among law enforcement agencies that poses the most difficult problem when a country wants to decrease the amount of corruption in the economy. And implicitly it is often assumed that when this problem is solved it will be just as easy to lower corruption in a heavily corrupt economy as it is in a less corrupt economy. Even if the former assumption is correct, the second is not necessarily so. This misconception can be due to the fact that in most theoretical papers modelling corruption, the probability of detection is taken as an exogenous variable unaffected by the choices of the agents (cf. Andvig and Moene, 1990, and Rose-Ackerman, 1975). Some scholars try to tackle this problem as in Bicciheri and Duffy (1996) where they assume that bureaucrats face a lower probability of detection as they have spent longer time in office; Bac (1999) who lets it vary with the degree of transparency in the decision making; in Bac (1998) where it depends on the supervision procedure; or in Acemoglu and Verdier (2000) where they do not have a screening process at all, just a random selection. But no paper to my knowledge incorporates the decision of other individuals who are not investigators, in the probability that a corrupt individual is detected, henceforth called the probability of detection. This paper checks the validity of the second assumption, namely if corruption can be changed as easily in heavily corrupt economies as in less corrupt ones. This is achieved by testing two similar propositions. The model developed is simple but effective for the testing of the two propositions; first whether the amount of people being corrupt in a country has any effect on the probability of getting caught given the same legal system and enforcement. And second, whether it is harder to change the probability of detection in a country with a high level of corruption than in a country with a low level of corruption, given the same legal system and enforcement.

The investigator in the model does not just randomly choose one individual who is to be investigated, as in Acemoglu and Verdier (2000), but rather has the opportunity to screen the individual he has randomly selected for signals of corruption before he starts the investigation, thus increasing the probability that the person he chooses to investigate is actually corrupt. If he chooses not to investigate the individual based on the result of the screening process, he removes the individual from the sample and draws a new individual whom he screens. This process continues until he has found someone to investigate. The screening conducted by the investigator is noisy in the sense that there is a positive likelihood for individuals not guilty of corruption to be investigated after the screening as well as for guilty individuals not to be investigated after the screening. But, it is assumed that the probability of investigation after a screening is higher if the individual screened is guilty than if he is innocent (thus indicating that the screening has a predictive power greater than tossing a coin). The rationale behind a screening process is that it
saves time and money for the government since a full scale investigation is costly and some basic evidence is normally needed before a legal investigation of an individual can be started. The consequence of this is that it is not only how good the legal system is in spotting those who are actually corrupt that has an impact on the probability of detection but also how good the screening process is in discarding individuals who are not guilty.

The two simple cases investigated in part 3 show that highly corrupt economies experience less positive effects from better law enforcement, in the form of more efficient screening of individuals before investigation. This means that highly corrupt economies have a harder time decreasing corruption than uncorrupt economies. But more interestingly, we can also see that in an economy with widespread corruption, the effectiveness of screening completely loses its impact on the probability of detection as the size of the economy increases, while the screening still has a positive impact in the honest economy.

The simulation result reported in part 4 supports the result found in part 3 and further makes it possible to check for possible equilibria in the model concerning the amount of corruption. Two possible pure strategies as well as one mixed is found, with the two pure equilibrium strategies resulting in 0% corruption and 100% corruption. A one-time shock in the corruption decision of the population, as in Tirole’s (1996) model of collective reputation, although for different reasons, may shift the equilibrium from low to high corruption, but contrary to Tirole’s model it is also possible to have the shift occur in the opposite direction from high to low corruption. Even though the model is simple and was constructed primarily for testing two propositions concerning corruption, it could also be used for analyzing other questions in organisations, such as the monitoring of the work effort exerted by employees.

The paper is structured as follows; in the first section the model is presented. In the following section the analytical results of the two simplest cases, a totally honest economy and a totally corrupt economy, are presented. In the third section a simulation of a more extensive case is presented and for which the numerical results are discussed. Finally a conclusion with suggestions for further research is presented, followed by an appendix with the complete formulas used in the simulation.

2 The model

The agent can choose once per time period whether to be corrupt (c) or non corrupt (nc). Each period, the investigator draws one individual at random from the sample, and after a screening process he decides whether to investigate that person or not. Due to the screening process the probability of getting investigated, \( P(I) \), is greater if you are actually corrupt than if you are not. Because of time constraints only one investigation can be done per time period
but the investigator can screen as many people as he likes until he finds indications that an individual is likely to be corrupt. If the investigator screens an individual and decides on not proceeding with an investigation then that individual is removed from the sample from which the individuals to be screened are drawn. Thus once an agent has passed the preliminary screening he cannot be drawn again. An agent’s true choice - corrupt or not corrupt - is always revealed after an investigation, i.e., a guilty person being investigated is always caught and an innocent person is never convicted. The probability of detection after an investigation \( P(d \mid I) \) can be given any probability between 0 and 1, but without any loss of generality it is assumed henceforth that the probability of detection is equal to 1. All of the assumptions are presented below in equation 1, 2 and 3 and the whole procedure is illustrated in a flow chart in Figure 1 below.

\[
\begin{align*}
P(I) &\in (0,1] \\
P(I \mid nc) &< P(I \mid c) \\
P(d \mid I, c) &= 1
\end{align*}
\]

As the population \( n \) increases, the model used quickly becomes quite messy to completely deduce for every possible level of corruption \( \alpha \) due to the combinatorial nature of the problem. The two settings, no one being corrupt and everyone being corrupt, covered in part 3, are simple since their forms are unaltered by changes in \( n \), but never the less they reveal some interesting results through comparative statics. Not least since the individuals are assumed to be identical so these two settings represent two possible pure strategy Nash equilibria of the model. To simplify the notation the following is used interchangeably in both parts \( P(I \mid c) = x \) and \( P(I \mid nc) = y \).

![Flow chart of the procedure](image)

**Figure 1** Flow chart of the procedure
2. Detection of corruption

The sample from which the investigator draws is of size n and if no evidence is found in the screening process, the screened individual is removed from the sample and a new draw is made from the remaining n-1 individuals. This process continues until the investigator chooses to investigate the individual screened. After the investigation the investigator finds out the true choice of the individual, i.e. whether the individual was corrupt or not, after which the game ends.

3 Screening

The quality of the screening process, which precedes the decision of investigation (see Figure 1. above), is mirrored in the two probabilities $P(I|c)$ and $P(I|nc)$. High efficiency in the screening process would imply that $P(I|c)$ is close to one while $P(I|nc)$ is close to zero, leading to both few type 1 as well as few type 2 errors. Thus there would be a low probability that time is wasted on investigations of honest individuals while at the same time almost every time a corrupt individual is screened this leads to an investigation. Therefore an increase in the effectiveness of screening can come either from an increase in the probability of getting investigated if corrupt ($x$), a decrease in the probability of getting investigated if honest ($y$) or both. The probabilities calculated are conditioned on the choices of the other individuals in the economy thus $P(d|\alpha=0)$ in equation 4 below tells us the probability for an individual to be detected if no other individual chooses to be corrupt. Since symmetry is implicitly assumed the probabilities are equal valid for all individuals in the economy. No individuals are thus more skilled in being corrupt than others. The probability for individual $i$ to be investigated if he chooses to be corrupt if all other individuals are honest is the same as it would be for individual $j$ if he chooses to be corrupt when all other individuals are honest.

4 Simple setting

The following two equations represent the two simplest cases of any interest namely: where no other individual is corrupt in the economy $\alpha=0$ (4), everyone else is corrupt in the economy $\alpha=n-1$ (5). As a note it can be said, as shown in the simulation part, that these two simple settings are also the two pure strategy Nash equilibria of the model.
On a general basis we can see that bad screening has an adverse effect on the corruption level since this makes it harder to single out corrupt people, thus lowering the percentage of successful investigation. An increase in the effectiveness of screening can be based on either an increase in the probability of getting investigated if corrupt, a decrease in the probability of getting investigated if honest, or both. If everyone is just as likely to be investigated this makes the overall chance for someone corrupt to be caught to be lower than if good screening can successfully single out corrupt individuals. This is quite intuitive; if the police force spends less time on investigating innocents this gives them more time to investigate the guilty. This can be deduced from (6), (7) and (8) where the marginal effects of changes in \(x\) and \(y\) on \(P(d)\) are shown.

The marginal effect of changes in \(y\) on \(P(d)\) is negative, meaning that an increase in the probability of investigating non-corrupt individuals decreases the probability of detecting corrupt individuals. This is so due to the time constraint which limits the amount of investigations that can be done.

Further we see that the marginal effect of changes in \(x\) on the probability of detection is positive. This is not surprising but we can also see in (9) that the marginal effect of changes in \(x\) on \(P(d)\) is greater in the case where \(\alpha = 0\) than in the case where \(\alpha = n - 1\). In the honest economy an increase in the effectiveness of screening has a larger effect on the probability of detection than the same increase would have in the corrupt economy. This would mean that it takes more effort to increase the probability of detection in a dishonest economy compared to a reasonably honest economy.

\[
P(d \mid \alpha = 0) = \frac{X}{n} \sum_{i=1}^{n} (1 - y)^{i-1} \tag{4}
\]

\[
P(d \mid \alpha = n - 1) = \frac{X}{n} \sum_{i=1}^{n} (1 - x)^{i-1} \tag{5}
\]

\[
\frac{\partial P(d \mid \alpha = n - 1, n > 1)}{\partial x} = (1 - x)^{n-1} > 0 \tag{6}
\]

\[
\frac{\partial P(d \mid \alpha = 0, n > 1)}{\partial x} = \frac{1}{ny} \left(1 - (1 - y)^n\right) > 0 \tag{7}
\]

\[
\frac{\partial P(d \mid \alpha = 0, n > 1)}{\partial y} = \frac{x}{y} (1 - y)^{n-1} + \frac{x}{ny} \left(1 - y^n - 1\right) < 0 \tag{8}
\]
2. Detection of corruption

\[
\frac{1}{ny}(1-(1-y)^n)>(1-x)^{n-1}
\]

(9)

It is also interesting to see how the size of the economy, \( n \), affects the impact of \( x \) on \( P(d) \). The change of \( P(d) \) as \( n \) increases is shown in Figure 2 below. As the population increases we can see that the probability of getting detected falls.

![Figure 2](image_url)

**Figure 2.** Convergence of \( P(d \mid \alpha = n-1, y = 0.15) \) for different values of \( P(I \mid c) \) as the population size increase

Each line in the graph stands for a different value of \( x \), \( x \) being in the range 0.5 to 1, with the highest value, i.e. 1, being represented by the top most line and the lowest value, i.e. 0.5, by the lowest line. As can be seen in Figure 2 above, when \( n \) increases the value \( P(d \mid \alpha = n-1) \) converges to a common value for all different values of \( x \). As \( n \) becomes increasingly large \( P(d) \) converges to \( \frac{1}{n} \), this can be seen below in (10) where the second part of the expression goes towards 0 much quicker than the first part \( \left( \frac{1}{n} \right) \) as \( n \) grows. This implies that in a society with much corruption the probability of getting investigated has no significant effect on the probability of detection as the population becomes large. The rationale for this is that increasing the effectiveness of the screening process in a highly corrupt economy not only makes it more likely that the individual gets investigated if he chooses to be
corrupt (the positive effect) but also that it makes it less likely that he gets picked at all (the negative effect). The reason for the negative effect is simply due to the fact that if he is not the first individual to be drawn for an investigation there is less chance that the drawn individual actually gets discarded and he himself drawn if the screening process is more effective. As the population gets larger the negative effect cancels out the positive effect.

\[ \frac{X}{n} \sum_{i=1}^{n} (1-x)^{i-1} = \frac{1}{n} - \frac{1}{n} (1-x)^{n} \]  

(10)

In Figure 3 below the same convergence graph for \( P(d | \alpha = 0) \) is shown. As can be seen \( P(d | \alpha = 0) \) decreases as \( n \) increases. As \( n \) becomes increasingly large \( P(d | \alpha = 0) = \frac{x}{ny} \), this means that in contrast to (10) the probability of investigation continues to influence the probability of detection.

\[ \frac{X}{n} \sum_{i=1}^{n} (1-y)^{i-1} = \frac{x}{ny} - \frac{x}{ny} (1-y)^{n} \]  

(11)

**Figure 3.** Convergence of \( P(d | \alpha = 0, y = 0.2) \) for different values of \( P(I | c) \) as the population increases
2. Detection of corruption

The easiest way to show the effect of an increase in the number of investigators, i, is simply to divide the population n into equally sized groups with size \( j = \frac{n}{i} \). This of course assumes that each group will have the same composition or at least that the individuals carries that belief. The marginal effect of increasing the number of investigators would thus have the opposite effect of an increase in the population.

5 Simulation and presentation of a six person case

This section investigates the case where there are six individuals in the economy. We will simulate this economy while keeping \( P(I | c) \) and \( P(I | nc) \) constant. The results of the simulation are presented below in Table 1 and Figure 4. As can be seen the probability of getting detected falls as the degree of corruption increases, a result which was predicted above in the analysis of the simple case.

Table 1. Numerical values in a six person case

| \( \alpha \) | \( P(d | x = 0.3, y = 0.15) \) |
|------------|------------------|
| 0          | 0.20762          |
| 1          | 0.19272          |
| 2          | 0.17939          |
| 3          | 0.16745          |
| 4          | 0.15672          |
| 5          | 0.14706          |
Figure 4. The values of $P(d | x = 0.3, y = 0.15, n = 6)$

The simulation supports the results found above in the simple case; as the amount of corruption increases in the economy, the probability of detection decreases. But the simulation also makes it possible to investigate possible corruption equilibria through the use of the fact $R - P(d) * C = \pi$, with $R$ being the revenue of corruption, $C$ being the cost when detected and thus making $\pi$ the expected profit of being corrupt. If the chance of getting caught is greater than the revenue to cost ratio then the individual is making an expected loss of engaging in corruption. If the ratio is greater than the chance of getting caught then the firm is making an expected profit of engaging in corruption.

This means that if $P(d) > R/C$ then it is rational for an individual to choose nc. Since $P(d)$ is negatively related to the amount of corruption in the economy, the behaviour of other individuals has an impact on the expected profit.

Since the agent will engage in corruption if his expected profit is positive and stay honest if his expected profit is negative, there are two cases when the behaviour of others has no impact on his decision. The first is when $P(d | \alpha = n-1) > \frac{R}{C}$, in that case the expected profit is always negative no matter what other people do so the individual will choose nc. The other is when
2. Detection of corruption

\( P(d \mid \alpha = 0) < \frac{R}{C} \), then the expected profit is always positive no matter what other people do so the individual will choose \( c \). Since the solution is symmetrical the first case yields a pure strategy Nash equilibrium where every individual chooses \( nc \) and thus the economy experiences no corruption. The second case also yields a pure strategy Nash equilibrium where every individual chooses \( c \) and thus the economy experiences 100% corruption. The two cases are summarized in (12) and (13)

100% corruption if: \( P(d \mid \alpha = 0) < \frac{R}{C} \)  

(12)

0% corruption if: \( P(d \mid \alpha = n-1) > \frac{R}{C} \)  

(13)

Both of these cases yield pure strategy Nash equilibria, the first (12) at the extreme right in Figure 4 with 100% corruption (every individual choosing to be corrupt) and the second (13) at the extreme left with no corruption (every individual chooses to not be corrupt). If the Cost/revenue ratio is situated between \( P(d \mid \alpha = n-1) \) and \( P(d \mid \alpha = 0) \) the decisions of the individual depends on his expectations of the other agents’ decisions. This is the case depicted below in Figure 4 where the checked line in the diagram shows the ratio of revenue to cost. If the economy starts at a point where \( P(d) > \frac{TR}{TC} \) we can see that it is going to move to the left since the corrupt individuals are all making an expected loss until it reaches the point of 0% corruption and conversely it will move to the right until it reaches 100% corruption if it starts at a point where \( P(d) < \frac{TR}{TC} \). The economy can also arrive at a mixed strategy equilibrium, depicted by (W) in Figure 4, if the cost to revenue ratio would happen to be equal to the probability of detection but otherwise we end up in either of the two pure strategy equilibria; every player choosing \( nc \) yielding 0% corruption or every player choosing \( c \) yielding 100% corruption.
Figure 5. Probability of getting detected (full drawn line) compared with the revenue-cost ratio (dashed line). The two stable equilibria are found at 0% and 100% of population corrupt.

In the multiple equilibrium model presented above we can see that a one time shock in the revenue-cost ratio can make a permanent shift in the amount of corruption even if the economy returns to its previous state. As an example assume that Figure 5 depicts the economy in question and that we are currently situated at the 0% corruption equilibrium. If the revenue of corruption raises for one period so that it becomes greater than 0.21, the $P(d | \alpha = n - 1) > \frac{k}{\eta}$ case, then everyone in the economy will become corrupt. When the economy then returns to the original revenue-cost ratio the economy will stay at the 100% corruption equilibrium, thus this one time shift had a permanent effect on the corruption level in the economy. Further as more people enter the economy or simply because the norms that constitute the social part of the cost changes, this may cause the economy to shift from low to high corruption. This shift can be counter acted by a relatively small improvement of the law enforcement or punishment contrary to the improvement that would be needed if the economy is allowed to shift to the high corruption state before any changes are made. It is thus important to act swiftly when an economy is close to the point where the revenue to cost ratio is close to the probability of detection since waiting until the economy has reached the high corruption level equilibrium will entail a much higher cost. We end this section with a numerical example to clearly show the mechanics behind the discussed problem.
Assume a seven person economy with zero corruption, a revenue/cost ratio of 0.19, \( x = 0.3 \) and \( y = 0.15 \), then this economy is situated at a pure strategy equilibrium where every individual plays nc. But if an additional individual enters the economy then nc is no longer the pure strategy equilibrium but rather c, so everyone becomes corrupt. As the economy increased in size \( P(d | \alpha = 0) \) changed from 0.194 to 0.181 while \( P(d | \alpha = n - 1) \) became 0.118. If the change in enforcement is done before the entry, \( P(d) \) has to be changed so that the post entry \( P(d) > 0.19 \), this would mean an increase of 0.01 while if the change is done after the entry the change would have to be in the magnitude of 0.07. To escape the pure strategy equilibrium where everyone plays c the cost would, for example, have to be raised by roughly 70% while it would only have taken an increase of around 10% before the entry to have kept the corruption at zero. Or equivalently, to keep it at the low level, it would suffice to increase \( x \) by 15% before the entry while it is impossible to revert back to the nc equilibrium by just increasing \( x \). To make the individuals prefer to choose nc once more it would be necessary to hire a new investigator as well as increasing \( x \) by 15% to escape high corruption equilibrium after the entry.

6 Conclusion

It has been shown in the paper that economies with much corruption experience less positive effects from more efficient screening of individuals in search of corruption. This has some severe consequences for the possibility of lowering corruption in highly corrupt economies through better and more efficient law enforcement. This clearly shows the danger of assuming that an incorrupt law enforcement system is all that is needed for lowering corruption. The self-enforcing effect of corruption is strong and very likely a hindrance in curing corrupt economies. It should also be noted that if the enforcement stays constant, an increase in the number of firms, through, for example, foreign direct investments, might actually have a negative impact on the probability of detection, which could potentially increase corruption. Moreover, with more firms, the deterrent effect of effective screening becomes lower, making it harder to influence the probability of detection; this is especially true in economies that are already corrupt. The model presented could be extended in a number of ways; by letting the revenue from corruption be a function of GDP which in turn is a function of the structure of the economy, by allowing corruption between investigators and individuals as in for example Andvig and Moene (1990) and increasing the effort exercised by the investigators through incentive payments as suggested by Becker (1968) to name a few possible avenues.
7 Reference list


Appendix

The six person case

In this appendix the six person case is presented with full specifications and all parameter values (presented in Table 2 below). The notation in the equations are as follows; \( \alpha \) is the number of individuals in the population being corrupt, \( n \) is the total population, \( \beta \) is the number of people in the population being honest, \( x \) is the risk of getting investigated if corrupt and \( y \) is the risk of getting investigated being honest.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n )</td>
<td>6</td>
</tr>
<tr>
<td>( \beta )</td>
<td>( n-1-\alpha )</td>
</tr>
<tr>
<td>( y )</td>
<td>0.15</td>
</tr>
<tr>
<td>( x )</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Specification of equations

\[
P(d \mid \alpha = 0) = \frac{\alpha}{n} \left( 1 + \sum_{i=1}^{n-1} \frac{\beta}{i} \binom{n-1}{i} (1-y)^i \right) \tag{A.1}
\]

\[
P(d \mid \alpha = 1) = \frac{\alpha}{n} \left( 1 + \sum_{i=1}^{\frac{n-1}{2}} \frac{\beta}{i} \binom{n-1}{i} (1-y)^i + \left(1 - \frac{\beta}{i} \binom{n-1}{i} (1-x)(1-y)^i \right) \right) \tag{A.2}
\]
\[ P[d \mid \alpha = 2] = \frac{X}{n} \left( 1 + \sum_{i=1}^{n-1} \left( \frac{\beta}{\binom{n-1}{i}} (1-y)^i + \frac{\alpha}{\binom{n-1}{i}} (1-x)^i \right) \right) + \right. \]

\[ \left. \left( 1 - \frac{\beta}{\binom{n-1}{2}} \right) (1-x)(1-y) \right) \left. + \right. \]

\[ + \left. \frac{\alpha}{\binom{n-1}{2}} (1-x)^2 (1-y)^2 + \frac{\alpha}{\binom{n-1}{3}} (1-x)^3 (1-y)^3 \right) \right) \] \tag{A.3}

\[ P[d \mid \alpha = 3] = \frac{X}{n} \left( 1 + \sum_{i=1}^{n-1} \left( \frac{\beta}{\binom{n-1}{i}} (1-y)^i + \frac{\alpha}{\binom{n-1}{i}} (1-x)^i \right) \right) + \right. \]

\[ \left. \left( 1 - \frac{\beta}{\binom{n-1}{2}} \right) (1-x)(1-y) \right) \left. + \right. \]

\[ + \left. \frac{\alpha}{\binom{n-1}{2}} (1-x)^2 (1-y)^2 + \frac{\alpha}{\binom{n-1}{3}} (1-x)^3 (1-y)^3 \right) \right) \] \tag{A.4}
2. Detection of corruption

\[ P(d \mid \alpha = 4) = \frac{x}{n} \left( 1 + \sum_{i=1}^{n-1} \left( \binom{\alpha}{i} \left(1 - x\right)^i + \left(1 - \binom{\alpha}{i} \right) \left(1 - y\right)^{i-1} \right) \right) \]  
(A.5)

\[ P(d \mid \alpha = 5) = \frac{x}{n} \left( 1 + \sum_{i=1}^{n-1} \left( \binom{\alpha}{i} \left(1 - x\right)^i \right) \right) \]  
(A.6)
Chapter 3
Power corrupts

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Abstract

Deviating from the standard corruption literature the focus of this paper is on private corruption instead of bureaucratic corruption. We model an organisation’s decision making process in two dimensions, complexity and concentration, and explore how these dimensions affect the existence and extent of corruption in an organisation. As expected, the decision making process affects corruption. However, changes of the decision making process do not necessarily have a monotonic influence on corruption.

Keywords: Corruption, organisations, private corruption, decision making system

JEL: D73
I Introduction

It is clear that corruption is only possible in connection with power. That is why economists often favour deregulation as a remedy for corruption. Since deregulation is assumed to increase the number of firms in a market (Carlton and Perloff, 2000: p.687) there is a loss of power for the firms that predate the deregulation due to the inflow of new firms. In the utopian world of free markets, no actor has any market power and thus corruption, by default, is non-existent (cf. Rose-Ackermann, 1975).

Since power is strictly linked to decision making and the key prerequisite for corruption, different decision making processes will lead to corruption with different natures. We will characterise the power according to appropriate decision making processes that influence how power is granted in the organisation. Different organisational social structures (Mintzberg, 1979, Johnson and Scholes, 2005) will hold different decision making structures and consequently different ways of granting power. Therefore, corruption should display differently. The relation between organisational structure and the display of corruption is not necessarily linear. Since people’s behaviour is inevitably affected by institutional pressures inside and outside the organisation, the resilient social structures will affect the intra-organisational dynamics by defining the appropriate actions to take in a situation and thus shape the decision making process.

The majority of research done in the area focuses on bureaucratic corruption, i.e. corruption that originates from government regulations such as taxes and quotas (cf. Mauro, 1995, Shleifer and Vishny, 1993, Bardhan, 1997, and, Ades and di Tella, 1999). This type of corruption is based on the discriminatory power of government officials over state funds. This is most notable when major regulations exist on the market. Trade quotas, fixed exchange rates and credit rationing all provide opportunities for corruption by government officials. Very little research has been done on the private form of corruption; it might even be argued that according to some definitions, corruption is a purely bureaucratic concept not applicable in the private market. One reason for this focus on bureaucratic corruption is that the empirical data available mainly measures bureaucratic corruption. Another is due to the difficulty to define corruption satisfactorily in a private context. How should we separate corruption from other types of business transactions? Where do we draw the line between entertaining a potential business partner and corruption? This difficulty does not make the question of corruption between profit seeking organisations of less importance. Further corruption exists not only between individuals from different organisational entities but also between individuals from the same organisation. Thus, this paper tries to deviate from the standard literature by focusing on private corruption.
3. Power Corrupts

The paper aims at giving a micro-foundation to the phenomenon of corruption, focusing on the organisational context. Corruption is defined as the use of power granted in an organisation to enrich oneself. Two additional restrictions are applied to further limit the definition of corruption. For an act to be labelled as corruption it has to consist of, at least, two parties who actively agree on the transaction without the threat of illegal violence or other types of illegal punishments. Further, the transaction has to be a two-way transfer where both receive revenue. Thus, we do not consider theft as corruption, nor necessarily embezzlement. The first since it involves the threat of illegal violence and the second if there is no way two way transfer of revenue. However, the decision of a supervisor of not reporting a detected violation would be classified as corruption if he is granted something in return.

We specify a model where an agent is interested in attaining a certain outcome in a decision making process. To reach the outcome - the verdict - of a decision making process it is necessary with one or more decisions. The more decisions needed for the outcome, the more complex the process is. For each of the decisions, there may be one or more eligible decision-makers. The fewer the number of possible decision makers for each decision, the more concentrated the decision making process is deemed to be.

According to the complexity and concentration, the decision-makers in the organisation get a certain amount of power that in turn affects the revenue they can earn from corruption. As an organisation gets less centralised, each decision-maker gets less power and hence gains less from engaging in corruption; this could reduce corruption if their expected profit becomes negative. However, since the agent earns more when the decision-makers get less power, it might also increase corruption if the profit of the agent was previously negative. So, by reducing the power of the decision makers, the expected profit of the agent increases and may become positive. Thus, concentration is not necessarily monotonically related to corruption.

By increasing the complexity of a decision making process, the power of each decision-maker is reduced, thus reducing the expected profit from corruption. As there are more decisions needed the total amount paid to decision-makers increases, which decreases the expected profit of the agent as well. However, as long as the expected profit from corruption stays positive by increasing the complexity, there is actually an increase in corruption as measured by the number of corrupt transactions. Hence, the relationship between corruption and complexity is non-monotonic.

If corruption does not already exist in an organisation, making it less centralised may cause corruption to come into existence, while making the organisation more complex will not influence corruption. However, if corruption already exists it may be eradicated through decentralisation of the organisation. If corruption exists in an organisation and the organisation

\[ \text{"Your money or your life"} \]
becomes more complex, corruption may increase or be eradicated depending on how much more complex the organisation becomes. However, if no corruption exists, corruption will not appear if the organisation becomes more complex.

2 Organisational background

Power is related to the decision making process within organisations and decision making is shaped by the particular organisational characteristics. The way the organisational structure is designed frames the way decisions are taken in an organisation from a structural point of view. It influences the what, the who, and the how of decisions.

Therefore, three related concepts are key in our reasoning: power, organisational structure and decision making. We will here introduce them to give the foundations before proceeding with the presentation of our model.

2.1 Power

Following a behavioural view on power, we focus on the behaviour in making decisions over which there is overt conflict of interests. This school can be exemplified by Dahl (1957) and Lukes (1974), whose works on power have, to a great extent, influenced the following views. They aimed at explaining the policymaking's impact on interest group politics, the decision making practices of politicians. We follow the pluralist approaches within the behavioural school, which focus on power position and access to influence available throughout the organisations. Any exchange partner, where someone does something for another person, enters into a dependency relationship. Since all relationships involve exchange, they all involve dependency. Dependency can weaken or strengthen the power of an individual (Pfeffer, 1981; Handy, 1985; Dawson, 1986).

Within exchange theory or dependency theory, power is seen as the dependency of individual B on individual A (Mardsen, 1983). To increase their power, actors can increase others’ dependency on them or decrease their dependency on others (Brass and Bukhardt, 1992). This may be done by decreasing the motivational investment in outcomes controlled by others, or by increasing the number of alternative sources available for acquiring the outcome (Emerson, 1962) or by decreasing the number of decisions needed in the process to acquire the outcome.

In order to acquire power in an organisation, actors must both decrease their dependency on others as well as increase others’ dependency on them.

Therefore, here we define power as dependency (Mardsen, 1983) and our power model therefore refers to individuals’ decision making as the basis for power.
2.2 Organisational structure

Organisation theorists are interested in organisational structures. Given the objective of this paper, the organisation structure is relevant as it influences the decision making structure. An organisation can be thought of as a decision making locus. As decisions involve at least two people, an agent and a decision-maker, they are intrinsically social acts. Therefore, the social structure of organisations is very important in determining how they are made.

In other words, organisational social structures are the framework within which decisions are made.

When talking about organisational structure, power and decision making, an obvious reference to be made is Weber (1964). His early study on bureaucracy offers an account of ways in which formalized organisations can work by delineating how and why its imperatives are accepted by those who are subject to them. Prussian bureaucracy and its incorrupt way of functioning fascinated him.

As is clear from this reference, we refer here to organisational structures as social structures of bureaucratic systems, in which the distribution of authority, control and power shape the relationship among people.

Organisational social structure has been measured in a variety of dimensions. In this context, the building block is the division of labour. Since the earliest organisational design theorists, this has been considered as a key element in influencing the structure of an organisation. In fact, as Fayol (1948) has pointed out, the division of labour provides the rationale for job specialisation (as did a certain Adam Smith some years earlier), both horizontal and vertical, departmentalisation and divisionalisation, but also span of control, scalar chain and centralisation/decentralisation.

Relevant to a discussion on power in decision making we focus here on two dimensions of the organisational structure: structural complexity and centralisation.

Structural complexity refers to both horizontal and vertical differentiation, which concern the way in which the activities are distributed and conducted throughout the organisation. Horizontal differentiation refers to the number of units within the organisation and it is related to what Fayol (1948) calls job specialisation, departmentalisation and divisionalisation. Vertical differentiation is measured as the number of levels from the highest position in the organisation to the lowest. It refers to Fayol’s concept of scalar chain, which is the linking together of employees into spans of control by supervisors coordinated by spans of control at higher levels. This gives the organisation the typical pyramidal structure and characterises the organisation as a hierarchy. Size is a major factor in complexity: in general, the bigger the organisation, the more complex it is.

Centralisation addresses the question of the level in the organisation at which decisions are taken. In a centralized organisation, final choices are made
almost exclusively at high levels and unquestioning acceptance of top-level decisions is expected. As a result, the lower levels' participation tends to be low in a centralized organisation. In a decentralized organisation, the individuals who are closest to the situation take decisions. Size, market demands and geographical dispersion are determinant in the decentralization process. Decentralized organisations rely on the participation of many members of the organisation in decision making processes. It is difficult to characterize an organisation as purely centralized or decentralized because different decisions can be taken following different processes within the organisation.

As mentioned, an organisational social structure, defined along these two dimensions, influences how decisions are made and power is granted in the organisation. Nevertheless, the relationship between the organisational structure and the decision making process is not simple. A certain organisational structure can host different kinds of decision making processes. Organisations have different strategies of decentralisation and differentiation, which means that they can have a different impact on how the decision making is carried out.

In a centralized organisation, decisions are made at the top level. One person, or the top management team, takes all the decisions. No delegation is conceived. Decentralisation means empowering the people at different levels by delegating decisions to where the work is performed and to whom the decision is the most relevant. Therefore, more people can take decisions. This can imply a number of consequences for the decision making process. First, some decisions vary as on which management level they are to be taken. It can happen that each middle manager is in charge of specific decisions. It could also happen that more than one decision maker can take the same decision. Secondly, the number of decisions to obtain an outcome can increase.

In a structurally complex organisation, generally more than one decision is needed to finalize a process. Vertical differentiation leads to a sequential decision making process. More than one decision maker is involved one after the other. Horizontal differentiation has a number of consequences on the decision making. It can lead to having managers able to decide upon similar matters in a definite way. It can also make necessary a number of simultaneous decisions for the outcome to be reached. In this case, the agent, that is the initiator of the decision making process, depends on two independent decision makers for the final verdict. By increasing structural complexity, an organisation will decrease the power of each decision maker, as each becomes only a partial actor in the process.

Having introduced the decision making process, we will now define it more precisely.
3. A Decision Making Process in Organisations

We define a decision making process as a course of action that consists of either one or more decisions leading to a final outcome, henceforth called the verdict of a process. Each decision in a process can be taken by one or more individuals who we call decision makers. A person dependent on the verdict is called the agent. The structure of a process can vary in a number of ways. The process can consist of one single decision, which is taken by one specific individual. It is also possible that the decision making process consists of one single decision but with numerous individuals able to take it. Another variety is when there are numerous decisions in each process, but for each decision there is only one person who has the power to make it. Finally, the process can consist of numerous decisions with numerous possible decision makers for each decision. The first could be exemplified by tennis player being bribed to lose and the second in the case of drug prescription where there are many doctors but you only need the opinion of one to get your prescription.

We have chosen to define the decision making process in two dimensions: Concentration and Simplicity/Complexity.

3.1 Concentration

The concentration of a decision making process is the extent to which each decision maker takes unique decisions and therefore he/she has a unique position in the decision making structure. Within the same organisation, there can be more than one decision maker able to take the same decision. An increase in the number of decision makers decreases the concentration of the decision making process. If we take the perspective of the decision makers, an increase in concentration implies an increase of what Freeman (1983) calls degree of centrality. It thus represents a decrease in the number of alternatives available to an agent to get his/her desired outcome supplied. Increasing one’s alternatives thus indirectly increases one’s relative power.

3.2 Simplicity/Complexity

The simplicity of the decision making process refers to the necessary steps to finalise a verdict. More steps mean a more complex decision making process. Conversely, fewer necessary steps imply a simpler process. The steps can be sequential or simultaneous decisions taken to reach the verdict. Sequentiality characterizes the decision making process in a hierarchical organisation where decisions are taken one after the other at different levels. In this case, one decision represents the necessary premise for the next one to be taken.
Simultaneity, instead, characterizes a decision making process in a horizontally differentiated organisation, which is an organisation that has a complex structure of departments and units. In such a context, decision makers have to express their judgement at the same time, or often, if they do it sequentially, they do not know the other’s decision. The more decisions needed, the less simple the process is.

Conceptually, this dimension is close to what social network theorists (Brass and Bukhardt, 1992) call closeness. Closeness measure accounts for how close a person is to all other people in his/her network. It is the number of people mediating the relationship between an agent and a decision maker. It refers to a sequential decision making process rather than a simultaneous one. This measure can be interpreted as a measure of efficiency or independence (Freeman, 1979). An actor that is close to all other actors is less dependent on others and can avoid being controlled by them. We have decided to measure the simplicity of the decision making process as a function of the number of decisions necessary for a verdict to be reached. If the number of steps increases, the index decreases, as it represents the simplicity of the process. In our model the decisions are made simultaneously. Although the result would stay the same if they are taken at different points in time, given that the decision makers have incomplete information, thus not knowing at which place in the process they are; i.e. they cannot derive any extra advantage as would be the case if they knew that they were the last person in the decision making process.

4 The model

As stated above, the power, \( V \), of the decision maker is dependent on two factors, concentration and simplicity/complexity of the decision making process. Simplicity (complexity), \( \alpha (1 - \alpha) \), which signifies the decision maker’s influence on the final verdict of a process, is dependent on whether the process consists of only one or numerous decisions. In a process where there is only one decision to be made, the decision maker has more power than in one where his decision is only one out of many decisions. Concentration (dispersion), \( \beta (1 - \beta) \), which signifies the degree of freedom the agent has of choosing between different decision makers, is dependent on whether each decision in the process can be taken by one single individual or whether it can be taken by numerous individuals. If the decision maker is the only one who can take a decision which is part of the process, his power is greater than if many decision makers are able to take the same decision. Both of these variables are measured on a scale from zero to one, \( \alpha, \beta \in (0,1) \), with a larger value signifying more power to the decision maker. Since the power is dependent on both of these variables we choose to represent \( V \) as the length of a vector in a two dimensional space with coordinates \([\beta, \alpha]\). Thus we can graphically show
3. Power Corrupts

the power of a decision maker in a specific process as in Figure 1 below. The longer the vector the more power the individual has. To make power bounded between 1 and 0 we normalise the length yielding the following definitional equation of \( V \).

\[
V = \frac{\sqrt{\alpha^2 + \beta^2}}{\sqrt{2}}, \quad V \in (0,1)
\]  

(1)

We further assume that the power, \( U \in (0,1) \), of the agent is a function of the number of people who are dependent on the process. A value of one would signify that there is only one agent while a value of 0 would signify an infinite number of agents.

There are four vectors each belonging to a different process in Figure 1. Each vector shows the power of the decision makers in the four different processes. Vector D (1,1) is the case of a process with only one decision and one decision maker, Vector A (0.5,1) is the case of process with only one decision but two decision makers, Vector C (1,0.5) depicts a process with two decisions but where each of the decisions have only one eligible decision maker and finally B (0.5,0.5) depicts a process with two decisions where each decision has two eligible decision makers.

Figure 1. Graphical depiction of the decision makers power for different decision making process

For simplicity we assume the following functions for \( \alpha, \beta \) and \( U \).

\[
\alpha = \frac{1}{n} \quad \beta = \frac{1}{m} \quad U = \frac{1}{p}
\]

(2)  

(3)  

(4)

With \( n \) in (2) being the number of decisions, \( m \) in (3) being the number of individuals who can take each decision in the process, and \( p \) in (4) being the number of agents dependent on the process.
4.1 The effect on corruption

The expected pay-off \( \pi \) from corruption depends on two variables; cost, \( c \) and revenue, \( \chi \). And no agent will engage in corruption unless they receive a positive payoff i.e. \( \chi > c \). Revenue for the decision maker \( i \), \( \chi_i \), is in most cases of pecuniary form i.e. a bribe, \( \eta \), but may also be in kind transfer or a favour granted. The size of the bribe in a corrupt transaction is dependent on the value, \( \Omega \), that the agent puts on the final verdict i.e. his revenue from the corrupt transaction. The higher \( \Omega \) is, the more he is willing to pay in absolute terms. With more decisions in a process he will have to pay more bribes, thus decreasing the size of each individual bribe, although the total amount he pays might be larger. The net value of the verdict, \( \Omega - (n \cdot \eta) \), is what remains after the agent has paid the necessary bribes. Costs can be broken down into three components; social cost, \( \theta \), monetary cost, \( \delta \) and the bribe \( \eta \) for the agent and two, social cost and monetary cost, for the decision maker. The monetary cost is normally either a fine or dismissal, while the social cost is the stigmatisation that might occur for an individual exposed as corrupt. These two are dependent on the risk of getting caught, \( \mu \). With a low value of \( \mu \) the punishments have less of a deterrent effect. For expositional simplicity we chose to label all costs which depend on the risk of getting caught, \( c \).

\[
\begin{align*}
C &= (\delta + \theta)\mu \\
c_a &= C + \eta \\
c_i &= C
\end{align*}
\] (5)

All of the above is common knowledge both for the agent and the decision maker. The actual amount that goes to the decision maker is dependent on the power of the decision maker as well as the power of the agent. In line with standard bargaining theory we assume that the revenue of corruption is split according to the relative power of the decision makers and the agent. The decision maker \( i \) would then receive \( \chi_i = \Omega \left( \frac{V_i}{U + \sum_{i=1}^{n} V_i} \right) \), while an agent \( a \) would receive \( \chi_a = \Omega \) where \( \sum_{i=1}^{n} V_i \) is the total power of all decision makers who will take a decision in the process and \( \Omega \) is the value of the corrupt activity. With corresponding profit functions \( \Pi_i = \Omega \left( \frac{V_i}{U + \sum_{i=1}^{n} V_i} \right) - c \) and \( \Pi_a = \Omega \left( 1 - \sum_{i=1}^{n} \left( \frac{V_i}{U + \sum_{i=1}^{n} V_i} \right) \right) - nc \) or \( \Pi_a = \Omega \left( \frac{U}{U + \sum_{i=1}^{n} V_i} \right) - nc \) where \( \Omega \left( \frac{U}{U + \sum_{i=1}^{n} V_i} \right) \) is equal to the net value of the verdict. The profit for both decision makers and agents decrease as \( \alpha \) decreases since \( V_1 > 0 \). Assuming \( V_1 = V_2 = \ldots = V_n \) this can formally be shown as in (6) and (7) below if we normalize \( \Omega \) to 1 and \( c \) to \( \hat{c} \).

\[
\frac{\partial}{\partial n} \left( \frac{U(m)}{U(m) + nV} \right) - nc = \left( \frac{1}{2n^2V(U + nV)^2} - \frac{UV}{(U + nV)^2} \right) - \hat{c} < 0 \] (6)
3. Power Corrupts

\[ \frac{\partial}{\partial \eta} \left( \frac{V(n,m)}{U(m) + nV(n,m)} - \bar{c} \right) = \left( \frac{n}{2m^2(U + Vn)^2} - \frac{1}{2n^2(U + Vn)^2} \right) - \bar{c} < 0 \]  

That (6) and (7) are both less than can be shown. For the decision makers the increase in complexity means that their power decreases and thus their revenue decreases. For the agent the increase in complexity means that although her power is constant she must now hand out more bribes and, further, each bribe entails the cost of getting caught. So, the agent as well as the decision maker both lose, but for different reasons. For the decision maker it is due to a decrease in revenue, while for the agent it is due to an increase in the costs.

While an increase in the number of decisions, \( n \), unilaterally lowers the profit for all participants in the process, as shown above, there is only redistribution of the profit from the decision makers to the agents as \( m \) increases, this is formally shown in (8) and (9) below.

\[ \frac{\partial}{\partial m} \left( \frac{V(n,m)}{U(m) + nV(n,m)} - \bar{c} \right) = \left( \frac{n}{2m^2(U + Vn)^2} - \frac{1}{2m^2(U + Vn)^2} \right) < 0 \]  

\[ \frac{\partial}{\partial m} \left( \frac{U(m)}{U(m) + nV(n,m)} - \bar{c} \right) = \frac{Un}{2m^2(U + Vn)^2} > 0 \]  

That (9) is greater than zero is self evident and since (9) is positive and \( \Omega \) is constant we know that (8) must be negative.

5 Discussion

The propensity to become corrupt will be positively related to the expected profit from corruption. As the profit increases, decision makers as well as agents will be more likely to engage in corruption.

An increase in \( m \) could be seen as a decentralisation of an organisation. In a centralised organisation, decision makers are few and thus powerful. Keeping the size of the company and the number of decisions constant for each

\[ \text{If} \quad \left( \frac{U}{2m^2(U + Vn)^2} - \frac{Un}{(U + Vn)^2} \right) < 0 \quad \text{this imply that} \quad U - (2m^2V^2)U < 0 \quad \text{since} \quad U > 0. \quad \text{This in turn imply that} \quad 2m^2V^2 > 1 \quad \text{which can be rewritten through substitution of} \quad V \quad \text{as} \quad \left( \frac{\left( \frac{U}{2m^2(U + Vn)^2} \right) - \frac{Un}{(U + Vn)^2}}{2} \right) > 1. \quad \text{This is obviously always true since} \quad m, n > 0. \quad \text{Further if} \quad nV = (U + nV) - 2n^3V^3 < 0 \quad \text{then (1.6) is also below zero and since} \quad -U - 2n^3V^3 \quad \text{is always negative as} \quad U, n, V > 0 \quad \text{this then imply that so is also (1.6).} \]
verdict, an increase in the number of decision makers decreases their power, as it increases the number of alternatives agents have for a certain decision to be taken. In organisational terms, this signifies a decentralisation process, which will empower more people to take decisions at different levels, decreasing the agents’ dependency on each of them. With regard to the profits from corruption, an increase in the number of decision makers lowers the profit of the decision makers, but increases the profit of the agents from corruption, as shown in (9), and thus increases their propensity to become corrupt.

When the number of decisions in a process increase profits decrease for all participants, as shown in (6) and (7). While an increase in the number of decision makers only shifts the power and thus the revenue from the decision makers to the agents, as shown in (8) and (9). These results have implications on how organisational complexity influences the corruption decisions of individuals and thus the level of corruption. Increasing the number of decisions lowers the profit for all individuals. Thus, it lowers the propensity to become corrupt for all individuals both agents as well as decision makers. Conversely, an increase in the number of decision makers, although lowering the profit of the decision makers, actually increases the profit of the agents from corruption and thus increases their propensity to become corrupt.

As we defined corruption earlier, it has to involve two parts, both voluntarily agreeing on a transaction. For this to happen, both parties must earn a positive profit. If either party has a negative profit then corruption will not exist. In Figure (2) we show how profits, given certain parameter values, change as the process becomes less centralised. While in Figure (3) we show how profits change as a process becomes more complex.

![Figure 2. Effect on corruption of a change in the concentration of the decision making process](image)

In a very centralised organisation the decision maker’s power is great and therefore he can demand a large bribe. The size of the bribe is in fact so great that it leaves so little to the agent that it does not cover the costs. With a
negative profit, the agent chooses to abstain from using corruption. As the process becomes more decentralised the power of the decision maker decreases, which in turn makes the size of the bribe they can demand smaller. This leaves more to the agent thus increasing his propensity to become corrupt. However, at the same time with a lower bribe offered, the profits for the decision makers decrease lowering their propensity to be corrupt. In the case shown in Figure (2) the first critical point is when there are more than two decision makers. After that point the power of the decision maker has decreased sufficiently for corruption to be profitable for the agents. The second critical point is when there are six or more decision makers, then the decision makers’ power has decreased so much that the bribe they can demand is too small to cover their cost. With a negative profit, the decision maker chooses to abstain from corruption.

This seems to suggest that the best option should be to make an organisation more complex, thus decreasing the power of all individuals and consequently decreasing their propensity to become corrupt. However, what should be remembered here is that for corruption to take place both the agents as well as the decision makers must be willing to engage in corruption for corruption to exist. Moreover, as can be seen in Figure (3) the amount of corruption in an economy might actually increase in the economy although the profits decrease for all individuals involved, implying that an increase in complexity increases corruption.

This increase of corruption is due to the fact that the number of corrupt transactions increases as the number of decisions in the process increase. This increase of corruption persists up to the point where the profit for either the decision makers or the agent drops below zero (when n>4 in Figure (3)), at that instance corruption suddenly drops to zero. It is thus important to understand that, even though increasing the number of decisions can have a strong deterrent effect on corruption if the revenue is sufficiently large.
compared to the costs, this way of combating corruption may backfire, increasing corruption in the organisation instead of decreasing it.

In standard corruption literature, the possibility for bureaucrats to create red tape in order to receive a bribe is viewed as a serious threat to the efficiency of an organisation (cf. Bardhan, 1997 and Rose-Ackerman, 1999). It is argued, that even though a bribe might speed up a complex process, it is also the case that the complex process has been created just to facilitate the extraction of bribes. This is in line with the inference that can be drawn from our model as well. However, our model also shows that at a certain point the complexity of the process will be so great that profit of either the decision makers or the agent drops to zero at which time corruption also ceases to exist. So, it is possible and probable that given unlimited ability to create red tape, the decision makers will create so much red tape that corruption becomes unprofitable. This is most likely to occur if decision makers, who currently have no possibility to extract bribes, have the possibility to create red tape.

There is also another side of the story, that of simplifying a process. It is often argued that a too complex process, i.e. too much bureaucracy, creates inefficiency. But, as a complex process becomes simplified it might cause corruption to appear in a previously uncorrupt organisation. There is thus a trade-off between corruption on the one hand and complexity on the other. Corruption is clearly a complex phenomenon in the sense that it does not behave in a monotonic manner with regard to changes in the structure of the decision making process. To demonstrate this the possible effects of a change in the decision making process on corruption are displayed in table 1 below.

**Table 1 Summary of the effects on corruption of a change in the decision making system**

<table>
<thead>
<tr>
<th>Type of change in the decision making process</th>
<th>Increase complexity</th>
<th>Decrease complexity</th>
<th>Increase concentration</th>
<th>Decrease concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption exists in the organisation</td>
<td>Decrease corruption</td>
<td>Increase corruption or remove corruption</td>
<td>No effect or remove corruption</td>
<td>No effect or remove corruption</td>
</tr>
<tr>
<td>No Corruption exists in the organisation</td>
<td>Make corruption appear or no effect</td>
<td>No effect</td>
<td>Make corruption appear or no effect</td>
<td>Make corruption appear or no effect</td>
</tr>
</tbody>
</table>

As can be seen in the table there are only in two cases when there is only one possible outcome for a change in the decision making process in a certain situation. That is when complexity is increased and corruption already exists in the organisation, and when complexity is decreased and corruption does not already exist in the organisation.
3. Power Corrupts

This illustrates why corruption is so devious; the same change may have diametrically different results not only under different circumstances but also under the similar conditions. Thus, when a change in a decision making process is effectuated it is important to closely monitor the effect on corruption. This is important, not least when there is presently no corruption in an organisation since corruption tends to be path dependent and thus it is often easier to prevent corruption to appear in the first place than remove it when it has appeared.3

5.1 Efficient Anti-Corruption Work

Besides pointing out when corruption may appear in an organisation due to changes in the decision making system the findings can be employed in explaining how the decision making process can be employed in anti-corruption work.

Corruption will enter as a cost in the objective function of a company since the bribes that the agent offers the decision makers could instead have been collected by the company. Even if the company compensates for the corruption by lowering the decision makers’ wage it is still inefficient. The agent would have been willing to pay a higher price to the company in the legal market than it did in bribes to the decision makers because by legally purchasing the service from the company he would not incur the expected cost of getting caught. If decision makers that engage in corruption are less productive as predicted by Erlich and Lui (1999) this will also add to the cost of corruption.

However, changing the decision making process as to combat corruption may be costly; making the process more complex will probably mean that it takes longer to reach a decision; it will also increase the work load of decision makers possibly forcing the company to hire additional staff. As was shown figure 3 above, this is not even guaranteed to reduce corruption if the service is valuable enough for the agent.

Assuming that the company would have been able to extract the whole value from the agent, $\Omega$, and that each corrupt transaction costs the company $z$, then cost of corruption would be equal to $\Omega + nz$. Thus if corruption cannot be eradicated by increasing complexity, $n$, or the cost of doing so is greater than $\Omega + z$, which is the lowest cost of corruption possible, then the optimal choice from a corruption cost perspective for the company would be to have a decision making process which is as simplistic as possible.

From a concentration perspective the company may both increase as well as decrease costs by making the process more decentralized.

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3 It has been shown that the benefits of corruption increase with the amount of corruption (Andvig and Moene, 1990 and Tirole, 1996) and that the costs decrease with the amount (Andvig and Moene, 1990 and Dahlström 2008)
concentrated process may speed up the decision making since there is less risk of hold ups, but it is costly to pay several individuals for the same skill if it suffices with one individual. If it is costly to decentralize, i.e. empowering an additional decision maker to take the decision, with the cost being equal to $b$ per empowered decision maker and corruption is present there are two possible scenarios. First, if corruption can be removed by concentrating the process then the company obviously gains from doing so since it both reduces the cost of corruption as well as the cost of decentralization. Second, if corruption cannot be removed by concentrating the process then the company can choose to either minimize the cost of decentralization and bear the cost of corruption, $\Omega + nz$, or decentralising the process, removing corruption but suffering the cost of decentralisation, $b * m$. The opposite would apply if concentration was costly for the company.

6 Conclusion

The decision making system in a company is not primarily constructed as to minimise corruption but as to maximise efficiency. However, when a decision making process is changed as to improve efficiency or due to the implementation of new government regulations it is important to be aware of how this may influence corruption since corruption is costly for a company.

The paper has shown how corruption changes as the decision making system changes. This can be used to construct anti-corruption plans and more importantly to give indication of possible scenarios if the decision making system is changed due to other reasons such as making a process more streamlined or empowering more workers to take decisions.

The paper further illustrates the non-monotonicity of corruption that makes corruption extremely difficult to combat, since it makes it hard to give an organisational panacea regarding corruption. It implies that what works in one organisation may not give the same result in another. The paper has illustrated how this non-monotonicity works in a simple two dimensional model of a decision making process.
3. Power Corrupts

7 References


Chapter 4
Globalisation and corruption-
Learning how to become less corrupt

Author: Tobias Dahlström

Abstract:
When countries do business with each other, be it through trade or investments, they expose themselves to foreign culture, behaviour and values (cultural traits). Previous research has shown that exposure to foreign cultures entails possible transmission of cultural traits. This paper demonstrates that when countries interact, domestic corruption may be influenced by the level of corruption in a foreign country. The empirical assessment of a panel of countries produces evidence that there indeed exists transmission of corruption between countries that interact. However, this transmission seems to be one directional going from rich to poor countries.

Key words: Globalisation, Corruption, Cultural Transmission and Trade

JEL Classification: D02, D73, F42
I Introduction

Institutions, characterised by North (1991) as the rules of the game, have been shown to matter for growth (Acemoglu, Johnson and Robinson, 2001 and 2002). Intuitively, corruption impairs the institutional framework since the rules matter less if the referee can be bribed. Hence, it is not surprising that corruption has been found to severely hamper economic development and accordingly has received considerable scholarly attention (Easterly, 2002, Mauro, 1998 and 2002, and Bardhan, 1997).

Corruption has mainly been treated in a closed economy context, the cause and also the solution being found inside a country's border. It is however plausible that countries, which interact through trade, investment, tourism or aid might see their culture and behaviour change because of this interaction. Some cultural traits and behaviour can spill over country borders as the countries interact. So even if the causes are internal, the solutions may be imported from abroad. This paper will demonstrate how a country's exposure to other countries might influence the domestic level of corruption.

International trade and investments will not only mean goods and money flowing over boarders but also that culture, values, and norms flow over boarders. Trade and commerce has since early times entailed transmission of culture over boarders and over long distances. During the area of European colonialism there has also been extensive transmission of culture partly imposed through military force. To sell goods today, advertising is constructed and business meetings are held, both with potentials for the transmission of behaviour and values. In many cases, this has been deemed negative and discussed under the heading of cultural imperialism, where developing countries lose their own identity, and are then replaced by mimicry of the western world.

However, acquiring a different culture can have positive effects such as reducing oppression, or advancing growth. It is a question open for debate as to whether we want less or more cultural diversity in the world. In a sense it

1 As an additional example, the Encyclopaedia of World History has a good entry on how African culture was influenced by long-distance trade 1000-1500 (The Encyclopedia of World History, 2001, http://www.bartleby.com/67/351.html)

2 This is frequently discussed in the Institutional Economics literature, see for example Acemoglu, Johnson and Robinson (2001 and 2002). However, already in his “An Inquiry into the Nature And Causes of the Wealth of Nations” Smith has quite thoroughly discussed how culture and behaviours were transmitted through colonisation, not only by Britain, but also Greece and Rome (Book 4, chapter 7).

3 See for example Jeffrey Garten’s article in Business Week, November 30, 1998 or Julia Galeota’s essay in The Humanist, June 3rd, 2004. For a scholarly article see Herbert Schiller’s Communication and Cultural domination from 1976.

4 This have been done frequently both in popular and in scholarly press see for example The case for Contamination by Princeton philosopher Kwame Anthony Appiah in The New York Times, January 1, 2006 or Lian and ONeal
depends on the specificity of the cultural trait that the interaction helps transmit. In the case of corruption, it would however surely be a positive thing if the developing world were able to become more like the developed. The general consensus in the international community seems to be that corruption severely hinders development. The World Bank (2008) sees corruption as an obstacle that seriously hinders growth and development and the OECD has had an anti-corruption convention since November 1997 as corruption undermines good governance and economic development (Convention on combating bribery of foreign public official in international business, p.3, OECD, 1997). Whether doing business is more efficient with or without corruption might of course be different under different circumstances, but generally, it is reasonable to believe that doing business without corruption is more efficient. I can get some support of this from the high level of correlation between the level of corruption and GDP per capita. If it were more efficient to do business with corruption, we should expect higher levels of corruption in more developed countries. The data shows conversely that a higher level of corruption normally is indicative of a lower level of development as measured by GDP per capita. Recent research done by leading scholars such as Easterly (2002), Mauro (1998 and 2002) and Bardhan (1997) to mention but a few lends support to this view.

Discussions of the importance of adapting to a culture are frequent when doing business within that culture. To be able to work in a different cultural sphere a company has to adapt as to be able to perform well. Some of these changes may be carried back. The general idea is that exposure to a different culture, be it through trade or other types of interactions, might influence existent values and behaviours (cultural traits).

(1997) in Economic Development and Cultural Change. There is also the literature of ethnic fractionalization (see Easterly and Levine, 1997 or Alesina et al, 2003) but this is slightly different with its focus on ethnic strife.

On a scale from 1 to 10 where a higher number signifies less corruption, developed countries had a mean of 7.2 and developing countries 3.1 in 2007 (Transparency International). At the 1%-level, there is a significant difference between developed and developing countries, where developed countries are those classified as high income countries by the United Nations and developing countries are those classified as low, low-middle and high middle-income countries.

It is definitely true that corruption can be a solution to tedious routines and a malfunctioning bureaucracy. However, if it is viewed as an acceptable practice to bribe, then bureaucrats will actually have an incentive to create red tape and cause hold-ups so as to be able to collect bribes (for more on this see Bardhan, 1997, Tanzi, 1998 or Rose-Ackerman, 1978). Some empirical evidence of this type of behaviour in Indonesia is presented by both Winters, 1996 and Flatters and Macleod, 1995.

In 2004, the correlation coefficient was 0.866 and significant at the 1% level.

Two strong proponents of the necessity of adapting your business to the local culture are Fons Trompenaars (see for example his book Riding the waves of culture, 1997) and Geert Hofstede.
Some evidence that this type of cultural adaptation also apply to corruption can be found in Transparency Internationals study Bribe Payers Index (BPI) from 2006. There it is showed that companies from corrupt countries behave in a less corrupt way when they operate in OECD countries compared to when they operate in their home country; the same is true for companies from OECD countries, which behave more corruptly in developing nations than in their home country so the place of operations sets the rules. What is explored in this paper is whether this change in the companies’ corruption behaviour has a possibility to carry over to the corruption behaviour in the domestic country. It should be observed that this is a dynamic issue of transformation. The only previous study on cultural transmission and corruption known to the authors is an early study by Roy (1970) that loosely describes how the exposure to and the subsequent adaptation of Western culture influenced corruption in Thailand. A number of studies have also looked on the impact of trade intensity on corruption (Ades and Di Tella, 1999, Treisman, 2000, Wei, 2000, Sandholtz and Gray, 2003 and Beets, 2005). They argue that more trade with respect to GDP is due to less regulation or increased competition which in turn means less corruption (Ades and Di Tella, 1999, Treisman, 2000 and Wei, 1999). Sandholtz and Gray (2003) is perhaps the study that is most similar to ours in that it also argues that flows of goods and services entail, using our terminology, cultural transmission. However, they do not look on exposure between countries but only on how exposed a country is to the global market. Further, their study is cross-sectional and does not attempt to control for possible endogeneity problems.

By using bilateral trade data as a proxy, I am able to measure the extent to which a certain country is exposed to other countries. This makes it possible to create a profile of exposure which is unique for each country. Thus, I am not forced to assume that all countries that have certain trade intensity should also anticipate the same impact on corruption. Using this measure, the formalised model of section 3 is tested, using a number of different estimation techniques and sample selection criteria. An advantage of the model is that since it is constructed as a differential equation some of the problems regarding causality and endogeneity are avoided. The results are robust and suggest that there is indeed a transmission of corruption between countries, meaning that a country, which is exposed to less corrupt countries, does experience a positive impact on its level of corruption. However, additional results suggest that this transmission mainly occurs in a unidirectional manner, going from richer to poorer countries. The message of this study is then that an OECD country would not become more corrupt by being exposed to a developing country with a higher level of corruption, whereas a developing country interacting with a less corrupt OECD country would see its level of corruption drop.

The rest of the paper is structured as follows; first there is a short discussion on transmission of behaviours (cultural transmission) and how this can be applied to corruption. Next, the conceptual ideas from the discussion is
formalised in a dynamic model, which is subsequently tested using an unbalanced panel of 91 countries over 7 years. The paper ends with a discussion of the regression results.

2 Model

The purpose of this paper is to see if corruption in a country, $H$, is at all influenced by the fact that the country frequently interacts with other countries, $F_i$, whose corruption levels are different from the corruption level in country $H$. There are a number of reasons why this exposure could impact on domestic corruption. One could be that after being exposed to a different institutional setting, individuals might be more likely to demand institutional changes in the home country. Further, they might also be better at phrasing how and why they want the institutional setting to change and thus have a greater chance of actually being able to invoke a change. In many studies corruption has been modelled by corruption by using different preferences towards corrupt acts (see Besley and McLaren, 1993, Hunt et al., 2005 or Hauk and Saez-Marti, 2002). If it is the case that people are more averse to corruption in less corrupt countries, this aversion towards corruption could be acquired due to the exposure. An increased disutility of engaging in corrupt acts could then result in a reduction of corruption.

The basic idea of acquisition of behaviours, frequently termed cultural transmission (Cavalli-Sforza et al., 1982), has in economics been most frequently used in explaining the evolution of preferences (see Bisin and Verdier, 2001 or Bowles, 1998, for a survey). However, the transmission of behaviours and attitudes between individuals has been studied in a variety of different disciplines, besides economics, such as Evolutionary biology, Philosophy, Anthropology and Sociology, where culture is defined broadly and includes both values and behaviours.

Within the theoretical context of cultural transmission, I will be focusing on horizontal transmission, sometimes also referred to as cultural diffusion (C. R. Guglielmino et al., 1995). This is when individuals of different groups interact and acquire cultural traits pertaining to the other group. This is different from vertical transmission (or inter-generational transmission) which is when individuals from a younger generation acquire cultural traits from an older generation within the same group (Cavalli-Sforza and Feldman, 1981).

\[\text{Some support for the assumption of relationship between acceptance of corruption and existence of corruption can be found in a World Bank report from 2007 where the attitude towards corruption is found to be highly correlated with bribe paying.}\]
The probability that an individual will acquire a certain behaviour increases with the exposure to that behaviour (Mark, 2002 and Taveggia and Santos, 2001). Empirical evidence from a study on sick leave in Sweden (Hesselius et al., 2005) can serve as illustration. One area in Sweden was given less stringent demands for proof of their sickness, and this resulted in an increase in sick-leave for this area, as anticipated. However, there was also an increase in the amount of sick-leave in neighbouring regions where demand for sick notes had not changed. Moreover, this effect got smaller the further away from the experimental area the region was situated, i.e. the less exposure there was to the sick-leave behaviour.

It has been shown in numerous studies that humans are biased towards acquiring behaviour found in individuals perceived as being successful (see Henrich and Gil-White, 2001, for a review of studies). It is thus natural to assume that individuals are more likely to acquire the behaviour of individuals that they perceive as being more successful (Mark, 2002 and (Henrich and McElreath, 2003). In the setting of Cournot oligopoly models several experiments have shown that subjects tend to imitate the most successful subject in the previous round when such information is available (Huck et al., 1999, Huck et al., 2000, and Offerman et al., 2002).

In a country setting this would mean that poorer countries imitate the behaviour of richer countries and not other way around. This would mean that if country $F_i$ has a lower GDP per capita than country $H$ while $F_j$ has a higher GDP per capita than country $H$, then only country $F_j$ would exert influence on country $H$. This will be examined in the empirical part of the paper where I test whether there is transmission only from rich to poor countries or whether transmission is unconstrained. Further, I will posit that the impact of country $F_j$’s level of corruption on country $H$ will be dependent upon the exposure of country $H$ to country $F_j$. The greater the exposure, the greater the impact of country $F_j$ on country $H$ would be.

Further, I will posit that the impact of country $F_j$’s level of corruption on country $H$ will be dependent upon the exposure of country $H$ to country $F_j$. The greater the exposure, the greater the impact of country $F_j$ on country $H$ would be. In figure (1) below we have two different countries ($H_a$ and $H_b$), depicted by the circles with bold lines, exposed to foreign countries ($F_i$ and $F_j$ ), depicted by circles with thin lines. The exposure here is the intersection, $A$ between $H$ and $F$, i.e. the shaded areas. The degree of exposure for country $H_a$ would be less than the exposure for country $H_b$. Country $H_a$ would be an economy with scant contact with the outside world, a closed economy, while country $H_b$ would be a more open economy. A larger exposure makes it more likely that behaviour from the foreign country is acquired. If a country is exposed to different behaviours, the impact of each will be dependent on their respective degree of exposure. For country, $H_a$ the exposure to country $F_i$ is
4. Globalisation and corruption – Learning how to become less corrupt

much larger than the exposure to country $F_j$. Hence $H_a$ will be more likely to acquire behaviours from country $F_i$ than country $F_j$.

If corruption is almost identical in $H$ and $F$ the possible change will be smaller than if there is a substantial difference. So the greater the difference, the greater will be the possible impact on corruption. If the adaptation is not perfect the change will not be complete, i.e. if we assume that there exists a function, $f$ such that the multidimensional concept of corruption, $C$, can be mapped into a number on the real line. The change will always be smaller than the difference between the level it should converge to in the long run and the present level.

Given a function $f: C^n \rightarrow \mathbb{R}$ each country would be connected to a level of corruption $C_i$. The external level of corruption, $C_{ext}$ would be the weighted average of the corruption value in each foreign country, $F_i$, $i \in N$ that the domestic country, $H$, is exposed to. Where exposure would be the intersection, $A_i$, between $H$ and $F_i$ The weight, $\mu_i$, being the relative size of the intersection between the domestic country and each foreign country.

$$C_{ext} = \sum_i \mu_i C_i, i \in N$$
$$A_i = F_i \cap H, i \in N$$
$$\mu_i = \frac{A_i}{(A_i \cup A_j)}, i, j \in N, i \neq j$$

And the level of corruption towards which the domestic country will converge $\bar{C}$ would be the weighted average of current corruption and the
external corruption, with the weight, $\lambda$ being the relative size each area

$$\lambda_F = \frac{(A_N \cup A_I)^N}{H}$$

and

$$\lambda_H = \frac{H \setminus ((A_N \cup A_I)^N)}{H}.$$

$$\bar{C} = \lambda_F C_{ext} + \lambda_H C_H$$

In the short run, the convergence would be towards $\bar{C}$, which would be dependent on the corruption level in each of the countries to which $H$ is exposed, the level of exposure to each country and the current level of corruption in $H$. However the level towards which the country should converge in the long run would be dependent upon the evolution of the exposure pattern as well as the development of the other countries’ corruption levels. If both of these factors would be constant over time then the long run level towards which the country would move would be $C_{ext}$.

Let us exemplify using figure (b), where $N \in \{i,j\}$ and the corruption levels are $C_{Fi} = 6$, $C_{Fj} = 9$, $C_H = 4$. Assume further that the size of home, $H = 1$ and the size of each intersection is $A_1 = 0.3$, $A_2 = 0.15$. The external level of corruption is then $C_{ext} = 9 \cdot \left(0.3/(0.3 + 0.15)\right) + 6 \cdot \left(0.15/(0.3 + 0.15)\right) = 8$. If the convergence would be instantaneous the change, $\Delta C$, would be equal to $\Delta C = 5.8 - 4 = 1.8$ assuming only partial convergence $\Delta C$ would be positive but less than 1.8. Assume that $\Delta C$ is equal to 0.3 and that all other parameters remain constant. Then in the next period the level of corruption that it would converge to in the short run, would become $8 \cdot \left(0.45/(0.55 + 0.3 + 0.15)\right) + 4.3 \cdot \left(0.55/(0.55 + 0.3 + 0.15)\right) = 5.965$, while in the long run the country would converge towards $C_{ext} = 8$.

Exposure and difference will interact, meaning that a small exposure but a large difference might yield the same change as a large exposure with a small difference. The total change of the internal behaviour will thus be dependent on these two variables and the internal behaviour will move some distance towards a weighted average of the present level and the external levels that the country is exposed to.

### 3 Formalisation

I can formalise the ideas in the previous section by assuming the following differential equation

$$C'(t) = \beta(C - C_t), \beta \in (0,1)$$

(1)
with the following definitional equations

\[
\begin{align*}
\bar{c}_i &= \lambda_i \hat{c}_i (1 - \lambda_i) c_i, \lambda_i \in [0,1] \\
\hat{c}_i &= \sum_{j=1}^{n} \mu_{ij} c_j, \sum_{j=1}^{n} \mu_{ij} = 1
\end{align*}
\]

(D1) (D2)

The corruption level in a country, \( c_i \), will thus converge towards \( \bar{c}_i \) if \( \hat{c}_i \) remains fixed. The change will be greater the further the economy is from the steady state level \( \bar{c}_i \), with \( c_i \) being the domestic or internal level of corruption for country \( i \) and \( \beta \) being a constant governing the change in corruption thus representing the speed of cultural transmission. Moreover, \( \hat{c}_i \) is the weighted average of the corruption level of foreign countries with which country \( i \) interacts, where a larger weight, \( \mu_{ij} \), is put on countries with which the domestic country has relatively more interaction, where foreign countries are indexed over \( j \). \( \hat{c}_i \) will be referred to as the external or foreign level of corruption for country \( i \) and the parameter \( \lambda_i \) as a measure of the total exposure to foreign economies.

In (D2) I weight the corruption level in each receiving country by the relative exposure to that specific country. If the exposure to each country is equally large the weighted average, \( \hat{c}_i \) would simply be the arithmetic mean. The level towards which the corruption level converges is a weighted average of the external level of corruption that the country is exposed to and the internal level. The greater the exposure to foreign countries the greater will the weight, \( \lambda_i \), put on the external level of corruption become. The constant \( \beta \) signifies cultural transmission, a measure of how fast behaviour from other countries is acquired.

Given the information in the definitional equations then (1) can be rewritten as follows

\[
\begin{align*}
C_i' &= \beta \left( \lambda_i \hat{c}_i - \lambda_i c_i \right) \\
C_i' &= \beta \lambda_i \left( \hat{c}_i - c_i \right)
\end{align*}
\]

(2)

and in the empirical section below it is equation (2) that will be used and the parameter \( \beta \) that will be estimated.

The solution to equation (2) is given in (3). The solution to (2) makes it possible to plot the evolution of corruption over time if we assume \( \hat{c}_i \) to be fixed over time.

\[
C(t) = \hat{c}_i - (\hat{c}_i - C(0)) e^{-\beta \lambda t}
\]

(3)

or equivalently

\[
C(t) = \hat{c}_i (1 - e^{-\beta \lambda t}) + C(0) e^{-\beta \lambda t}
\]
4 Empirics

To test equation (2) I need to be able to calculate the term $\lambda_{it}(\hat{C}_{it} - C_{it})$. The computation of $\hat{C}_i$ demands a quantification of the exposure measure $\mu_{ij}$. For the regression a proxy of this variable is calculated using equation (4) below, where export $ijt$ is export from country $i$ to country $j$ at time $t$.

$$\mu_{ijt} = \frac{\text{export}_{ijt}}{\sum_{j=1}^{n} \text{export}_{ijt}} \tag{4}$$

In the calculations of $\mu_{ijt}$, $n \in N$, where $N$ is the set of countries with which country $i$ trades and $n$ is the set of countries with which country $i$ trades and for which corruption data is available. There are other candidates to use as proxy is variables such as investments and travels but bilateral trade data are readily available and more reliable than information about direct investment and tourism. Moreover, trade has been found to be significantly correlated with business travels (Khan et al., 2005), as well as with tourism (Kulendran and Wilson, 2000) and direct investments. Hence, there are reasons to believe that the export variable in (4) is a good choice. Regarding trade and direct investments, the bivariate correlation for the OECD countries in 2002 was 0.396 and significant at the 1% level (own calculations using data from OECD, 2008)\(^{10}\). I choose to use exports instead of imports, since export values are FOB, free on board, i.e. they do not include trade costs as imports do. Import values are however specified as CIF (Cost, Insurance and Freight). This would tend to inflate the actual coverage for countries located far away since that increases CIF. The trade data are taken from the COMTRADE database (UN, 2008).

The correct calculation of $\hat{C}$ according to (D2) and (4) demands information on the level of corruption for all trade partners of each country in the sample. This is sadly not available so the measures are calculated over the $n$ available countries. The estimated value of $\hat{C}$ is probably a slight overestimation since the countries for which the data are unavailable are probably among the most corrupt ones. It is however possible to construct a coverage measure $\Omega_i = \sum_{j=1}^{n} \text{export}_{ijt}/\sum_{j=1}^{n} \text{export}_{ijt}$ for each country. This shows how much of the country’s total trade that is included in the analysis. A value of 1 would signify that the corruption measure is available for all countries with which country $i$ trades. To check the robustness of the results, supplementary equations excluding observation with a low coverage will be employed. Here I want to stress that I am using export as a proxy for exposure and that trade-

\(^{10}\)Care should be taken however since even for the OECD countries there are many missing observations
related contact is only one aspect of several exposure or interface phenomena. Thus, the basic assumption is that trade intensity correlates with exposure intensity in general.

An alternative measure of $\mathcal{C}$, $\mathcal{C}_{mod}$, is obtained when only trading partners with a higher GDP per capita than the exporting country are included. This measure is calculated in order to test whether behaviour is more likely to be adopted from countries which are perceived as being more successful. As reported earlier, there is evidence that individuals are more likely to imitate people that they perceive as being more successful. In a country setting I believe that the best measure of success is the income level. By comparing the results from regressions using the alternative measure and the original measure, I hope to be able to shed some light on this.

The calculation of the measure of exposure, $\lambda_{it}$, as specified in the following equation, with export being the total value of exports at time $t$ for country $i$.

$$
\lambda_{it} = \frac{export_{it}}{GDP_{it}}
$$

Both variables are measured in USD at constant 2000 prices and are taken from the World Bank’s World Development Indicators (2007).

To test whether corruption in a country is influenced by the corruption behaviour in countries with which it is exposed, I will estimate the following regression equation

$$
\Delta \mathcal{C}_{it} = a + bK_{it} + \gamma X_{kit} + \varepsilon_{it}
$$

where $\Delta \mathcal{C}_{it}$ is the change in corruption for country $i$ between $t$ and $t + 1$, $K_{it}$ is the calculated value of $\lambda(\mathcal{C} - \mathcal{C})$ for country $i$ at time $t$. $X_{kit}$ is a vector of $k$ control variables and $\varepsilon_{it}$ is a normally distributed error term. The $b$ is the estimate of $\beta$ from equation (2) and should be significant and positive if there is any transmission of corruption behaviour between countries. The intercept $a$ is expected to be zero unless there is some general trend of corruption.

### 4.1 Control variables

The quality of the bureaucracy and size of government has been shown to have an impact on the level of corruption (Brunetti and Weder, 2003, Bonaglia et al, 2001 and Ali and Isse, 2003). The quality of the bureaucracy is expected to have a positive impact on corruption. However, regarding the size of the government, it is possible to argue both for a positive as well as negative impact. If a larger government means a better judicial system and better law enforcement then we should expect a positive impact, whereas if a large
government means more red tape and regulations we should expect a negative impact on corruption. It is hard to know which effect is the dominating one, and the empirical evidence is also mixed with Ali and Isse (2003) finding a positive impact and Bonaglia et al (2001) finding a negative. I use government expenditures to measure the size of the government and the measure Contract Intensive Money (CIM) developed by Clague et al. (1999) as proxy for the quality of the bureaucracy.

The CIM measure is defined as \((M2 - C)/M2\), where \(C\) is the amount of currency held outside banks and \(M2\) is a broad definition of the money supply (Clague et al., 1999). An advantage of the CIM measure is its availability, the fact that it is objective and that it is continuous, problems that most other indices measuring the same thing has. However as is shown in Clague et al. (1999), it is highly and consistently correlated with such measures. The reasoning behind the CIM measure is that if governments are unreliable, people will be hesitant to rely on the financial institution since the money is less safe and hence more money will be held outside banks. Moreover, with more regulations and red tape, the informal economy will be more important and hence currency is more attractive. So when the quality of the institutions and the bureaucracy deteriorates, the amount of money held outside banks will increase. Hence, a lower value of CIM would signify a lower bureaucratic quality.

GDP per capita has been shown in many studies to be positively correlated with corruption (Treisman, 2000, Ades and Di Tella, 1999, and, Brunetti and Weder, 2003, among others). One reason for this is that GDP per capita in many ways reflects the level of development in a country, and a higher level of development also means that many institutional variables such as quality of law enforcement are also high. Many of these variables are difficult to measure and when data exists it is generally only for a limited number of countries and for a limited number of years. Hence GDPcap is able to pick up many unobservable but important factors which are correlated with the development level. I am interested in controlling for such development factors to avoid our \(K\) variable becoming significant due to spurious correlation. It is then natural to include GDPcap as well as the growth of GDPcap as a control variables.

It has been shown before that general openness to trade reduces corruption, since openness implies that there are fewer regulations and tariffs (Ades and Di Tella, 1999, and Wei, 1999) and hence incentives to pay bribes are much smaller. To make sure that the \(K\) variable does not only capture this type of effect I include openness which is measured as \((\text{Import} + \text{Export})/\text{GDP}\).
Table 1 Description of the control variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Name</th>
<th>Source</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita</td>
<td>GDPcap</td>
<td>World Bank (WDI)</td>
<td>To capture development level</td>
</tr>
<tr>
<td>Growth of GDP per capita</td>
<td>GDPcapgr</td>
<td>World Bank (WDI)</td>
<td>To capture change in development level</td>
</tr>
<tr>
<td>Government expenditures</td>
<td>Govexp</td>
<td>World Bank (WDI)</td>
<td>To capture size of government</td>
</tr>
<tr>
<td>Growth of Government expenditure</td>
<td>Govexpgr</td>
<td>World Bank (WDI)</td>
<td>To capture change in size of government</td>
</tr>
<tr>
<td>Openness</td>
<td>openness</td>
<td>World Bank (WDI)</td>
<td>To capture a general effect from trade</td>
</tr>
<tr>
<td>Contract Intensive Money</td>
<td>CIM</td>
<td>IMF (IFS)</td>
<td>To capture quality of Bureaucracy</td>
</tr>
<tr>
<td>Change in Contract Intensive Money</td>
<td>CIMdelta</td>
<td>IMF (IFS)</td>
<td>To capture change in the quality of Bureaucracy</td>
</tr>
</tbody>
</table>

5 Data

The data set is unbalanced and includes 124 countries between 1999-2005, however all control variables are not available for all countries. So the data set used for the regression analysis with all control variables included has observations for only 94 countries. The measure of corruption used is the Corruption Perception Index (CPI) from Transparency International. All control variables except CIM and CIMdelta are from the world development indicators (World Bank, 2008). The CIM and CIMdelta are calculated by using data from the International Financial Statistics (IMF, 2008) and was first proposed by Clague et al (1999) and has since been used in numerous studies as a proxy for property rights or the quality of the financial system (Dollar and Kray, 2003, 2004, and Fagerberg et al., 2007, among others). The descriptive statistics of all variables can be found below in table (2).
Table 2 Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPIdelta</td>
<td>506</td>
<td>-1,30</td>
<td>1.00</td>
<td>0.018</td>
<td>0.31468</td>
</tr>
<tr>
<td>K</td>
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<td>-5.45</td>
<td>2.86</td>
<td>0.6805</td>
<td>0.96151</td>
</tr>
<tr>
<td>K_mod</td>
<td>506</td>
<td>-7.71</td>
<td>3.16</td>
<td>0.8280</td>
<td>0.70883</td>
</tr>
<tr>
<td>GDPcap</td>
<td>506</td>
<td>119.57</td>
<td>38403.78</td>
<td>6777.4745</td>
<td>9984.59528</td>
</tr>
<tr>
<td>GDPcapgr</td>
<td>506</td>
<td>-15.10</td>
<td>24.97</td>
<td>3.1561</td>
<td>3.93932</td>
</tr>
<tr>
<td>Govexp</td>
<td>506</td>
<td>4.51</td>
<td>30.98</td>
<td>15.4212</td>
<td>5.17948</td>
</tr>
<tr>
<td>Govexpgr</td>
<td>506</td>
<td>-32.85</td>
<td>55.49</td>
<td>5.4310</td>
<td>6.97418</td>
</tr>
<tr>
<td>openness</td>
<td>506</td>
<td>19.06</td>
<td>383.35</td>
<td>82.0455</td>
<td>46.16259</td>
</tr>
<tr>
<td>CIM</td>
<td>506</td>
<td>3673</td>
<td>1.0000</td>
<td>856088</td>
<td>1.070747</td>
</tr>
<tr>
<td>CIMdelta</td>
<td>506</td>
<td>-1.14</td>
<td>21</td>
<td>0.0033</td>
<td>0.02298</td>
</tr>
</tbody>
</table>

All empirical analysis made of corruption is troublesome due to the illegal nature of the phenomenon. This makes it hard to quantify the extent of corruption in a country in any meaningful way. Objective data such as the number of corruption convictions raise many questions about validity and can be misleading. For example, the fact that a country has few or no convictions of corruption could have several explanations. One explanation is that corruption indeed is a minor problem. However, it can also be the case that the number of convictions is low due to inefficient law enforcement or a forgiving attitude towards corruption. Is Argentina uncorrupt since there have been only 23 convictions over the last 25 years or could it be that the opposite applies, and that the country is very corrupt since the other 730 cases ended with no convictions? Therefore, in order to provide a more correct picture, corruption is perhaps better measured indirectly, using subjective rather than objective data.

The difficulties in measuring corruption merit a description of the CPI. The CPI has been reported since 1995 and the number of countries covered has gradually increased and is today ranking 180 countries in terms of corruption. The CPI ranges from 0 to 10 where 10 equals a perfectly clean country while 0 indicates a country where business transactions are entirely dominated by corruption. The CPI is a composite index and is constructed from several different sources in the form of surveys of business people as well as assessments by country analysts. For a country to be included, at least three different surveys must cover it. The index is thus in part based on subjective opinions and is a measure of perceived and not actual corruption. Assessments from the three previous years are combined to reduce variations.\footnote{More information about the measure can be found on Transparency Internationals homepage, www.transparency.org}
6 Results

Since I have two alternative measures of $K$, I can determine which one to use primarily by comparing the results of the two measures in an OLS regression identical to equation (6) but without any control variables. As can be seen from the results in table (3) the modified value of $K$ performs much better, the t-value is higher as well as the R$^2$. Thus, I will primarily use the modified value of $K$ for the reminder of the regression analysis. However, the result of the regressions with $K_{mod}$ will be compared with identical regressions using the unmodified value of $K$ so as to assure that the choice was correct.

Table 3 Regression results for the full sample without control variables

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td>K_mod</td>
<td>0.0321**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0160)</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>0.0145 (0.0098)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.0182 (0.0173)</td>
<td>-0.0023 (0.0132)</td>
</tr>
<tr>
<td>Observations</td>
<td>601</td>
<td>601</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.0035</td>
<td>0.0005</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.0051</td>
<td>0.0022</td>
</tr>
</tbody>
</table>

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

Before I go forth with other estimation techniques, I want to check that the results from table (3) are not due to spurious correlation. I run four different specifications of equation (6). The first includes yearly dummies, the second adds the level of GDPcap, Govexp and openness, the third adds the growth rates of GDPcap and govexp, and the fourth adds CIM and CIMdelta. As can be seen, the point estimate of $K_{mod}$ is robust for the last three specifications and the sign and significance are robust in all four. Thus, I am confident that it is the acquisition of behaviour from other countries that affects the change in corruption and that is not just some spurious correlation. In addition, I also run a regression without the inclusion of $K_{mod}$ to see that the variable really captures something which is not captured by the other variables in the regression. As can be seen, this is the case. None of the previous insignificant control variables becomes significant besides govexp which becomes significant at the 10% level. There is also a noteworthy drop in the explanatory power of the model when I exclude $K_{mod}$. All of these results were obtained using a pooled OLS so we need to see that the results also hold when we allow for unobserved country heterogeneity by using panel data techniques.
Table 4 Regression results adding control variables stepwise

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<tr>
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<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td>K_mod</td>
<td>0.0311*</td>
<td>0.0771***</td>
<td>0.0759***</td>
<td>0.0713***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0160)</td>
<td>(0.0263)</td>
<td>(0.0266)</td>
<td>(0.0270)</td>
<td></td>
</tr>
<tr>
<td>GDPcapk</td>
<td>0.0050***</td>
<td>0.0050***</td>
<td>0.0062***</td>
<td>0.0034**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0018)</td>
<td>(0.0018)</td>
<td>(0.0020)</td>
<td>(0.0015)</td>
<td></td>
</tr>
<tr>
<td>GDPcap_gr</td>
<td>0.0032</td>
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</tr>
<tr>
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<td>(0.0043)</td>
<td>(0.0047)</td>
<td>(0.0047)</td>
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</tr>
<tr>
<td>Govexp</td>
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<td>-0.0035</td>
<td>-0.0052</td>
<td>-0.0055*</td>
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</tr>
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<td>(0.0031)</td>
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<td>(0.0033)</td>
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</tr>
<tr>
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<td>-0.0003</td>
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</tr>
<tr>
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<td>(0.0026)</td>
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<td>-0.0004</td>
<td>-0.0003</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
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<td>(0.0003)</td>
<td>(0.0003)</td>
<td>(0.0003)</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>CIM_1</td>
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<td>-0.1258</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.6523)</td>
<td>(0.6551)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>year_dummy2</td>
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<td>-0.0163</td>
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<td>-0.0207</td>
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<tr>
<td></td>
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<td>(0.0654)</td>
<td>(0.0746)</td>
<td>(0.0750)</td>
</tr>
<tr>
<td>year_dummy3</td>
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</tr>
<tr>
<td></td>
<td>(0.0567)</td>
<td>(0.0565)</td>
<td>(0.0570)</td>
<td>(0.0621)</td>
<td>(0.0624)</td>
</tr>
<tr>
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<td>-0.0430</td>
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<td>-0.0396</td>
<td>-0.0792</td>
<td>-0.0762</td>
</tr>
<tr>
<td></td>
<td>(0.0556)</td>
<td>(0.0551)</td>
<td>(0.0557)</td>
<td>(0.0614)</td>
<td>(0.0622)</td>
</tr>
<tr>
<td>year_dummy5</td>
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<td>0.0220</td>
</tr>
<tr>
<td></td>
<td>(0.0545)</td>
<td>(0.0546)</td>
<td>(0.0555)</td>
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</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>(0.0507)</td>
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<td>(0.0513)</td>
<td>(0.0583)</td>
<td>(0.0581)</td>
</tr>
<tr>
<td>year_dummy7</td>
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<td>0.0155</td>
<td>0.0179</td>
</tr>
<tr>
<td></td>
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<td>(0.1630)</td>
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Observations  601  600  600  505  505
R-squared      0.0132  0.0300  0.0313  0.0466  0.0316
Adj. R-squared 0.0016  0.0136  0.0115  0.0194  0.0059

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

I employ the following procedure for the remainder of this section. I estimate a full specification, of equation (6), using panel data techniques. Next Woolridge’s test for autocorrelation in panel data (Wooldridge, p.282-283, 2002) is run to determine whether ordinary panel data techniques should be run or whether I should incorporate an ar(1) process in the estimation. The model can incorporate the ar(1) process even if the panel data set is unbalanced since I use the Baltagi-Wu (1999) method. When this has been determined, a Hausman-test is run to check whether a fixed or random effects model should
4. Globalisation and corruption – Learning how to become less corrupt

be used, and if needed, incorporating a disturbance term, which is first order autoregressive. The proposed model is then tested against an OLS specification using either an F-test (against a fixed effects model) or a LM-test (against a random effects model). If the Woolridge test suggests autocorrelation while the F/LM-test suggested an OLS I use Feasible Generalised Least Squares (FGLS) instead of a standard OLS regression to obtain a model that adjusts for both autocorrelation and heteroscedasticity. The appropriate model is then run using robust standard errors and where possible I use the Ramsey RESET test to check for misspecifications. In all cases we should either run OLS or FGLS according to the statistical tests. Hence, the choice is never to include fixed or random country effects. However, the results from the panel data estimations are also displayed in the tables for completeness in addition to the final model, which is shown in the third column.

To assure robustness four different versions are run, one for the complete data set (1999-2005), one for the complete data set excluding all observations with a trade coverage smaller than 0.9, (SS1), one for a balanced data set (2001-2005),¹² (SS2), and one for the balanced data set excluding all observations with a trade coverage of less than 0.9, (SS3). The results are reported, respectively in Table 5 to Table 8.

¹²To get sufficient many different countries we cannot use the early years if we want to get a balanced data set
### Table 5 Regression result for the full sample

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<th>VARIABLES</th>
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<th>(2) AR adjusted random effects FGLS</th>
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<td>0.0041***</td>
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<td>(0.0022)</td>
<td>(0.0016)</td>
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<td>N/A</td>
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<td>Test against ols</td>
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Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
4. Globalisation and corruption – Learning how to become less corrupt

**Table 6** Regression results for subsample 1 (SS1)

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<th>(3) OLS</th>
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<td>(0.0327)</td>
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<td>0.0047**</td>
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<td>(0.0023)</td>
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Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
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<th>(1) fixed effects</th>
<th>(2) random effects</th>
<th>(3) OLS</th>
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Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
4. Globalisation and corruption – Learning how to become less corrupt

Table 8 Regression results for Subsample 3 (SS3)

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<td>(0.0862)</td>
<td>(0.0696)</td>
<td>(0.0718)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.1215</td>
<td>0.2398</td>
<td>0.2150</td>
</tr>
<tr>
<td></td>
<td>(1.3504)</td>
<td>(0.3052)</td>
<td>(0.3084)</td>
</tr>
<tr>
<td>Observations</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.2498</td>
<td>0.0</td>
<td>0.1789</td>
</tr>
<tr>
<td>Hausman test</td>
<td>0.3017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test against ols</td>
<td></td>
<td>0.7451</td>
<td></td>
</tr>
<tr>
<td>Autocorrelation</td>
<td>0.1346</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESET</td>
<td>0.0551</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

The tables show that the results regarding \( K_{mod} \) are robust across the different estimations. Moreover, similar results as those in Table (4) are obtained for the full sample, displayed in table 5, and the different subsamples displayed in table 6-8. In addition, the RESET test does on no occasion indicate misspecification. It is also only when I use the full sample that autocorrelation is present. This means that I am not able to calculate any \( R^2 \) statistic for the full sample since in this case I use an FGLS estimation. As can be seen in the tables, the results of the OLS yield basically the same results as the fixed and random effects model when it comes to hypothesis testing, the
same variables are significant and have the same signs. When it comes to the point estimates though, the fixed effect model has larger point estimates of the estimated $b$ while the random effect models more or less mirrors the result of the OLS estimations. The only other variable which has a robust impact on the change in corruption besides $K_{\text{mod}}$ is the level of GDP per capita.

To check that the $K_{\text{mod}}$ variables are really the appropriate choice, I run all the full specification for all samples replacing $K_{\text{mod}}$ with $K$. The complete results can be found in the appendix but in table (9) I present and compare the results with regard to the parameter estimations of $K$ and $K_{\text{mod}}$ and the R2 values. As can be seen, in all cases but for SS2 the significance level is higher for $K_{\text{mod}}$ than $K$ and in all cases using $K_{\text{mod}}$ grants more explanatory power.

Table 9 Summary of the results for the $K_{\text{mod}}$ and $K$ variable over the different subsamples

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full sample</td>
<td>SS1</td>
<td>SS2</td>
<td>SS3</td>
</tr>
<tr>
<td></td>
<td>FGLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td>$K_{\text{mod}}$</td>
<td>0.0682***</td>
<td>0.0629*</td>
<td>0.0784**</td>
<td>0.1028**</td>
</tr>
<tr>
<td></td>
<td>(0.0176)</td>
<td>(0.0327)</td>
<td>(0.0360)</td>
<td>(0.0477)</td>
</tr>
<tr>
<td>R-squared</td>
<td>(3.8670)</td>
<td>(1.9216)</td>
<td>(2.1799)</td>
<td>(2.1553)</td>
</tr>
<tr>
<td>$K$</td>
<td>0.0406***</td>
<td>0.0255</td>
<td>0.0503**</td>
<td>0.0595**</td>
</tr>
<tr>
<td></td>
<td>(0.0137)</td>
<td>(0.0203)</td>
<td>(0.0220)</td>
<td>(0.0288)</td>
</tr>
<tr>
<td>R-squared</td>
<td>(2.9579)</td>
<td>(1.2584)</td>
<td>(2.2822)</td>
<td>(2.0639)</td>
</tr>
<tr>
<td>Observations</td>
<td>501</td>
<td>330</td>
<td>260</td>
<td>150</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Robust standard errors and t-values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The point estimate, $b$, of the transmission constant $\beta$ is positive and significant, which means that we have a transfer of corruption behaviour between countries that are exposed to each other. So, if a country is exposed to countries with lower levels of corruption, as signified by a higher CPI-score, then there would be a drop in domestic corruption. Further, the fact that the $K_{\text{mod}}$ variable seems to be superior to the $K$ variable suggests that the transmission of corruption is more likely to occur when the direction of transmission goes from countries with a higher GDP per capita to countries with lower GDP per capita than vice versa.

The actual change is also greater if the difference between the corruption level in the receiving countries and the domestic country is big, a kind of catch-up effect where countries that are further away from the steady-state has a tendency to experience greater change. This catch-up effect is however conditional in the sense that it depends on who you trade with, so that the less corrupt the trading partners are, the greater the impact on the domestic country.
6.1 Endogeneity

It is very important to test for endogeneity since if the independent variables are not exogenous the parameter estimates will be biased and inefficient. By running the regression $\varepsilon = a + bX_j$, for all $j$ independent variables, i.e. $C$ and all control variables, I can test for endogeneity. If the variables are exogenous the $b$-estimate should be insignificant. This is reported in table 10, where the $b$ coefficient for all $j$ regressions are displayed for the complete data set as well as the individual subsamples. So, each independent variable has in turn been regressed on the residual and it is the parameter estimate and standard error for each of these regressions that are displayed in the table. As can be seen, there is no trace of endogeneity. If there was, the parameter should have been significant in some of the regressions. Regarding causality and our independent variable of interest the value of $C$ should not be influenced by $\Delta C$ since $C$ represents a value at the start of period $t$ while $\Delta C$ is the change between $t$ and $t+1$ and it is unreasonable to think that the change would influence the value at the start of the period.

Table 10 Results for the endogeneity test

<table>
<thead>
<tr>
<th></th>
<th>Full sample</th>
<th>SS1</th>
<th>SS2</th>
<th>SS3</th>
</tr>
</thead>
<tbody>
<tr>
<td>K_mod</td>
<td>.011</td>
<td>.000</td>
<td>.002</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>(.019)</td>
<td>(.074)</td>
<td>(.089)</td>
<td>(.101)</td>
</tr>
<tr>
<td>GDPcap</td>
<td>-.000</td>
<td>.000</td>
<td>-.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(.000)</td>
<td>(.000)</td>
<td>(.000)</td>
<td>(.000)</td>
</tr>
<tr>
<td>GDPcapg</td>
<td>.002</td>
<td>.000</td>
<td>-.000</td>
<td>-.001</td>
</tr>
<tr>
<td></td>
<td>(.003)</td>
<td>(.014)</td>
<td>(.015)</td>
<td>(.019)</td>
</tr>
<tr>
<td>Govexp</td>
<td>.002</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(.003)</td>
<td>(.010)</td>
<td>(.012)</td>
<td>(.013)</td>
</tr>
<tr>
<td>Govexpg</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(.002)</td>
<td>(.008)</td>
<td>(.010)</td>
<td>(.012)</td>
</tr>
<tr>
<td>openness</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>-.000</td>
</tr>
<tr>
<td></td>
<td>(.000)</td>
<td>(.001)</td>
<td>(.001)</td>
<td>(.001)</td>
</tr>
<tr>
<td>CIM</td>
<td>.070</td>
<td>.003</td>
<td>.030</td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>(.128)</td>
<td>(.503)</td>
<td>(.657)</td>
<td>(.796)</td>
</tr>
<tr>
<td>CIM_1</td>
<td>.054</td>
<td>.070</td>
<td>-.040</td>
<td>-.107</td>
</tr>
<tr>
<td></td>
<td>(.596)</td>
<td>(2.843)</td>
<td>(3.508)</td>
<td>(4.149)</td>
</tr>
</tbody>
</table>

Note 1: each independent variable has in turn been regressed on the error term i.e. $\varepsilon = a + b(C_{mod})$ and $\varepsilon = a + b(GDPcap)$, and so on.

Note 2: Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. 

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6.1.1 Dynamic panel data estimations

A different approach which is gaining popularity is to use dynamic panel data methods to correct for possible endogeneity. So as a last measure to account for possible endogeneity I estimate equation (6) using the Arellano and Bond system GMM estimator. This allows to introduce a lagged dependent variable on the right hand side while at the same time taking into account unobserved country heterogeneity. In ordinary panel data models this will cause correlation between the lagged dependent variable and the error term. The initial condition problem described in Blundel and Bond (1998) and Roodman (2008) should not be a problem since the model is specified as differential equation thus the model in itself takes into account that different countries are at different distances from their long run steady state. The results are displayed in the appendix, the result of the $K_{mod}$ variable remains and while the point estimates are slightly larger than those from OLS estimations. There is no indication of second order autocorrelation nor is the model over-identified according to the Hansen test.

7 Discussion

The results seemingly validate the results of other studies which argue that countries which are more open and trade more will have lower corruption levels. However, there are major differences between our study and previous ones. First of all, I am not arguing that it is trade per se which reduces corruption. Instead I use trade as a proxy for exposure to rules of conduct in different countries. In fact, I include a variable to control for pure trade effects, openness, and this remains insignificant throughout all regressions even when the $K_{mod}$ variable was excluded in table (4). I argue that even if trade would have an impact on corruption, part of this does not come from its impact on competition but rather the ideas and values which are exchanged. Thus, the matter is not whether a country trades or not but also with whom a country trades. Given that our $K_{mod}$ variable is more significant and has higher explanatory power than the $K$ variable this lends additional support to this reasoning. If it was only important with the size of trade why would trade with certain countries have a greater impact than trade with other countries? Hence, I argue that the effect that I pick up is something which is not unique to trade but is due to transmission and adaption of culture, values and behaviour, which in turn have an impact on corruption. A second difference is that we, contrary to other studies, do not use the level of corruption but rather the change in corruption as dependent variable. This makes it possible to rule out the

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13 A good introduction to dynamic panel data can be found in Baltagi, 2009 and Roodman et al. 2006)
problem of reverse causality which the earlier studies may suffer from.\(^\text{14}\) In spite of clear similarities between this study and previous ones, our approach is methodologically different and assumes a different mechanism of influence.

8 Conclusion

Building on conceptual ideas from the theoretical framework of cultural transmission and imitation, I have presented a formalised model on how the level corruption in a country may be influenced by other countries with which it interacts. The greater the exposure to a country, the greater the influence it exerts. I have estimated the model using bilateral trade data as a proxy for the degree of exposure of one country to another. The results confirm that the level of corruption in other countries to which a country is exposed, will have an impact on the domestic level of corruption. Therefore, if a country is exposed to another country with a lower level of corruption it will experience a positive impact on its own corruption level.

Moreover, there are reasons to believe that even if a richer country influences a poorer country the opposite might not necessarily be true. On the micro level I assume that individuals are more likely to imitate the behaviour of individuals who are perceived as being successful. In the context of the model, this is shown by comparing the estimation results using two different measures, one where transmission of behaviour is allowed only from richer to poorer countries and one where no restrictions are put on the transmission of behaviour. The former measure performs better in all estimations done. If individuals in poorer countries imitate the behaviour in richer countries but not vice versa, there should be no fear for developed, open countries to experience more corruption due to exposure to a developing country even if it is more corrupt.

The results found are robust for different samples sizes and estimation methods. However, I readily recognise that any empirical research done on corruption will never be conclusive, as a consequence of how the illegal and clandestine nature of the phenomenon makes the data unreliable. I nevertheless believe that the results have helped to shed some light on the obscure concept of corruption and hope that they will spur future research.

\(^{14}\) The study by Ades and di Tella (1999) controls for this using an instrument for trade and still obtains similar results
9 References


4. Globalisation and corruption – Learning how to become less corrupt


Globalisation and corruption – Learning how to become less corrupt


Data:


World Bank, 2007, World Development Indicators, CD-ROM
## 4. Globalisation and corruption – Learning how to become less corrupt

### Appendix

#### Table A.1 Regression results using the Arellano-Bond system GMM estimator

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full sample SS1</td>
<td>-0.0279</td>
<td>-0.0308</td>
<td>0.0214</td>
<td>-0.0030</td>
</tr>
<tr>
<td></td>
<td>(0.0668)</td>
<td>(0.0702)</td>
<td>(0.0939)</td>
<td>(0.0780)</td>
</tr>
<tr>
<td>Lagged Dependent variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-0.4179)</td>
<td>(-0.4380)</td>
<td>(0.2280)</td>
<td>(-0.0382)</td>
</tr>
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<td>K_mod</td>
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<td>0.1524***</td>
<td>0.1196***</td>
<td>0.1776***</td>
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<td>(0.0501)</td>
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<td>(2.5918)</td>
<td>(3.5441)</td>
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<td>0.0144***</td>
<td>0.0102*</td>
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</tr>
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<td></td>
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<td>(0.0041)</td>
<td>(0.0057)</td>
<td>(0.0051)</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Govexp</td>
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<td>-0.0107***</td>
<td>-0.0099*</td>
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</tr>
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<td>(0.0060)</td>
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<tr>
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<td>-0.0002</td>
<td>-0.0009*</td>
</tr>
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<td>(0.0005)</td>
<td>(0.0006)</td>
<td>(0.0005)</td>
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<tr>
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<td>(-1.9858)</td>
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<td>(-1.8499)</td>
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<tr>
<td>CIM</td>
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<td>-0.7540**</td>
<td>-0.8335***</td>
</tr>
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<td></td>
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<td>(-1.6550)</td>
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</tr>
<tr>
<td>GDPcap_gr</td>
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<td>-0.0028</td>
<td>-0.0176</td>
<td>-0.0005</td>
</tr>
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<td>(-1.0749)</td>
<td>(-0.0411)</td>
</tr>
<tr>
<td>CIM_1</td>
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</tr>
<tr>
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<td>(1.6376)</td>
</tr>
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<td>Govexp_gr</td>
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<td>-0.0041</td>
<td>-0.0005</td>
<td>-0.0076</td>
</tr>
<tr>
<td></td>
<td>(0.0036)</td>
<td>(0.0059)</td>
<td>(0.0036)</td>
<td>(0.0056)</td>
</tr>
<tr>
<td></td>
<td>(0.0046)</td>
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</tr>
<tr>
<td>Constant</td>
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<td>0.8169*</td>
<td>0.8403***</td>
</tr>
<tr>
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<td>(0.2738)</td>
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<td>(1.7465)</td>
<td>(3.0691)</td>
</tr>
<tr>
<td>Observations</td>
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<td>120</td>
</tr>
<tr>
<td>Number of panel_space</td>
<td>90</td>
<td>69</td>
<td>52</td>
<td>30</td>
</tr>
<tr>
<td>Number of instruments</td>
<td>60</td>
<td>59</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Arellano-Bond test for autocorrelation:</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>for first difference</td>
<td>0.005</td>
<td>0.024</td>
<td>0.016</td>
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</tr>
<tr>
<td>for second difference</td>
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<td>0.508</td>
<td>0.520</td>
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</tr>
<tr>
<td>Hansens test for overidentification</td>
<td>0.255</td>
<td>0.493</td>
<td>0.309</td>
<td>0.917</td>
</tr>
</tbody>
</table>

Note: Robust standard errors and t-values in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Chapter 5
The role of information in combating corruption

Author: Tobias Dahlström

Abstract

The dynamics and existence of corruption has been attributed to many different factors. This study specifically looks at the links between information and corruption. The paper asserts the importance of a free press in anti-corruption work. However, the novelty is to stress not only freedom of expression but also show why technological constraints on the circulation of information play an important role in anti-corruption work. The empirical result suggests that freedom of press only has a positive impact on corruption if the informational infrastructure is of a sufficiently good quality.

Keywords: Corruption, Information, Informational infrastructure, Press freedom

JEL: D73, O1, O57, H11

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1 I gratefully acknowledge financial support from the MMT-center at Jönköping International Business School
I Introduction

‘Although we say all information should be free, it is not. Information is power and currency in the virtual world we inhabit.’

Gareth Branwyn and Billy Idol, 1992, Intro Monologue

Following in the proud tradition started by Milton (1688) and Hume (1748) I argue that freedom of information has a positive impact on corruption. The fact that information is important in deterring corruption has been shown in earlier papers, which have identified press freedom as a significant influence upon corruption (Brunetti and Weder, 2003, Chowdhury, 2004, Lederman et al., 2005 and Freille, et al., 2007). However, conceptually press freedom only measures part of what is important. It captures the right to free expression, to criticise the elite without risking repercussions. But, it does not capture how easy it is to spread information or how easy it is to share and distribute information. We can loosely define them as two different constraints on information, the first being tied to regulation and policy, the second to technical factors.

Relaxing the first becomes useless in practice if the second continues to hold. Even if it is possible to produce a critical television show, the freedom of expression will have little impact on corruption unless people have some way of watching it. However, relaxing the second constraint might have an impact even if the first continues to hold. Even if it is not legal to hold and share certain views, access to the internet or a telephone line still makes it possible to share these views, whether they are illegal or not. A measure of press freedom probably captures the first constraint while it most likely does not capture the second.

In this paper, I try to make an overall assessment of the impact of information on corruption. To do that, I use press freedom and a measure of the informational infrastructure, in a country as proxies for the two constraints. By interacting the variables, in addition to entering them individually in a regression equation, it is possible to capture synergy effects. But more importantly, it also makes it possible to test whether both constraints must be relaxed at the same time, or whether it is sufficient to relax only one.

To ensure robustness two different measures each of press freedom and corruption are used in the regression analysis. The results of a cross-sectional sample of 140 countries show that for press freedom to exert a positive impact on corruption there must exist an informational infrastructure of a certain quality. Below that level of informational infrastructure press freedom has no impact on corruption. The marginal effect of the informational infrastructure has similar properties. It has a significant and positive effect for higher levels of press freedom. However, the results regarding its impact at low levels of press freedom differs between different measures of corruption and press freedom
5. The role of information in combating corruption

with some measures showing that the informational infrastructure, indeed, has the robust effect advanced above, while others show that improvements in the informational infrastructure might actually worsen corruption if press freedom is low.

Albeit being intuitive, the fact that the impact of press freedom on corruption could be affected by the quality of the informational infrastructure has previously been overlooked in research on corruption, and has important policy conclusions regarding anti-corruption work.

2 Why is corruption of interest?

The World Bank has lately named on their website corruption as the biggest obstacle for poverty reduction, and numerous researchers have confirmed that corruption indeed has a deterrent effect on development (see Erlich and Lui, 1998, Mauro, 1998, 2004, Ali and Isse, 2003 and Rose-Ackerman, 1998).

Although the consensus among researchers today is to see corruption as something negative there have been voices raised for the opposite. Leff’s (1964) famous paper “Economic development through bureaucratic corruption” makes a number of critical statements concerning corruption’s believed negative impact on economies. The central argument is that corruption may improve the workings in the economy if the current system is one of inefficiency. He further states that most critical comments about corruption are based on the assumption that the current bureaucracy is working to promote development even though this often seems to not be the case.

Nevertheless, no empirical paper has so far been able to find any positive relationship between corruption and the level of gross domestic product per capita. In addition to the negative effect on development, negative effects on investments have been extensively documented (Mauro, 1995 and Wei, 2000a and 2000b). Partly in agreement with Leff, Bardhan (1997) suggests that when a country suffers from a rigid bureaucracy, bribes can actually speed up the decision making which can lead to economic profits for both the country as well as the individual enterprise. However, in such a system, Bardhan points out the fact that the bureaucrats themselves have an incentive to increase the amount of red tape so as to raise their income from bribes. Therefore, it is possible that the reason an inefficient bureaucracy exists in the first place is actually to make it possible for the bureaucrats to engage in corruption (c.f. Rose-Ackerman, 1978 and Tanzi, 1998). Empirical evidence from Indonesia seems to point in this direction as well (see Winters, 1996 or Flatters and Macleod, 1995).

Hence, even if corruption sometimes can be a second best solution, not least when rules and regulations are fuzzy or slow, it is still not a ‘first-best solution’. An economy with a clear and transparent institutional structure has
no need of corruption. This of course means that dishonest individuals have an interest in creating red tape to be able to extract more bribes. A lenient position versus corruption thus has a tendency to create unfavourable institutional structures, which in itself has negative impacts on growth.

3 Defining corruption

As a concept, corruption is hard to define even within a certain cultural sphere. To do so over different cultural spheres is even harder. However, corruption is better used as an antonym to what we see as an ideal behaviour. All that we term as corruption in everyday life is a deviation from that model behaviour. Hence, in one sense the concept of corruption is inherently subjective.

Perhaps the most common example of corruption is bribes. Exchange of gifts and favours is a part of everyday life and has been so for a long time. In classical texts (Greece, Latin, Egyptian or Hebrew) there is no word for a corrupt gift, the term used in those texts can be employed both for a lawful gift as well as for a corrupt gift (Taylor, 2001). In English, the word bribe was closely connected to stealing but changed meaning to the modern day meaning of a corrupt gift during the early 16th century; first in various translations of the bible and later in plays by Whetstone and Shakespeare (Noonan, 1984). The first attested usage of it is from 1535 in Miles Coverdale’s translation of the bible, where on some instances the word gift has been replaced by the word bribe (brybe) (Online Etymological Dictionary and Noonan, p.316).

Bribes are formed on the basis of reciprocity and although it is nowadays illegal to give a gift even after a service has been rendered (Cars, 2001) this has not always been the case. In the famous play “The Merchant from Venice” which has its fair share of discussion on corruption, it is not seen as a bribe if the gift is given after a verdict while it is a bribe if it is given before (for a discussion of this see Noonan 1984, pp.323). The same kind of argument i.e. that the gift was received after the ruling and hence not a bribe, was put forth by Francis Bacon in his Confessions which he wrote during the trials when he was convicted of corruption (Noonan, 1984).

Corruption is however wider than bribes and thus encompasses behaviour that is not necessarily illegal like bribes. In Britain during the 17th century, monopolies and proliferation of offices were frequently included under the heading of corruption together with bribery and sale of office. The first two was by no means illegal while the second two were (Peck, 1993). The same can be said for France, where the sale of office was regarded by the public as corrupt according to the Cahiers although it was legal.

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5. The role of information in combating corruption

The type of behaviour which is today viewed upon as corruption is closely tied to the distinction between public and private. In one of the earliest papers published on corruption (Adams, 1898), the case of an elected official who gives special favours to his constituency is discussed. By keeping the behaviour he had before he was elected, i.e. helping and supporting his friends and neighbours he becomes corrupt. Because he now has a public as well a private role, and the behaviour he has in his private role cannot be directly carried over to his public role. This causes problems if the constituency has problems defining the limits of his public and private roles. This particular problem is often encountered in discussions of corruption in developing countries, when corruption is defined according to Western European values. Behaviour that is deemed normal in certain cultures is definitely regarded as being corrupt in others. This is due to different strong divisions of public and private. Thus, it is not necessarily the action per se but also the situation in which the action is taken that matters.

In one of the earliest modern discussions about how to define corruption it is defined as “the intentional misperformance or neglect of a recognized duty, or the unwarranted exercise of power, with the motive of gaining some advantage more or less directly personal” (Brooks, 1909). This definition is not very different from the one commonly used today “the use/abuse/misuse of public office for private gain” (see: Triesman, 2000, the World Bank home page and Tanzi, 1998 respectively). In this paper I adhere to the World Bank definition of corruption being: the abuse of public power for private gain. There is one major (pragmatic) reason for this, and it is that is this type of corruption that the empirical measures of corruption capture. Moreover, it includes most behaviour, which today is viewed upon as corruption.

4 Why might information matter?

‘The time, it is to be hoped, is gone by, when any defence would be necessary of the “liberty of the press” as one of the securities against corrupt or tyrannical government.’

John Stuart Mill, 1859, Chapter II

For corruption to be curbed, it is important that people are aware that the problem exists and also of its extent. It is first when this awareness exists that: policy changes will be made, receivers and payers of bribes prosecuted and politicians voted out of power. When information has been uncovered, it must be legal to “speak up” and it must be possible to “spread the word”. Conceptual information can be restricted either by limited possibilities to express certain opinions or by limited possibilities to share information.
The first generally relates to policies and regulations, and the second to technical constraints. Press freedom is perhaps the single most important part of the freedom of expression regarding anti-corruption work and it has received some scholarly attention of late (Rose-Ackerman, 1999, pp. 162-164, Brunetti and Weder, 2003, Chowdhury, 2004, and Lederman et al. 2005). The idea that a free press is important in keeping the behaviour of government in check is however not new; already in 1748, David Hume treated the issue in his “On the Liberty of the Press” although the issue of a free press had been raised almost a century earlier by Milton (1644) in his Areopagitica.

In many countries, journalists and media companies face obstacles when reporting, such as censorship or limited access to official information. However, restrictions on the press are not only about legislation but also include the threat of physical violence. The International Federation of Journalist (IFJ) reports on their webpage that 68 journalist have been killed since 1994 where their work on uncovering corruption is suspected to be, at least partly, the reason behind the killing.

The media is a major actor regarding dissemination of information of corrupt practices and people to the populus. It is also in many cases journalists who, using investigative journalism, find out about corrupt behaviour. Two of the largest corruption scandals involving Swedish companies, Ericsson and SAAB, during the last decade were exposed thanks to the work of journalists at the Swedish state radio and state television. The existence of such journalists might actually deter individuals from engaging in corruption due to the increased risk of being caught.

In a study by PriceWaterhouseCooper (2007), it is observed that very few economic crimes (less than 5 per cent) inside companies, where corruption can be regarded as a subset, was discovered by law enforcement. However, in the same study it is also noted that companies that discover corruption frequently report to the law enforcement because the press will later write about it. The companies feel that it gains credibility and goodwill by being the one reporting to the law enforcement about it. If the press did not write it, it would not be as likely that the perpetrators were challenged in a court of law, since the goodwill effect would disappear, and hence the companies would probably not report it to the police.

However, a free press does not need to lower corruption per se; there is of course the possibility that the press is equally corrupt as the society at large. One example is the concept of “cash for news coverage” where journalists agree to publish positive news against payments. In a study made by IPRA in 2002, 40 per cent of the respondents, chiefly senior practitioners, in Southern Europe, Africa and the Middle East, answered that they thought that bribes commonly influenced the editorial content. Moreover, in Latin America 41 per cent believed it was common to accept bribes not to publish an article (Transparency International, 2003).
One further problematic area for the media is the discounts given to political parties and candidates, as in Uruguay where the discount to the ruling party for advertisement has been estimated to be up to 95 per cent (Casas-Zamora, 2002). The same goes for ties with politicians through donations to their campaigns. In the US between 1993 and 2000 the media provided US$75 million to politicians (Columbia Journalism Review, Sep/Oct 2000).

One reason why it might be harder to bribe media than others such as politicians is that it is less likely that a politician is pivotal and thus he has lower bargaining power compared to media officials. By bribing more politicians than is needed to get a bill passed, no politician becomes pivotal. However, when it comes to media it might be enough that one source reports unfavourable information. Thus, all players are pivotal and can therefore demand higher bribes (McMillan and Zoido, 2004).

The importance of information can in one way be validated by the anecdotal fact that the head of the secret police in Peru paid bribes to an owner of a television channel that was roughly hundred times that paid to a judge. Still, in the end, it was the media who exposed the corruption prevalent in Peru, by the one television owner who was neglected (McMillan and Zoido, 2004).

Previous work on corruption and information has mainly been looking at the first constraint while the second has been left out. However, it might actually be that the technical side is more robust in its effect on corruption than the regulatory side. Even if the freedom of expression is suppressed it might still be possible to disseminate information if the informational infrastructure is of good quality. The internet is perhaps the most obvious example, which often can be reached through the use of landlines or mobile phones. However, radio transmission or simple telephone calls may also help to spread information over large areas.

However, the media is dependent on the informational infrastructure even if there are no restrictions on press freedom. Moreover, there is probably some synergy effect present, meaning that the effect of an improvement of the informational infrastructure will have a greater impact on corruption if the press is also relatively free. The same should be true for an improvement in press freedom, i.e. the impact of a free press should be greater the better the informational infrastructure is.

The most famous empirical study on press freedom and corruption is probably the study by Brunetti and Weder from 2003. They find significant effects of press freedom on the level of corruption. The note by Chowdhury (2004), using slightly fancier estimation techniques, confirms the findings by Brunetti and Weder (2003). However, Ledereman et al (2005) in their study on the determinants of corruption do not find a robust effect of press freedom on corruption when they include the level of development, as measured by GDP per capita. This study extends on theirs by adding an interaction term where press-freedom is interacted with a measure of the informational infrastructure.
Further, this study has roughly twice as many observations as the two earlier studies.

Regarding the technical constraint there exists only one paper which explicitly deals with it as far as the author knows. Andersen et al. (2008) however focuses on only the internet and does not take into account any interaction effects with the level of press freedom. They find that increasing the internet coverage decreases the amount of corruption. Using micro-data, Reinikka and Svensson (2005) find that better media coverage decreases corruption connected to the distribution of educational funds in Uganda. By publishing the monthly transfers to each district in newspapers, the amount of money actually reaching the schools increased. However, the distance to a newspaper outlet decreased the positive effect of the publication of the funds disbursed. This also lends some weak support to the fact that the informational infrastructure could moderate the effect of a free press on corruption.

5 Empirics

This section will outline the methodology for testing whether corruption is influenced by press freedom and if this effect is influenced by the informational infrastructure. Given the confusion regarding the treatment of interaction effects, special attention will be granted to this issue. Further, each of the variables included in the regression analysis will be shortly discussed, with a longer section devoted to the corruption measures employed and the construction of the measure of informational infrastructure.

I look at two constraints on information; the first concerns the freedom of expression while the second concerns technological constraints on information sharing. Each of the constraints will be tested individually as well as jointly through an interaction term. By including an interaction term, I will be able to test whether the two constraints must be relaxed simultaneously for there to be any substantial effect on corruption, or if it is possible to influence corruption by increasing only the freedom of expression or improving the informational infrastructure.

To test whether the informational infrastructure has any impact on an eventual effect of press freedom I run a standard multiple regression of the following form,

\[ C = \alpha + \beta_1 X + \beta_2 Z + \beta_3 XZ + \sum_{t=1}^{T} \gamma_{t} V_{t} + \epsilon \]  

(1)

where \( C \) is a measure of corruption \( X \) is a measure of press freedom, \( Z \) is a measure of the informational infrastructure in the country and \( XZ \) is an interaction term between press freedom and the informational infrastructure. In addition to these, a vector of \( T \) control variables is included.
If both constraints must be relaxed at the same time, only the multiplicative term should matter and thus only $\beta_3$ would be significant. To see if relaxing one constraint while holding the other constraint constant has any effect on corruption would amount to determining whether the marginal effect of $X$ or $Z$ is different from zero. To see whether relaxing only one of the constraints is effective, however, does not amount to simply looking at the significance of $\beta_1$ or $\beta_2$ since these coefficients do not in this case translate to the marginal effects; except the one particular case when the other variable is equal to 0. Since this a concept often overlooked (Brambor, Clark and Golder, 2006), and relatively quickly explained, I believe it merits a small detour.

Using simple differentiation, we can see that the marginal effect of press freedom is equal to

$$\beta_1 + \beta_3 Z$$

As suggested by Aiken and West (1996) and Jaccard and Tussardi (2003) I centre the variables that are interacted with each other. By centring the variables, I not only reduce the problem of multicollinearity but also make it easier to interpret the coefficients. The marginal effect of an increase in the Press Freedom Index when the informational infrastructure score is equal to the average is just the coefficient of press freedom.

However, care should be taken when interaction effects are included regarding the significance levels of the marginal effects. As Brambor, Clark and Golder (2006) show, this is often neglected in the literature. Since the marginal effect of press freedom is no longer just equal to the coefficient of the press freedom variable I need to recalculate the significance levels. The significance level of the marginal effect of press freedom on corruption is

$$s_{pf} = \sqrt{s_{11} + 2Zs_{13} + Z^2s_{33}}$$

where $s_{11}$ and $s_{33}$ are the variance of $\beta_1$ and $\beta_3$ and $s_{13}$ is the covariance of $\beta_1$ and $\beta_3$. It is thus not possible to use the standard output from the statistical package; it needs to be recalculated using the variance-covariance matrix of the predictors. The question remains for which values of $Z$ this should be done. Following Brambor, Clark and Golder (2006) I do this for the whole sample range and graphically display the results. The other option is to do it for just some of the values. Cohen and Cohen (1983) suggest using the mean of $Z$, $Z_m$, and one standard deviation above the mean, $Z_h$, and one below the mean, $Z_b$. I do not see the advantage of using only some; instead of all values of $Z$ besides computational simplicity, so therefore I choose to follow the advice of Brambor, Clark and Golder (2006).

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3 I have used STATA version 9
To assure robustness of the results, two different measures of corruption will be employed. One is Transparency International’s (TI) and the other is the International Country Risk Group’s (ICRG). Both measures are widely used in the empirical literature and cover a wide range of countries. In the same vein, two different measures of press freedom will be used. One comes from Journalist Sans Frontier (JSF) and the other is from Freedom House (FH). The second measure also makes it possible to see if different checks on the freedom of press in a country have different effects regarding the level of corruption; the three components reported are legal, economic and governmental restrictions on press freedom. So in total six regressions will be run using equation (1) with the only difference being the source of the Press freedom and corruption measures.

5.1 Data

This section contains a description of the variables used in the regression analysis how the measure of information infrastructure is constructed as well as short discussion on the problems of measuring corruption.

5.1.1 Informational infrastructure

A principle component analysis has been used to create a composite factor measuring the informational infrastructure in the country in question. A higher value signifies a better informational infrastructure. As suggested by Stevens (1992) a factor loading greater than 0.512 is deemed as being significant. The variables included in the principal component analysis are: Percentage of population with access to television, the number of internet users out of one thousand inhabitants, and the mobile phone coverage (WDI, 2007). Only one factor is found, and the factor includes all variables. This factor is subsequently used in the regression analysis as a proxy for the informational infrastructure in a country.
5. The role of information in combating corruption

Table 1 Informational infrastructure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Component 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>television_percent</td>
<td>.874</td>
</tr>
<tr>
<td>mobile_percent_cov</td>
<td>.815</td>
</tr>
<tr>
<td>Internetusers_per_K</td>
<td>.847</td>
</tr>
<tr>
<td>Total variance explained</td>
<td>71.5%</td>
</tr>
</tbody>
</table>

Note: The Extraction Method used was Principal Component Analysis.

5.1.2 Measuring corruption

All empirical analysis made on corruption is awkward due to the illegal nature of the phenomenon. This makes it hard to quantify the extent of corruption in a country in any meaningful way. Objective data such as the number of corruption convictions raise many questions about validity and can be misleading in a cross-country comparison. For example, the fact that a country has few or no convictions of corruption could have several explanations. One explanation is that corruption indeed is a minor problem. However, it can also be the case that the number of convictions is low due to inefficient law enforcement or a forgiving attitude towards corruption. Is Argentina uncorrupt since there have only been 23 convictions over the last 25 years or could it be the opposite that the country is very corrupt since the other 730 cases ended with no convictions? Therefore, in order to provide a more correct picture perhaps corruption is better-measured indirectly using subjective rather than objective data.

5.1.3 Corruption measures

One often used measure of corruption is the Corruption Perceptions Index (CPI) constructed by Transparency International. The difficulties in measuring corruption discussed above merits a description of the index. CPI was first released in 1995, and is today ranking 180 countries in terms of their level of corruption. The CPI is a composite index and is constructed from several different sources in the form of surveys of business people as well as assessments by country analysts. For a country to be included at least three different surveys must cover it. To find the best reliable corruption index TI has formed an Index Advisory Committee (IAC) to deliberate upon its global corruption measurement tools. IAC members are economists, statisticians, and social and political scientists who have a consultative role in the development of various tools. TI has the main responsibility in the decision making process. A

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4 However, if the study compares different regions within a country like Glaeser and Saks, 2006 or Andersen et al. (2008) it might be better to use the number of convictions.
country’s CPI score presents the degree of public sector corruption as detected by country analysts and business people. The CPI ranges from 0 to 10 where 10 equals a perfectly clean country while 0 indicates a country where business transactions are entirely dominated by corruption.

ICRG measures the amount of corruption in the political system in a country. The concept of corruption used by ICRG includes bribes as well as other forms such as patronage and nepotism. The index is constructed by the staff of ICRG and is based on a subjective analysis of gathered data. The corruption measure is included in the aggregated index called Political risk which in addition to corruption has 11 other variables (ref http://www.prgroup.com/ICRG_Methodology.aspx). The measure has been employed in many other studies on corruption (among others Mauro, 1995, Brunetti and Weder, 2003 and Lederman et al., 2005). It ranges from 1 to 6 with a higher number indicating less corruption.

5.1.4 Press freedom

Freedom House, a think-tank founded in New York, 1941, constructs the legal, political and economic restrictions variables that together compose a measure of press freedom. The legal restrictions variable covers laws and regulations as well as the government’s willingness to use these to hinder the media. The political restrictions variable measures the degree of political control over the media. The economic restrictions variable evaluates media economic environment such as the degree of concentration and state subsidies in the media market. In the regression analysis I use one specification with the composite index and another with the three different components separately. All previous studies of corruption and press freedom have used this measure (Brunetti and Weder, 2003, Chowdhury, 2004, Lederman et al., 2005 and Freille, et al., 2007), however only Freille et al. (2007) have also used the three different sub components.

JSF measures press freedom and is based on a questionnaire on the violation affecting individual journalists as well as the news media, taking into account the legal framework for the media as well as the level of self-censorship. This measure has not previously been used in any other study on corruption and press freedom, despite its good coverage. One reason is perhaps that it has only been published since 2002. Thus I am able to not only check for robustness over different measures of corruption but also for different measures of press freedom.

All indexes of press freedom are constructed so that a higher value means more freedom.
5. The role of information in combating corruption

5.2 Control variables

All control variables except Regulations are collected from the 2007 version of the World Bank’s World Development Indicators (WDI). Since not all variables are available for every year and for every country I use the average value between 2001 and 2005.

5.2.1 Gross domestic product per capita (GDPcap)

This variable is used as a proxy for the level of development. It is measured in thousands of US dollars and it is expected to have a positive impact on the corruption level. Since the informational infrastructure is positively correlated with the level of development in a country it is of course important to include the development level since the informational infrastructure, and also perhaps the press freedom measure, might pick up a general development effect and not solely the effect of the information. Some studies which have used GDPcap as determinant for corruption are Treisman (2001), Ades and DiTella (1999) and Brunetti and Weder (2003), all of whom found a positive and significant effect on corruption.

5.2.2 Gross domestic product (GDP)

This variable is used as a proxy for the size of the economy. It is expected that size should have a negative impact on corruption, so a large country could be more difficult to organise with more different interest groups. It could, of course, also be that there are economies of scale in certain activities such as law enforcement, which would mean that size would positively affect corruption. In the end, it is an empirical question to determine whether size has a positive or negative effect on corruption.

5.2.3 Government expenditures as percentage of GDP

This variable is used as proxy for the size of the government. Already Rousseau (1761) in “A discourse on political economy” talked about how a too large government could cause corruption to increase. If you adapt a public choice perspective on bureaucrats’ behaviour, it is clear that unless you have rigorous monitoring and good incentive schemes, a larger government sector can certainly entail the risk of more corruption. Moreover, a large government could mean that we get more regulations and red tape, which might stimulate corruption. However, there are also reasons to believe that a larger government could reduce corruption. If more money is spent on a better law enforcement or judicial strength, a larger government could mean less corruption. The empirical evidence on the impact of government expenditures on corruption is also mixed; Ali and Isse (2003) find a positive impact on corruption while Bonaglia et al (2001) find a negative impact. I thus choose to include both government expenditures’ part of GDP as well as its squared value where I
expect the squared term to reveal possible non-linearities such as negative effect of a too large government.

Thus, an increase in government expenditures may have a positive impact on the level of corruption in a country at first, when the money is spent on the enforcement of laws and enhancement of the market functions. After a certain point, increasing the government expenditures also means too much government regulation and red tape, which could increase corruption.

In the regression analysis the variable is centred as suggested by Aiken and West (1996) and Jaccard and Tussardi (2003) since it is included as a polynomial.

5.2.4 Regulations

Bardhan (1997) concludes that corruption makes rent-seeking more profitable relative to productive investments and that regulations create conditions for corruption. When Ades and di Tella (1999) try to explain the existence of corruption, they claim that the level of rents and market structure determines the extent of corruption. They find that corruption is more severe in countries where firms enjoy higher rents due to lack of market competition. Something that has been common in some developing countries is to keep an artificially high exchange rate. This is believed to make domestic investments more interesting since it decreases the costs of input goods in industries. But, to be able to maintain an artificially high exchange rate, the regime must ration the possibilities to exchange the domestic currency for foreign currency. The rights to exchange will thus be valuable and a black market will come into existence. Here a possibility for corruption arises, however by deregulating the exchange rate the opportunity for corruption disappears. Similar reasoning applies to trade quotas (see Krueger, 1974, for a discussion on trade licences and corruption) and credit rationing. Trade quotas, fixed exchange rates or credit rationing all provide opportunities for corruption by government officials. By having an economy without such regulations it will be easier to keep corruption at a low level.

The measure of regulations used comes from the Heritage foundation and measures the amount of regulations regarding the business environment. It is based on a subjective assessment of data (www.heritage.org). Heritage foundation is a conservative think tank based in the US which also creates an index of economic freedom, which, in 2008, included 162 countries over 10 different areas.

5.3 Descriptive statistics

In table 2 below descriptive statistics of the variables used in the regression analysis are presented.
5. The role of information in combating corruption

Table 2 Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>158</td>
<td>1.22</td>
<td>9.72</td>
<td>4.0466</td>
<td>2.15996</td>
</tr>
<tr>
<td>ICRG</td>
<td>135</td>
<td>0.03</td>
<td>6.00</td>
<td>2.5535</td>
<td>1.14113</td>
</tr>
<tr>
<td>Totalinv</td>
<td>189</td>
<td>2.60</td>
<td>91.60</td>
<td>54.6548</td>
<td>25.07255</td>
</tr>
<tr>
<td>Ainv</td>
<td>189</td>
<td>3.00</td>
<td>29.33</td>
<td>17.6966</td>
<td>8.14187</td>
</tr>
<tr>
<td>Binv</td>
<td>189</td>
<td>6.40</td>
<td>88.40</td>
<td>24.5409</td>
<td>8.87805</td>
</tr>
<tr>
<td>Cinv</td>
<td>189</td>
<td>4.00</td>
<td>26.80</td>
<td>17.4701</td>
<td>5.76720</td>
</tr>
<tr>
<td>inf</td>
<td>151</td>
<td>1.55</td>
<td>9.96</td>
<td>7.6846</td>
<td>2.02310</td>
</tr>
<tr>
<td>GDP</td>
<td>184</td>
<td>48574051,20</td>
<td>1.04E13</td>
<td>1.8270E11</td>
<td>8.74290E11</td>
</tr>
<tr>
<td>GDPcap</td>
<td>182</td>
<td>85,79</td>
<td>49479,18</td>
<td>6423,7843</td>
<td>9542,58132</td>
</tr>
<tr>
<td>Govexp_GDP</td>
<td>143</td>
<td>,04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation</td>
<td>158</td>
<td>10,00</td>
<td>90,00</td>
<td>40,5696</td>
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<tr>
<td>openness</td>
<td>176</td>
<td>22,30</td>
<td>404,78</td>
<td>92,1995</td>
<td>50,89604</td>
</tr>
</tbody>
</table>

In table 3 the correlation between Journalist Sans Frontier’s measure of press freedom and Freedom house’s is displayed. All measures are highly and significantly correlated with each other, which is what should be expected, given that they try to measure the same phenomenon. The same is true for the different measures of corruption used. As has been previously noted, (see for example Wei, 2000a) different indices of corruption tend to be highly correlated. This is also so for this study, where Transparency International’s measure and ICRG for example has a correlation coefficient of 0.863.

Table 3 Correlations for indicies measuring Press Freedom

<table>
<thead>
<tr>
<th></th>
<th>JSF</th>
<th>FH</th>
<th>Legal restrictions</th>
<th>Political restrictions</th>
<th>Economic restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>JSF</td>
<td>1</td>
<td></td>
<td>.829(**)</td>
<td>.817(**)</td>
<td>.780(**)</td>
</tr>
<tr>
<td>FH</td>
<td>1</td>
<td></td>
<td>.957(**)</td>
<td>.965(**)</td>
<td>.942(**)</td>
</tr>
<tr>
<td>Legal restrictions</td>
<td>1</td>
<td></td>
<td>.924(**)</td>
<td>.890(**)</td>
<td></td>
</tr>
<tr>
<td>Political restrictions</td>
<td>1</td>
<td></td>
<td>.921(**)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic restrictions</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).

6 Regression results

This section starts with the results regarding the main variables of interest i.e. press freedom and the informational infrastructure, and is followed by a short
discussion of the results for the control variables. The marginal effect and significance level of press freedom and the informational infrastructure is best displayed in graphs since an interaction term is included. However, the standard regression results are also displayed below in table 4.

**Table 4 Regression results**

<table>
<thead>
<tr>
<th>Main variables</th>
<th>m1(ICR)</th>
<th>m2(ICR)</th>
<th>m3(ICR)</th>
<th>m1(C)</th>
<th>m2(C)</th>
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<td>jsf</td>
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<td>jsf*Informational infrastructure</td>
<td>0.217**</td>
<td>0.144</td>
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<td>FH</td>
<td>0.011***</td>
<td>0.010**</td>
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<td>FH*Informational infrastructure</td>
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<td>(0.024)</td>
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<td>0.044</td>
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<td>(0.027)</td>
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<td></td>
</tr>
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<td>(0.038)</td>
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<td></td>
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<td>(0.034)</td>
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<td>Political restriction* Informational infrastructure</td>
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<td>0.059</td>
<td>(0.032)</td>
<td>(0.036)</td>
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<tr>
<td>Economic restrictions* Informational infrastructure</td>
<td>0.018</td>
<td>0.023</td>
<td>(0.049)</td>
<td>(0.052)</td>
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<td>Informational infrastructure</td>
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<td>0.049</td>
<td>0.330**</td>
<td>0.453**</td>
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<td>(0.107)</td>
<td>(0.107)</td>
<td>(0.140)</td>
<td>(0.153)</td>
<td>(0.151)</td>
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Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
5. The role of information in combating corruption

(Table 5 contd).

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<th>0.021**</th>
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<td>(0.009)</td>
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<td>(0.008)</td>
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<td>Government exp./GDP</td>
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<td>5.623**</td>
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<td>(1.352)</td>
<td>(1.237)</td>
<td>(1.268)</td>
<td>(1.800)</td>
<td>(1.785)</td>
<td>(1.841)</td>
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<td>(Government exp./GDP)²</td>
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<td>(0.235)</td>
<td>(0.251)</td>
<td>(0.311)</td>
<td>(0.304)</td>
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Regression statistics

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<td>Shapiro-Wilk</td>
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<td>0.28021</td>
<td>0.28025</td>
<td>0.38600</td>
<td>0.20899</td>
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Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Figure 1-5 below shows the marginal effect of press freedom on corruption for different levels of press freedom, using equation (2). The dashed lines are the confidence intervals, so I can only reject the null-hypothesis, that press freedom has no impact on corruption, if the confidence interval does not include 0. As can be seen, this only happens for high levels of informational infrastructure. The confidence intervals have been calculated for the whole sample range of informational infrastructure. The figures 1-5 are only different in the sense of which corruption and press freedom measure that has been used, as noted in the caption of each figure; where CM in the caption stands for the corruption measure used and PFM stands for the Press Freedom measure used. In the main text, only the graphs where press freedom is significant are displayed to facilitate reading. However, the remaining graphs, numbered A.1-A.5, can be found in the appendix. In all graphs, the confidence interval implies a significance level of 5% except in figure 5 where the confidence interval implies a significance level of 10%.
**Figure 1** The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (Corruption Measure (CM): ICRG, Press Freedom Measure (PFM): FH)

**Figure 2** The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: ICRG, PFM: JSF)
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**Figure 3** The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: ICRG, PFM: Political Restrictions)

**Figure 4** The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: TI, PFM: FH)
As can be seen in the figures above, press freedom has a positive and significant effect on corruption but only once the informational infrastructure reaches a certain level of sophistication. The results simply point to the fact that for press freedom to work effectively against corruption the news must have the possibility to reach the recipients. Thus, the effect of an increase in press freedom on corruption is conditional on the quality of the informational infrastructure in a country.

When I disaggregate the press freedom variable, the one that seems to have significant effects on corruption is political restrictions on the press as seen in figure 3 and 5 above. It is, of course, hard to really pick out the effects due to the high degree of correlation between the three disaggregated measures as shown in table 1.

The results are fairly robust regarding choice of corruption measure with the ICRG measure showing a significant effect at the 5% level of press freedom for both of the aggregated measures of press freedom as well as the disaggregated measure of political restriction. The corruption measure of TI shows a significant effect of press freedom with the FH measure on the 5% level and a significant effect of the disaggregated measure of political restrictions at the 10% level. These results confirm the hypothesis that Press Freedom only has an impact on corruption when the informational infrastructure is of a sufficiently good quality.

However, the idea of the informational infrastructure having a more robust effect on corruption comes to nought. For the aggregate measures I have something which is different from what we saw when we were looking at the marginal effect of press freedom. For ICRG’s measure of corruption it is actually the case that the marginal effect of the informational infrastructure
becomes negative for low levels of press freedom. Therefore, increasing the quality of the informational infrastructure when we have low levels of press freedom would actually increase the amount of corruption. This effect is not present when using TI’s measure of corruption. For TI’s measure of corruption and JSF’s measure of press freedom, I only get a positive impact of the informational infrastructure for high levels of press freedom. When FH’s measure of press freedom is used I always have a positive marginal effect of the informational infrastructure on corruption regardless of the amount of legal restrictions on press freedom; although the marginal effect is increasing with the level of press freedom.

The figures displaying the marginal effect of the informational infrastructure with regard to the disaggregated measures of press freedom (figure 8, 11, 12 and 13) are constructed under the hypothesis that the values of the other two disaggregated measures are equal to their mean value.

**Figure 6** The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: ICRG, PFM: FH)
Figure 7 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: ICRG, PFM: JSF)

Figure 8 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: ICRG, PFM: Political restrictions)
5. The role of information in combating corruption

Figure 9 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: CPI, PFM: FH)

Figure 10 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: CPI, PFM: JSF)
Figure 11 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: CPI, PFM: Legal restrictions)

Figure 12 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: CPI, PFM: PR)
5. The role of information in combating corruption

If the elite in a country controls the media then they can use it to cover up corruption. Either by simply not reporting about it or by reporting false information and smear those who accuse them of corruption. If the control over the media is strong enough then an improvement of the informational infrastructure could mean that it becomes easier to cover up corruption thus leading to an increase in corruption. This could be a possible explanation of the results in figure 6, 7 and 8 where for low levels of press freedom, the marginal effect on corruption of an improvement of the informational infrastructure is negative. As the freedom of press increases the possibility of using the media this way fades away. With less control over what is published or broadcasted improvements in the informational infrastructure would reduce corruption. This is also what seen in figure 6-8, where at higher values of press freedom the marginal effect of the informational infrastructure becomes positive and as press freedom increases the marginal effect also increases.

However, the result of a negative marginal effect of corruption only shows up when the ICRG measure of corruption is used. When the TI measure is used no statistically significant negative marginal effect is found.

The results when using the disaggregated measures of press freedom are not clear cut. As shown in figure 8, and 12, as the political restrictions variable increases, i.e. more freedom, the marginal effect of the informational infrastructure increases. For the ICRG measure of corruption, the amount of legal and economic restrictions has no significant impact on the marginal effect of the informational infrastructure. For TI’s measure, however, the economic measure has a positive impact on the marginal effect of the informational infrastructure. While for the legal measure it has a negative impact i.e. as the
value increases the impact that the informational infrastructure has on corruption decreases and for large values of the legal restrictions measure there is no significant effect of the informational infrastructure on corruption. But, as was noted above, all three measures are very highly correlated and thus it is hard to distinguish between the different variables. Thus it is more accurate in the case of the marginal effect of the informational infrastructure to focus on the aggregate measures.

Although the results are mixed as can be seen in figure 6-13 above, one pattern stays robust and is similar to the one found for press freedom. For higher levels of press freedom an improvement in the informational infrastructure has a significant positive impact on corruption. This holds for all aggregate measures of press freedom, as can be seen in figure 6, 7, 9 and 10 above.

In brief, for low levels of press freedom if the informational infrastructure is improved their will either be no effect at all on corruption or a negative effect. At higher levels of press freedom an increase in the informational infrastructure will have a positive effect.

6.1 Control variables

As expected, the level of development, measured by GDP per capita, significantly affects the corruption level in all specifications as can be seen in table 3 above. This is to be expected given the numerous studies on corruption that has verified the relationship between development and corruption. However, this is what makes it so important to include the variable in any empirical study on corruption. As was noted previously regarding press freedom, the study by Lederman et al (2005) did not find any significant effect of press freedom when GDP per capita was included, while Brunetti and Weder (2003) as well as Chowdry (2004) still found significant results after including GDP per capita.

Regarding the other control variables we see that more regulations not surprisingly imply that there is more corruption. This result holds for all specifications although the t-statistic is larger when TI’s measure of corruption is used. This is in line with the idea that red tape has a tendency to create corruption.

In all specifications where TI’s index of corruption is used, the impact of government size on corruption is positive as in Bonaglia et al (2001) and the inclusion of a squared term does not change the result. When ICRG’s measure is used government size has no significant impact on corruption. Our findings are thus not conclusive but give at least weak support to the assumption that government expenditures are generally spent in such a way that corruption decreases.
5. The role of information in combating corruption

The size of the economy has a significant negative impact on the corruption level for all specification using TI’s index and for one out of three where ICRG’s measure is used.

6.2 Statistical tests

To test for normality the Shapiro-Wilks statistic is computed for each regression. Under no specification is the normality assumption rejected as can be seen from table 3.

It is possible that the causal relationship runs not only from press freedom to corruption but also that corruption influences press freedom. By using an instrument for press freedom I could explicitly test for this, however no variable has been found to work as an instrument. Ethnolinguistic fractionalisation as used by Freille, et al (2007), proves only to explain around 10% of the variation in the measures of press freedom used, a number of other possible variables have been tried with no one yielding an R2 of more than 10% thus disqualifying them for use as instrumental variables. Hence, I opt to not use an IV-approach. I use instead the value of Freedom House’s measure of press freedom for 1996-2000. We know that the value of corruption between 2001 and 2005 has no impact on the press freedom measure of the earlier period. It is not possible to use the measure of JSF since it was not available before 2002. The results are displayed in the appendix. As can be seen, the results stay the same using the lagged value, thus, at least providing some weak support that there indeed exists a causal relationship from press freedom to corruption.

7 Conclusion

“it is unacceptable that public television, paid for by all, should be the only public television (sic) that is always against the government”

Silvio Berlusconi

Even when the development level as well as other commonly used explanatory variables has been controlled for press freedom has a positive and significant effect on corruption in three out of four specifications using aggregated measures of press freedom. However, press freedom and informational infrastructure interact with each other and this has to be taken into account when the effect of press freedom on corruption is analysed. As can been seen from the figures, it is only when the informational infrastructure reaches a certain level that press freedom exerts a positive effect on corruption. So, for press freedom to have a positive impact on corruption, the country needs to have a decent informational infrastructure. People need to be able to access
information easily for the press to be able to have an influence. If the interaction term is excluded from the regression this will not be detected, since all variables of interest have the expected signs and are significant, regression results where the interaction term has been excluded can be found in Table A.1 in the appendix. The result has so far been overlooked in the literature on press freedom and corruption.

Regarding the impact of the informational infrastructure on corruption, I have found similar results for press freedom. The marginal effect of the informational infrastructure on corruption is positive and significant for higher levels of press freedom. However, there is some ambiguity regarding the marginal effect of the informational infrastructure for lower levels of press freedom. In two cases, both using ICRG’s measure of corruption, the results imply that a better informational infrastructure would increase corruption if the level of press freedom is low. This could possibly be explained by the elite using the media as to cover up corruption scandals. This however is only possible when the level of press freedom is low. The empirical results also show that as press freedom increases the marginal effect of an improvement in the informational infrastructure is positive. As the level of press freedom increase the marginal effect of the informational infrastructure also increases.

The paper shows the importance that the quality of the informational infrastructure has in anti-corruption work. Without easy access, the impact of information will be limited. Hence, a well developed informational infrastructure is a prerequisite for press freedom to exert a positive influence on corruption. The argument, albeit intuitive, has been overlooked in previous studies. Hence, the claim that press freedom reduces corruption is true only as far as there exists an efficient way to distribute information.
8 References


5. The role of information in combating corruption


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Transparency International 2007

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5. The role of information in combating corruption

Appendix

Figure A.1 1 The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: ICRG, PFM: Legal Restrictions)

Figure A.2 2 The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: ICRG, PFM: Economic Restrictions)
Figure A.3 3 The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: TI, PFM: JSF)

Figure A.4 4 The marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: TI, PFM: Legal Restrictions)
5. The role of information in combating corruption

**Figure A.5** 5 marginal effect of Press Freedom on corruption for different levels of informational infrastructure (CM: TI, PFM: Economic Restrictions)

**Figure A.6** 6 The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: ICRG, PFM: A)
Figure A.9  The marginal effect of Informational Infrastructure on corruption for different levels of press freedom (CM: ICRG, PFM: C)
5. The role of information in combating corruption

<table>
<thead>
<tr>
<th></th>
<th>m1 (ICRG)</th>
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<th>m1 (CPI)</th>
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<td>105,000</td>
<td>105,000</td>
<td>112,000</td>
<td>112,000</td>
<td>112,000</td>
</tr>
</tbody>
</table>

Note: ***/***/* significant at 1%/5%/10% level
### Table A.2 Using lagged value of press freedom

<table>
<thead>
<tr>
<th></th>
<th>m1</th>
<th>m2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b/се</td>
<td>b/се</td>
</tr>
<tr>
<td><strong>Main variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FH</td>
<td>0.010*</td>
<td>0.010***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>FH*Informational infrastructure</td>
<td>0.013**</td>
<td>0.018***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Informational infrastructure</td>
<td>0.455***</td>
<td>0.073</td>
</tr>
<tr>
<td></td>
<td>(0.149)</td>
<td>(0.109)</td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDPcap (thousands)</td>
<td>0.086***</td>
<td>0.022**</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>GDP (billions)</td>
<td>-0.167***</td>
<td>-0.076**</td>
</tr>
<tr>
<td></td>
<td>(0.055)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Regulation</td>
<td>0.027***</td>
<td>0.011**</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Government exp./GDP</td>
<td>5.477***</td>
<td>1.287</td>
</tr>
<tr>
<td></td>
<td>(1.766)</td>
<td>(1.333)</td>
</tr>
<tr>
<td>(Government exp./GDP)^2</td>
<td>-4.959</td>
<td>6.944</td>
</tr>
<tr>
<td></td>
<td>(20.590)</td>
<td>(18.290)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.396***</td>
<td>1.786***</td>
</tr>
<tr>
<td></td>
<td>(0.311)</td>
<td>(0.225)</td>
</tr>
<tr>
<td>r2</td>
<td>0.872</td>
<td>0.750</td>
</tr>
<tr>
<td>N</td>
<td>112,000</td>
<td>105,000</td>
</tr>
</tbody>
</table>

Note: ***/***/** significant at 1%/5%/10% level
5. The role of information in combating corruption

Figure A.10 The marginal effect of Press Freedom on corruption for different levels of informational infrastructure using the lagged value (Corruption Measure: TI, Press Freedom Measure: FH)

Figure A.11 The marginal effect of Press Freedom on corruption for different levels of informational infrastructure using the lagged value (Corruption Measure: ICRG, Press Freedom Measure: FH)
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