DISSERTATION

EMPIRICAL EXAMINATION OF THE DETERMINANTS OF CORRUPTION: CROSS-SECTIONAL AND PANEL ANALYSIS

Submitted By

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY NASR GALAL EL-DIN EL-BAHNASAWY ENTITLED "EMPIRICAL EXAMINATION OF THE DETERMINANTS OF CORRUPTION: CROSS-SECTIONAL AND PANEL ANALYSIS" BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

EMPIRICAL EXAMINATION OF THE DETERMINANTS OF CORRUPTION: CROSS-SECTIONAL AND PANEL ANALYSIS

This study explores the determinants of corruption, using cross-sectional, panel random-effects, and dynamic panel analysis to check the robustness of the results to alternative specifications and estimation methods. The study uses two different indexes of perceived corruption, the Corruption Perception Index (CPI) and the Control of Corruption measure (CC), to check the robustness of the results with alternative corruption measures. The study also uses a large array of explanatory variables that may influence corruption, including a large set of economic variables, a set of political variables, and a group of sociocultural variables.

The first interesting result indicates that the rule of law strongly impacts corruption and that a better quality of law enforcement is correlated with lower corruption. Moreover, rich countries are perceived to have lower corruption than poor countries. This work highlights the importance of the rule of law and per capita GDP in the battle against corruption. Furthermore, this study finds the following. Lagged corruption impacts current level of corruption. Larger countries seem to have higher perceived corruption. A larger percentage of the population that is rural is associated with higher perceived corruption. Higher proportion of seats held by women in the national

parliament is associated with lower corruption. Political stability, regulatory quality, ethnic fractionalization, and natural resource abundance do not impact corruption in my analysis. This study also examined the impact of some other factors on corruption such as voice and accountability, government effectiveness, the cost of business start-up procedures, the ratio of average government wage to per capita GDP, the degree of openness to international trade, membership in various religions, the level of economic development, and the legal system origin.

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Lastly, the usual disclaimer applies – any errors or imperfections in this study are solely my responsibility.

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CHAPTER ONE

INTRODUCTION

1.1 Preface

Corruption has received particular attention in recent years from both policymakers and researchers. Many studies have recently explained some of the harmful effects of corruption and have shown that corruption distorts the allocation of resources, reduces the productivity of public expenditures, and slows economic growth. The World Bank (2001) has identified corruption as "the single greatest obstacle to economic and social development". Recently, the World Bank (2004) has estimated that more than US $1 trillion is paid in bribes each year. Likewise, the African Union has estimated the cost of corruption to Africa as $148 billion annually, which is equivalent to 25% of Africa's GDP.[1]

Moreover, the 2004 Global Corruption Barometer (GCB) has polled the public about the extent of a number of problems facing a country. Grand corruption was rated among the five most urgent problems, while petty corruption was rated lower (unemployment, insecurity and violence, poverty, and inflation were rated as the most vital problems facing countries worldwide).[2] As Table 1.1 shows, grand corruption was seen as an urgent problem by 57% of the respondents around the world. In addition, 50%

[1] Moreover, Daniel Kaufmann, World Bank Institute, has estimated the annual global cost of bribes to households and firms at $1 trillion. However, such estimates could be made with a very wide margin of error, especially with unclear empirical basis for these calculations.

[2] However, the perceptions of social problems differed across the three income groups (low, medium, and high) across countries.

of the respondents with low incomes believed that petty corruption was a very big problem, while 38% of high-income respondents felt the same, suggesting that corruption hits the poor the hardest (Table 1.2). One of the interesting results from this barometer was that women had a more critical perception than men, and they also had less experience with corruption (fewer women (8%) admitted to bribing than men (12%)).

Table 1.1: Grand versus petty corruption (%)

	Petty/administrative corruption (corruption in ordinary people's daily lives, such as bribes paid for licenses, traffic violations, etc.)	Grand/Political corruption (corruption at the highest levels of society, by leading political elites, major companies, etc.)
Not a problem at all	3	2
Not a particularly big problem	16	10
A fairly big problem	32	28
A very big problem	45	57
Don't know/no answer	3	3

Source: Transparency International Global Corruption Barometer 2004

Table 1.2: Role of income on the perceptions of corruption

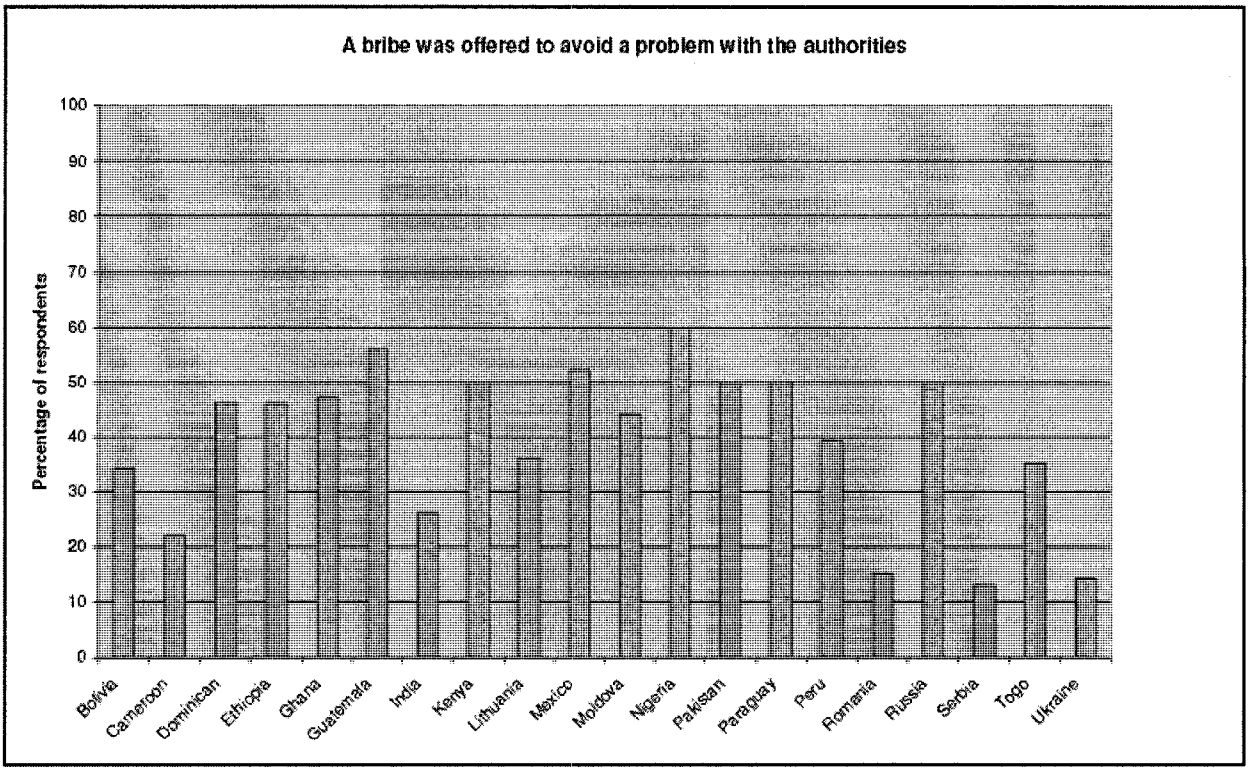
Income	Petty corruption as a very big problem	Grand corruption as a very big problem	Corruption affecting personal and family life to a large extent	Expectations that corruption will increase a lot
Low	50	61	25	23
Medium	43	56	18	20
High	38	52	15	16
Sample Average	45	57	20	21

Source: Transparency International Global Corruption Barometer 2004

Furthermore, the 2005 GCB reveals that the cost of bribery can be significant for households, and that families in some countries spend an excessive amount of their income on bribes. For example, families spent more than 9% of GDP per capita in 11 out of 19 countries in 2005 for which data were available.

In addition, offering a bribe to avoid problems with the authorities is a rather frequent occurrence in the 2005 GCB, as Figure 1.1 shows. Likewise, Figures 1.2 and 1.3 show the frequency with which a bribe was directly asked for and paying bribes offered for access to public services respectively.[3]

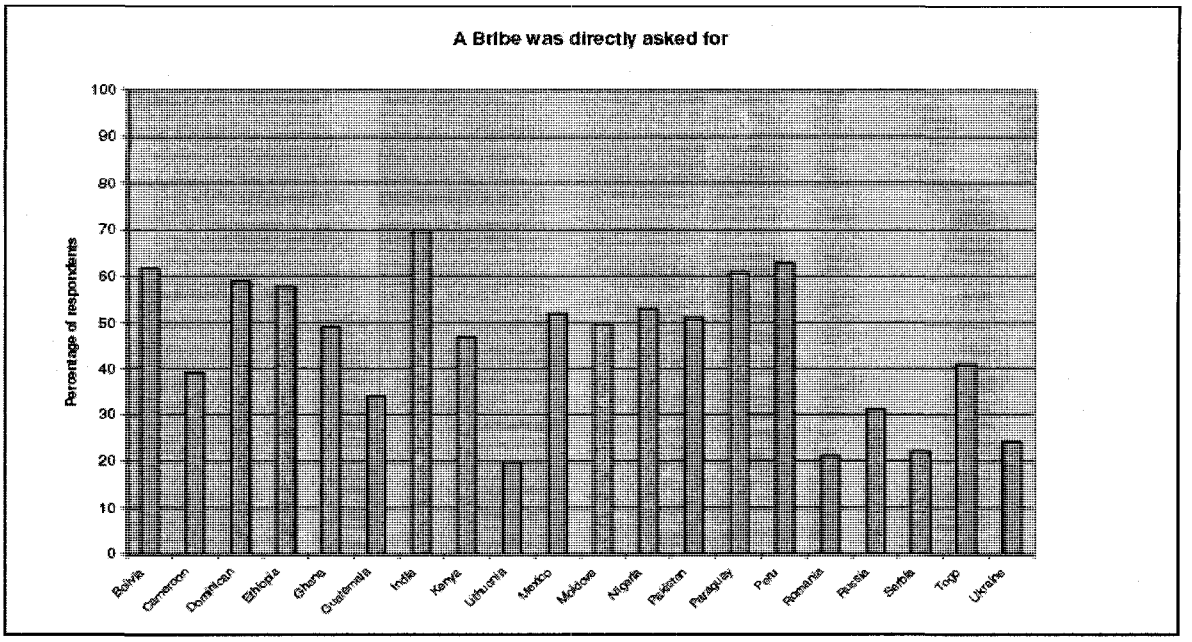
Figure 1.1: The supply side of bribery



Source: Transparency International Global Corruption Barometer 2005

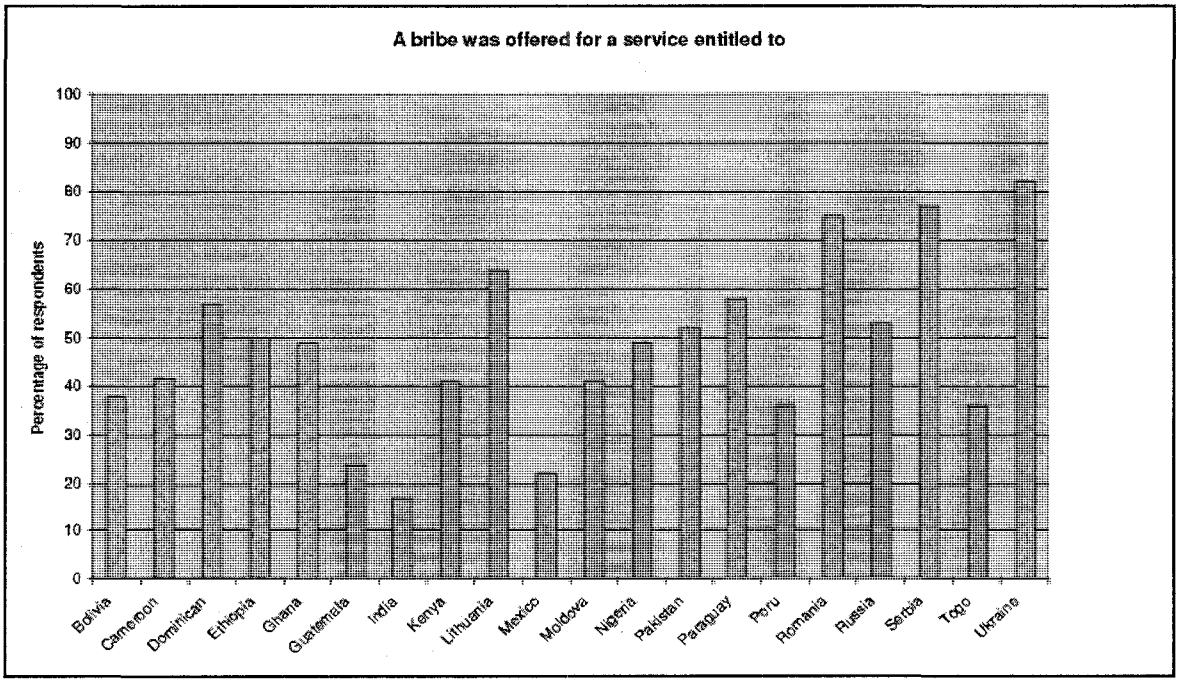
[3] Figures 1.1, 1.2, and 1.3 cover a limited number of countries (20) due to data limitations under that investigation in the 2005 GCB.

Figure 1.2: The demand side of bribery



Source: Transparency International Global Corruption Barometer 2005

Figure 1.3: Bribes for public services



Source: Transparency International Global Corruption Barometer 2005

Also, bribe-paying was reported most in poorer countries in the 2006 GCB, signifying that the burden of corruption falls hardest on those who can least afford it. In these countries, the misuse of public funds causes the greatest reductions in the money available for safe water, schools, and health care. The risks to lives are real, and those who can make a difference must act. Yet so far, in too many places in the world, government action to stop corruption has been judged ineffective.

The awareness of the dramatic effects of corruption on a country's development has been reflected in the strategies of multinational organizations and their policymakers to attenuate these effects and to minimize the existing corruption level. Examples include the 1997 World Bank Anti-Corruption Strategy, the OECD Convention on Bribery of Foreign Public Officials in International Business in 1997, and the United Nations Anti-Corruption Treaty in 2003.

However, corruption needs to be understood in the socio-political and economic context of a country and as it relates to the evaluation of a number of a social ills.

1.2 An Overview of the Study

One of the most important problems in empirical studies on corruption is the unavailability of high quality data both across countries and – more severely – over time. A number of studies have recently pointed out the possible determinants of corruption and what makes its prevalence so different among countries. However, the underlying causes of corruption remain poorly understood and widely debated. One reason is that previous studies employed rather small samples. Moreover, some economic aspects of

the corruption issue remain unexamined, and some possible determinants and effects of corruption have so far received scant attention.

The goal of my study is to find the true determinants of corruption, and an explanation of why corruption levels are so different around the world. I use cross-sectional and panel data analysis to estimate static and dynamic models of corruption, using two different corruption measures (the corruption perception index and the control of corruption measure) to check the robustness of the results. I combine a large number of data sets, and the determinants of corruption in my regressions are classified into three sets of explanatory variables: economic, political, and sociocultural.

Some of the interesting results in this study are that the rule of law is the most important determinant of corruption level, a better quality of law enforcement is associated with lower corruption, and higher per capita income is also correlated with lower corruption. Moreover, higher proportion of population that is rural is correlated with higher perceived corruption. In addition, lagged corruption impacts current level of corruption in that bureaucrats' choice to be corrupt or honest is affected by the past incidence of corruption. Therefore, this work adds the rule of law, the proportion of the population that is rural, and lagged corruption to the list of corruption determinants that was revealed by past research.

Another interesting finding is that a higher proportion of seats held by women in the national parliament lowers perceived corruption. Furthermore, larger countries seem to have higher perceived corruption. On the other hand, political stability, regulatory quality, ethnic fractionalization, and natural resource abundance do not impact corruption in my analysis. Therefore, while most of the previous research had suggested that ethnic

fractionalization, natural resource abundance, and political stability are important determinants of corruption, my work reveals that they are unimportant.

1.3 The Organization of the Study

The outline of my empirical study is as follows. *Chapter Two* defines corruption and discusses corruption measures. *Chapter Three* reviews the literature. In *Chapter Four*, I describe the data and their sources, and set the empirical strategy to examine the possible determinants of corruption by using cross-sectional and panel data analysis to estimate static and dynamic econometric models of corruption. The results of the cross-sectional, panel, and dynamic panel regressions are described in *Chapter Five*. *Chapter Six* then concludes and discusses the policy recommendations and implications of the results.

CHAPTER TWO

DEFINING AND MEASURING CORRUPTION

2.1 Defining Corruption

A clear definition of corruption is essential before a discussion on corruption takes place. It is crucial that one should be clear what he/she is talking about before making academic arguments. After a clear definition has been set, the actions of individuals and institutions can be judged as corrupt or incorrupt since a precise standard can be applied.

Yet, corruption has been defined in many different ways. Nye (1967) defines corruption as the "behavior which deviates from the formal duties of a public rule because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private-regarding influence."

Alam (1989) defines corruption based on the relationship between principals and their agents: "the sacrifice of the principal's interest for the agent's interest" or "the violation of norms defining the agent's behavior."

Cameron, Chaudhuri, Erkal, and Gangadharan (2005) define corruption as "a situation where two people can act to increase their own payoff at the expense of a third person, the victim, assuming that the transaction that takes place between the two people

is illegal. So, the victim is allowed to punish them, but punishment is costly to the victim."

Kaufmann and Vicente (2005) in their paper present a micro-founded definition of corruption: it is viewed as "a collusive agreement between a part of the agents of the economy who, as a consequence, are able to swap (over time) in terms of positions of power (i.e. are able to capture, together, the allocation process of the economy)."

On the other hand, the most popular definition is the one used by the World Bank and the International Monetary Fund (IMF): "the abuse of public office for private gains."

Additionally, according to Senior (2006), "corruption occurs when a corruptor (1) covertly gives (2) a favor to a corruptee or to a nominee to influence (3) action(s) that (4) benefit the corruptor or a nominee, and for which the corruptee has (5) authority." Therefore, Senior defines corruption as a composition of the above five conditions that must all be satisfied simultaneously.[4] However, the expression "corruption occurs when *a corruptor* covertly *gives* a favor to a corruptee or to a nominee *to influence* actions ..." could be misleading, in my opinion. It limits corruption to the physical giving of a tangible favor from the corruptor to the corruptee. If this condition is absent, the act is not corrupt. In other words, when an officer abuses his/her office power and gives undeserved advantage, for no instant return, to an applicant who has some power or clout, the officer is just doing this, say, for nepotism, prejudice, or possible future return.

[4] Senior claims that his definition is a basis for discussion in further academic papers and by those concerned in the legislature, the judiciary, and in management at all levels in any form of institutions who wish to confront corruption and take action against it. He also argues that his definition is independent of time, the country or the jurisdiction in which actions occur, and of both laws and customs in the jurisdictions or institutions concerned. In my opinion, I think that the corruption definition should consider all these factors to some extent.

According to Senior's definition, this act from the officer's side is not counted as corruption.[5]

In a similar vein, Senior argues that the favor must be a "positive good or service such as money or a free holiday." Again, the expression "positive good or service" gives the impression that the benefits a corruptee gets by engaging in corrupt acts must be physical and tangible. However, these benefits could be intangible as well, in my view. Thus, I disagree with Senior in this regard, and I think that the favor to a corruptee could also be non-positive, or what we can call with caution "passive benefits." For example, suppose the corruptor is an officer in another sector where the corruptee has some interest and had submitted an application and must wait for a couple days to get a response. But the corruptor now is offering a speeding up of the processing of the corruptee's application, which will delay the processing of others' applications and will violate the rules and norms in this sector, say. In this scenario, there's a mutual benefit from the corrupt act, though intangible.

Moreover, some of the above definitions (for instance, Nye's and Alam's) have a major weakness in restricting corruption to the abuse of *public* power for private ends. It is evident that corruption can and does occur within the private and non-governmental sector as well. Senior (2006) gives an example that demonstrates this weakness: when a parent pays an admissions tutor a covert bribe in return for admission of their son or daughter to a university, this act is possibly corrupt whether the institution concerned is

[5] We can avoid this flaw by focusing in the definition on the mutual agreement (offer and acceptance, explicit or implicit) between the corruptor and the corruptee (or any of their intermediaries). Also, it does not matter who starts the corrupt act, although it may matter from the legal point of view since this distinction can have some consequences such as the amount of punishment for each actor.

fully private, fully government-owned or controlled, or some mixture of private and government-controlled, which is not reflected in some of these definitions.[6]

In conclusion, it is an impossible task to come up with a clear and universally accepted definition of corruption, especially due to differences in cultures, norms, and laws. However, a good definition of corruption should have certain elements, in my view, such as including the demand and supply sides of corruption, and consistency with the norms, cultures, and laws in different societies.[7] Corruption could be defined as an act done with the intention of giving some advantage which is inconsistent with official duty and the rights of others. It includes bribery, though it is more comprehensive since the advantage to be derived from it could not be offered by another.

Yet, I adopt the World Bank and IMF definition of corruption in this paper for the sake of compatibility with available data, since I am using data on corruption from the World Bank and Transparency International (which applies the same World Bank and IMF definition).

2.2 Forms of Corruption

Johnson and Sharma (2004) offer a list of forms that corruption can take, which encompass more than bribery:

- Bribery and graft (extortion and kickbacks)
- Kleptocracy (stealing and privatizing public funds)

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[6] Moreover, Senior (2006) validly argues that Alam's definition would be equally applicable to an agent who just went to sleep during the afternoons, sacrificing his principal's interests and violating norms that define the agent's behavior. Yet, no one would describe laziness of this sort as corruption.

[7] However, this will raise the problem of measuring corruption and making comparisons among different societies and countries. Nevertheless, we could have a broad global definition of corruption, for the sake of cross-sectional comparisons, and some local definitions. In this case, the researcher should take this distinction between global and local definitions into account when interpreting the empirical results.

- Misappropriation (forgery, embezzlement, misuse of public funds)
- Non-performance of duties (cronyism)
- Influence-peddling (favor-brokering and conflict of interest)
- Acceptance of improper gifts (speed money)
- Protecting maladministration (cover-ups, perjury)
- Abuse of power (intimidation and torture)
- Manipulation of regulations (bias and election rigging)
- Electoral malpractice (vote buying and election rigging)
- Rent-seeking (public officials who illegally charge for services after creating an artificial shortage)
- Clientelism and patronage (politicians giving material favors in exchange for citizen support)
- Illegal campaign contributions (giving unregulated gifts to influence policies and regulations)

Heidenheimer (1989) classifies corruption in the following three categories:

- ***Black Corruption*;** which indicates that a particular action is one that a majority consensus of both elite and mass opinion would condemn and would want to see punished on the grounds of principle.
- ***Grey Corruption;*** which signifies that some elements, usually elites, may want to see the action punished, but others do not, and the majority may well be ambiguous.

- ***White Corruption;*** which reveals that the majority of both elite and mass opinion probably would not heartily support an attempt to punish a form of corruption that they regard as tolerable.

2.3 Measuring Corruption

Corruption is a secret activity by its nature. It takes place away from the glare of publicity and is difficult to measure empirically. Nevertheless, several measures have been attempted.

2.3.1 Ways of Measuring Corruption

Corruption is being measured in three broad ways (Kaufmann, Kray, and Mastruzzi, 2006):

A. By gathering the informed views of relevant stakeholders, with surveys of firms, public officials, and individuals, as well as views of outside observers in non-governmental organizations, multilateral donors, and the private sector. These data sources can be used individually, or in aggregate measures that combine information from many such sources. Several of these measures are available, and many of them cover large sets of countries, often over time for several years. These are the only available data sources that currently permit large-scale cross-country comparisons and monitoring of corruption over time.

B. By tracking countries' institutional features, which provide information on opportunities and/or incentives for corruption. Possibilities include procurement practices and budget transparency. These can provide useful indications of the possibility of corruption, but do not measure actual corruption. Moreover, these

efforts as yet have relatively limited country coverage, especially among developing countries, and so far have almost no time dimension.

C. By careful audits of specific projects, either purely financial audits or more detailed comparisons of spending with the physical output of projects. Such audits can provide information about malfeasance in specific projects, but not about country-wide corruption in general. These tend to be one-time and restricted to specific projects and countries, and they are not suited for cross-country comparisons or for monitoring over time. Yet, they are valuable to learn about the specifically audited project.

Kaufmann, Kray, and Mastruzzi (2006) suggest that responses about corruption based on individuals' actual experiences are the best available and sometimes the only information we have, since corruption typically leaves no paper trail. The survey questions about corruption have become progressively more specific, focused, and quantitative. However, all efforts to measure corruption using any kind of data involve an irreducible element of uncertainty, and no measure of corruption can be 100% reliable in the sense of giving precise measures of corruption.

2.3.2 Survey-Based Measures of Corruption

Since the early 1980's, a number of organizations have published various cross-country data sets of measures of corruption, derived from survey questionnaires sent to networks of correspondents around the world. Therefore, prior to the late 1980s, the lack

of reliable data on corruption meant that little was known about the true effects of corruption, and there were no quantitative studies about its true determinants.

The most recent survey-based measures of "corruption perception" are:

2.3.2.1 Business International (BI) Index[8]

The BI Index scores countries from one to ten according to the degree to which business transactions involve corruption or questionable payments. The index is based on surveys that experts/consultants (typically one consultant per country) conducted during 1980-1983 by Business International (now a subsidiary of the Economist Intelligence Unit of Economist Magazine) and covers 68 countries.

2.3.2.2 International Country Risk Guide (ICRG) Index[9]

The ICRG corruption index has been produced annually since 1982 by Political Risk Services, a private international investment risk service. The index is based on the opinion of experts. It intends to capture the extent to which high government officials are likely to demand special payments, and the extent to which illegal payments are generally accepted throughout lower levels of the government in the form of bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans.

2.3.2.3 Global Competitiveness Report (GCR)[10]

The GCR is a business publication produced in Switzerland by the World Economic Forum (WEF), a Europe-based consortium, and designed by the Harvard Institute for International Development (HIID). The index was originally based on a

[8] See Center for International Development (CID) at Harvard University, accessed online at http://www.cid.harvard.edu/cidinthenews/articles/SST7499.htm

[9] See CID, http://www.cid.harvard.edu/cidinthenews/articles/SST7499.htm

[10] See CID, http://www.cid.harvard.edu/cidinthenews/articles/SST7499.htm, and World Economic Forum (WEFORUM), http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm

survey in 1996 of firm managers, unlike the BI and ICRG indices which are based on experts or consultants. This survey asked business executives in the responding firms about various aspects of national competitiveness in the host countries where they invest. Approximately 3,000 firms in 53 countries answered the question on corruption which asked the respondent to rate the level of corruption on a one-to-seven scale according to the extent of irregular and additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection, or loan applications. The GCR corruption index for a particular country is the average of all respondents' ratings for that country.[11]

2.3.2.4 Business Environment and Enterprise Performance Survey (BEEPS)[12]

The first round of the survey (BEEPS I) was conducted in 1999-2000, with over 4000 firms in 22 transition countries,[13] which examined a wide range of interactions between firms and the state based on face-to-face interviews with firm managers and owners. The survey was sponsored by the World Bank and the European Bank for Reconstruction and Development (EBRD). BEEBS is designed to generate comparative measurements in such areas as corruption, state capture, lobbying, and the quality of the

[11] Moreover, according to the 2006-2007 GCR, Switzerland, Finland, and Sweden are the world's most competitive economies. Denmark, Singapore, the United States, Japan, Germany, the Netherlands, and the United Kingdom complete the top ten of the list, but the United States shows the most pronounced drop, falling from first to sixth. The rankings are drawn from a combination of publicly available data and the results of the Executive Opinion Survey, a comprehensive annual survey conducted by the World Economic Forum, together with its network of Partner Institutes (research institutes and business organizations) in the countries covered by the Report. In this GCR, over 11,000 business leaders were polled in a record 125 economies worldwide. Besides, there is the Global Competitiveness Index (GCI), which was first presented in the Global Competitiveness Report 2004-2005 as a tool to assess competitiveness of nations, developed for the World Economic Forum by Professor Xavier Sala-i-Martin of Columbia University. The GCI is based on over 90 variables, of which two thirds come from the Executive Opinion Survey, and one third comes from publicly available sources. The variables are organized into nine pillars, with each pillar representing an area considered as an important determinant of competitiveness (institutions, infrastructure, macro economy, health and primary education, higher education and training, market efficiency, technological readiness, business sophistication, and innovation).

[12] For more information, see http://info.worldbank.org/governance/beeps/

[13] These are the countries of Eastern Europe, the former Soviet Union, and Turkey.

business environment. The second round of the survey (BEEPS II) was conducted in 2002, with over 6000 firms in 27 countries.

2.3.2.5 The Control of Corruption Measure (CC)[14]

The Control of Corruption index from the World Bank Governance Indicators Database measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. The aggregate Worldwide Governance Indicators (WGI) measure six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. All scores lie between -2.5 and 2.5,[15] with higher scores corresponding to better outcomes.[16] The aggregate indicators are weighted averages of the underlying individual indicators, and the weights are proportional to the estimates of the precision of each individual estimator (greater weights were assigned to sources that are highly correlated with each other). Additionally, the governance indicators cover 204 countries and territories for 1996, 1998, 2000, 2002, 2003, 2004, and 2005. In the 2005 round of the WGI, the indicators were based on several hundred individual variables measuring perceptions of governance, drawn from 31 separate data sources that were compiled by 25 different organizations, using an observed-components model to

[14] For more details, see Kaufmann, Kraay, Mastruzzi (2006). Also see http://info.worldbank.org/governance/kkz2005/index.htm

[15] The WGI team assumed each indicator has a normal distribution with a mean of zero and a standard deviation of one in each period. In a handful cases, individual country ratings can exceed these boundaries when estimates of governance are particularly high or low. Year-to-year changes in the aggregate estimates convey no information about trends in global averages of governance, though they are informative about changes in individual countries' relative positions over time.

[16] In 1996, the standard error ranged from 0.28 to 0.40. In 2005, the standard error ranged from 0.17 to 0.21. This decline in the margins of error was due to the expansion of the data sources. Yet, the margins of error for aggregate governance indicators remain non-trivial. Additionally, the WGI team argues that the 2005 control of corruption indicator covers 204 countries, and that it is possible to make 20,706 pairwise comparisons of corruption across countries using this measure. For 64% of these comparisons, 90% confidence intervals do not overlap, indicating highly statistically significant differences across countries.

construct the six aggregate WGI in each period.[17] For the most part, all of the data sources are available annually and only the most recent year's data are used,[18] unlike the Transparency International's Corruption Perception Index (CPI).[19] The World Bank WGI team claims that, in the 2005 round of the WGI, they have made minor changes to the scaling of the indicators in earlier years to make the over-time comparisons of the aggregate indicators more robust with respect to year-to-year changes in the composition of the sample of countries included in the indicators and to allow a more timely monitoring of governance worldwide.[20]

Although the aggregate indicators are useful for broad cross-country and over-time comparisons of governance, as the WGI team pointed out, all such comparisons should take appropriate account of the margins of error that are associated with the governance estimates due to the limitations of these measures of governance.

Additionally, Arndt and Oman (2006) and Knack (2006) argue that governance cannot be compared across countries or over time using the WGI since the estimates for governance for different countries or periods may be based on different underlying data sources. Also, the WGI are adjusted to have the same global averages in each period (the aggregate WGI are scaled to have a zero mean and unit standard deviation in each period). For example, for the Control of Corruption indicator, each underlying data

[17] The point estimates of the dimensions of governance as well as the margins of error for each country and period are presented in these indicators. Moreover, the WGI team claims that they fully reported data from virtually all of their underlying individual sources on the Web, in the 2005 round of the WGI.

[18] Except in a few cases where the data are lagged one or two years when current data are not available. For more details, see Kaufmann, Kraay, Mastruzzi (2006), Appendix B.

[19] The 2005 CPI is based on data from 10 sources. The 2005 CC is based on 19 data sources, all of which are for 2005.

[20] 31% of countries experience a significant change, at the 90% confidence level, in at least one of the six dimensions of governance over the period 1996-2005. They also claim that this adjustment has no effect on the relative positions of countries on a particular indicator in a specific year since the scores in a given year and indicators have been adjusted by the same amount.

source measures a somewhat different concept of corruption, and the implicit definition of corruption is different when we compare two countries with different sets of underlying data sources. Moreover, Kurtz and Schrank (2007) argue that the individual indicators underlying the WGI are biased towards the views of business elites, and so are the aggregate indicators. However, Kaufmann, Kraay, and Mastruzzi (February 2007) reject these arguments and claim that it is useful to think about their aggregation method as a way of putting different data sources in common units. For the Control of Corruption, their aggregate indicator extracts the common component of all data sources, which they labeled as overall "Control of Corruption" that has one implicit definition of corruption, which comes from the aggregation of many data sources across many countries. In addition, most of the individual indicators from different sources are quite highly correlated with each other, especially for corruption.[21] They also claim that it is implausible that the interests of businesspeople differ so dramatically from those of other types of respondents.[22]

2.3.2.6 Corruption Perception Index (CPI) by Transparency International (TI)

Transparency International, an international non-governmental organization fighting corruption worldwide, has issued the Corruption Perception Index (CPI) annually since 1995. [23] The CPI provides data on extensive perceptions of corruption

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[21] For the 2005 Control of Corruption, the median correlation (across sources) of 18 underlying data sources with the aggregate indicator was 0.85. Only two data sources were correlated at less than 0.5 (these two are the Latinobarometro survey of countries in Latin America, and Freedom House's Countries and the Crossroads report).

[22] Generally, expert assessments of governance account for 23 out of 31 data sources.

[23] Transparency International (TI) formed an Index Advisory Committee (IAC) in 1996 to offer advice on its global corruption measurement tools. The role of the committee is to provide technical expertise and advice in the development and strengthening of the methodologies used by TI to measure corruption and governance.
Members of the committee are economists, statisticians, and social and political scientists. The latest IAC list of members is as follows:

within countries. It ranks countries on a one to ten scale; a perfect 10.00 would be a totally corruption-free country. The CPI is a composite index that makes use of surveys of businesspeople and assessments by country analysts. This index is based on a weighted average of approximately ten surveys of varying coverage.[24] For example, 16 sources could be included in the 2005 CPI, originating from 10 independent institutions.[25] Therefore, the CPI is an aggregate perception indicator based on single perception indexes computed from surveys of business people, local citizens, and experts' opinions.

All sources employ a homogenous definition of the "extent of corruption", in which this term equally reflects the frequency of bribes and the total value of bribes paid. The definition of corruption generally is "the misuse of public power for private benefit," such as bribing of public officials, kickbacks in public procurement, or embezzlement of public funds. Each of the sources also assesses the "extent" of corruption among public officials and politicians in the countries in question. The 2005 CPI includes data from the following sources:[26]

- Daniel Kaufmann, Director / World Bank Institute, Global Programs, USA
- François Roubaud, Economist / DIAL -Institut de Recherche pour le Developpement, France
- Jocelyn Kuper, Researcher / Research Media, Marketing and Socio-Political Analysis, South Africa
- Julius Court, Effective States Team, DFID, UK
- Mireille Razafindrakoto, Economist / DIAL -Institut de Recherche pour le Developpement, France
- Richard Rose, Director, Centre for the Study of Public Policy, University of Aberdeen, UK
- Shang-Jin Wei, International Monetary Fund, USA
- Steven Finkel, Professor / Hertie School of Governance, Germany
- Susan Rose –Ackerman, Henry R. Luce Professor of Jurisprudence, Yale Law School and Department of Political Science, USA
- Walter Zucchini, Professor / Institut fuer Statistik und Oekonometrie, Georg-August-Universitaet, Germany

➢ *Affiliated members:*

- Emmanuelle Lavellée, Economist / DIAL -Institut de Recherche pour le Developpement, France
- Jeremy Baskin, Cambridge Programme on Industry, Consultant, SRI Solutions, UK
- Johann Graf Lambsdorff, Professor / Lehrstuhl für Volkswirtschaftslehre, Universität Passau, Germany (http://www.transparency.org/policy_research/surveys_indices/cpi)

[24] The actual number of surveys and coverage differ from one year to another.
[25] See Appendix A for a complete list of sources of 2005 CPI.
[26] See Lambsdorff (2005).

1- *CU* (Columbia University), *the State Capacity Survey* by the Center for International Earth Science Information Network (CIESIN) at Columbia University, 2003. CU asks its panel of experts to rate the severity of overall corruption within the state on a scale of low; low/modest; modest; modest/severe; severe.

2- *EIU, the Economist Intelligence Unit*, 2005. EIU asks its panel of experts to assess the incidence of corruption on a scale between 0 (denoting a very low incidence of corruption) and 4 (denoting a very high incidence of corruption).

3- *FH, Freedom House Nations in Transit*, 2005. FH asks its panel of experts to assess the implementation of anticorruption initiatives; the government's freedom from excessive bureaucratic regulations and other controls that increase opportunities for corruption; public perceptions of corruption; the business interest of top policy makers; laws on financial disclosure and conflict of interest; audit and investigative rules of executive and legislative bodies; perceptions for whistleblowers; anticorruption activists and others who report corruption; and the media's coverage of corruption.

4- *II, Information International,* Beirut, Lebanon, 2003. II asks "which are the countries, besides this one, with which you have had the most business experience in the last 3-5 years? Please name up to five countries.

A- In country 1, how common are payments like bribes or additional illegitimate personal payments to senior public officials, like politicians, senior civil servants, and judges to obtain business or other improper advantages?

B- In country 1, how significant an obstacle are the costs associated with such payments for doing business?

C- In country 1, how frequently are public contracts awarded to business associates, friends and relatives rather than on a competitive bidding basis? Continue with countries 2-5. The scale for answers is from 'very common' to 'very uncommon/never', or 'do not know'."

5- *IMD, the International Institute for Management Development,* Lausanne, 2003-2005. IMD surveys elite business people and asks them to assess whether "bribing and corruption prevail or do not prevail in the economy."

6- *MIG, Grey Area Dynamics Ratings* by the *Merchant International Group*, 2005. MIG asks its panel of correspondents to assess the levels of corruptions.[27]

7- *PERC, the Political and Economic Risk Consultancy*, Hong Kong, 2003-2005. PERC asks expatriate businessmen to rate, on a scale from zero to 10, how bad they considered the problem of corruption to be in the country in which they are working as well as in their home country.

8- *UNECA, United Nations Economic Commission for Africa Governance Report*, 2005. UNECA determines the control of corruption as determined by its local expert panel. It includes aspects related to corruption in the legislature, the judiciary, at the executive level, and in tax collection. Access to justice and government services is also included.

9- *WEF, the World Economic Forum*, 2003-2005. The WEF asks: "in your industry, how commonly would you estimate that firms make undocumented extra payments or bribes connected with the following:[28]

- exports and imports
- public utility (e.g. telephones or electricity)

[27] Corruption in their definition ranges from bribery of government ministers to inducements payable to the "humblest clerk."

[28] Answers vary according to the following scale: Common, 1, 2, 3, 4, 5, 6, 7, never occur.

- annual tax payments
- public contracts
- loan applications
- influencing laws and policies, regulations, or decrees to favor selected business interests
- getting favorable judicial decisions." From these questions, the sample average response has been determined.

10- *WMRC, the World Markets Research Center*, 2005. WMRC provides an assessment of the likelihood of encountering corrupt officials. Corruption can range from petty bureaucratic corruption, such as paying bribes to low-level officials, to grand political corruption, such as paying large kick-backs in return for awarding contracts. Scores take the following values: 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5.[29]

It's worth mentioning that a source must provide a ranking of nations to be included in the CPI sources. For example, if a source conducts surveys in a variety of countries but with varying methodologies, the condition is not met because comparison from one country to another is infeasible in this case. Moreover, the sources must measure the overall extent of corruption. This condition is not met if aspects of corruption are mixed with issues other than corruption such as political instability or

[29] These values have the following meaning:
1: The country will have an excellent business environment and corruption will be virtually unknown.
2: This country will have a good and transparent business environment. Corruption – official and otherwise – may occur occasionally, but most businesses will not encounter it.
3: This country will have some significant operational obstacles, including corruption. At the same time, official corruption may be common and it should not affect business in an overly restrictive manner.
4: This country is a poor business environment. Corruption is likely to be endemic in the business environment and it will be common for kick-backs or bribes to be demanded in return for awarding contracts.
5: This country will have severe operational obstacles, which in practice make business impossible. Corruption will be persistent and will reach the highest level of government.

nationalism or if measures are changes instead of the levels of corruption. Additionally, comparisons to the CPI for different years should be based on a country's score and not its rank since a country's rank can change simply because new countries enter the index and others drop out. A higher score suggests that respondents provided better ratings, whereas a lower score suggests that respondents revised their perceptions downward. Nevertheless, year-to-year changes in a country's score could result from a changing sample and methodology, as well as from a changing perception of a country's performance. Old sources drop out of a recent CPI index and new sources enter, which disturbs the consistency of the assessment.[30] On the other hand, there is high correlation between different sources as shown by the standard Pearson correlation and Kendall's rank correlation, suggesting that the sources do not differ considerably in their assessment of the levels of corruption.[31]

Since each source uses its own scaling system, the data should be standardized before each country's mean value can be determined. This is done by using matching percentiles; the percentile rank of countries – not the score – is the only information processed from each source. Another standardization is done in a second step by beta-

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[30] To the extent that changes can be traced to a change in assessments provided by individual sources, trends can be identified. For example:

- Countries whose 2005 CPI decreased by at least 0.3 relative to the 2004 CPI, where this drop is not a result of technical factors, are Barbados, Belarus, Costa Rica, Gabon, Nepal, Papua New Guinea, Russia, Seychelles, Sri Lanka, Suriname, Trinidad and Tobago, and Uruguay. Improvements of at least 0.3 can be observed for Argentina, Austria, Bolivia, Estonia, France, Guatemala, Honduras, Hong Kong, Japan, Jordan, Kazakhstan, Lebanon, Moldova, Nigeria, Qatar, Slovakia, South Korea, Taiwan, Turkey, Ukraine, and Yemen.
- Countries whose 2006 CPI decreased by at least 0.3 relative to the 2005 CPI, where this drop is not a result of technical factors, are Brazil, Cuba, Israel, Jordan, Laos, Seychelles, Trinidad and Tobago, Tunisia, and USA. Improvements of at least 0.3 can be observed for Algeria, Czech Republic, India, Japan, Latvia, Lebanon, Mauritius, Paraguay, Slovenia, Turkey, Turkmenistan, and Uruguay.

[31] The standard Pearson correlation and Kendall's rank correlation are, on average, 0.87 and 0.72 respectively, averaged over different pairs of sources.

transformation, a monotonic transformation to increase the standard deviation to the previous year's value, while preserving the range from 0 to 10.

On the other side, critics point out that the CPI is imprecise since its components often do not measure the same thing. The components themselves are often imprecise, and the accuracy of the CPI will depend on the accuracies of the components in a particular year.[32] In the same way, the type of data used to create the CPI varies from one year to the next, and comparing the CPI ranking of countries from one year to the next demands care. In addition, the CPI relies primarily on the perceptions of a handful of country experts. These perceptions are distorted by a variety of factors, including media coverage, culture, and personal experience/interests. Similarly, Razafindrakoto and Roubaud (2005) argue that experts systematically overestimate the level of corruption suffered by the citizens.[33]

2.3.2.7 Other Corruption Measurements by Transparency International

In recent years, TI has developed other corruption measurement tools to complement the CPI. These measurements are as follows.

A. The Bribe Payers' Index (BPI)

The BPI assesses the supply side of corruption, the propensity of firms from industrialized countries to bribe abroad, and ranks corruption by source country and

[32] However, averaging over several numbers improvers the accuracy.

[33] In their study, the authors coordinated two types of surveys on the same subject, the petty bureaucratic corruption experienced by the population in their interactions with government officials, in eight sub-Saharan African countries (Benin, Burkina Faso, Cote d'Ivoire, Madagascar, Mali, Niger, Senegal, and Togo). Their study does not address large-scale corruption. The first type of survey covering a sample of over 35,000 people takes an objective measure of the frequency of petty bureaucratic corruption and its characteristics. The second type (the mirror survey) reports on 350 experts' opinions on the same matter. They also found that experts who contribute to the CPI overestimated four or fivefold the extent to which households in some francophone African countries experienced corruption, compared to survey of households evidence.

industry sector. This index was compiled in 1999 (covering 19 countries), 2002 (covering 21 countries),[34] and 2006 (covering 30 countries).[35]

The value of the BPI is reduced by its limited coverage and the uncertain reliability of the sources.

B. The Global Corruption Barometer (GCB)

The *GCB* is a public opinion survey that assesses the general public's perception and experience of corruption from around the world.[36] The GCB has been issued for the following years:

- 2003; carried out in 47 countries among 40,700 people roughly[37]
- 2004; carried out in 64 countries among 50,000 people
- 2005; carried out in 69 countries among 55,000 people
- 2006; carried out in 62 countries among 59,600 people roughly[38]

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[34] The 2002 BPI is based on surveys conducted in 15 emerging market economies by Gallup International Association (GIA). It was conducted in: Argentina, Brazil, Colombia, Hungary, India, Indonesia, Mexico, Morocco, Nigeria, the Philippines, Poland, Russia, South Africa, South Korea, and Thailand, which are among the largest countries involved in trade and investment with multinational firms. The questions relate to the propensity of companies from 21 leading exporting countries to pay bribes to senior public officials in the surveyed emerging market countries. Companies from Australia, Sweden, and Switzerland were ranked in the top of the index (meaning the least bribe payers). Companies from Taiwan, China, and Russia were ranked among the worst. Moreover, among the business sectors, it is more likely that officials in fishery, light manufacturing, and agriculture in the respondent's country of residence would demand or accept bribes. Additionally, public works/construction and arms and defense are the two business sectors where the biggest bribes are likely to be paid in the respondent's country of residence. The countries ranking highest in use of other unfair means (other than bribery, such as diplomatic or political pressure, financial pressure, and commercial and pricing issues, etc.) to gain unfair advantage in international trade and investment were the USA, France, the United Kingdom, and Japan. Australia, Austria, Hong Kong, and Sweden ranked lowest in this regard.

[35] In the 2006 BPI, companies from the wealthiest countries generally rank in the top half of the index, but still routinely pay bribes, particularly in developing economies (in the 2006 BPI, Switzerland, Sweden, and Australia ranked in the top of the index) . Companies from emerging export powers rank among the worst (in the 2006 BPI, India, China, and Russia ranked among the worst).

[36] Information about the public perception and experience of corruption is vital to anti-corruption efforts. Also, people's perceptions are an indicator of the success of anti-corruption policies and initiatives, and establishing which public agencies have the highest level of corruption helps set priorities for reform. See GCB Report (2006).

[37] Respondents included 19,448 males (47.6%) and 21,390 females (52.4%). A large percentage of respondents were aged 30-50 years (42.9%), had some education (71.3%), were receiving a low income (41.9%), and lived in urban communities (66.4%). Close to half of the respondents (47.4%) were employed at the time the survey was conducted.

For example, the 2006 GCB reflects the findings of a survey of 59,661 people in 62 low-, middle-, and high-income countries. The survey was carried out on behalf of TI by Gallup International, as part of its Voice of the People Survey, between July and September 2006. According to the 2006 GCB, bribes are most commonly paid around the world to the police, and these are substantially more frequent than to other services, as Figure 2.1 shows.[39] Figure 2.2 reveals that the extent of the problem of police bribery varies enormously among regional groupings;[40] police are most commonly bribed in Africa and Latin America.[41]

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[38] The 2007 GCB will come out in December, 2007.

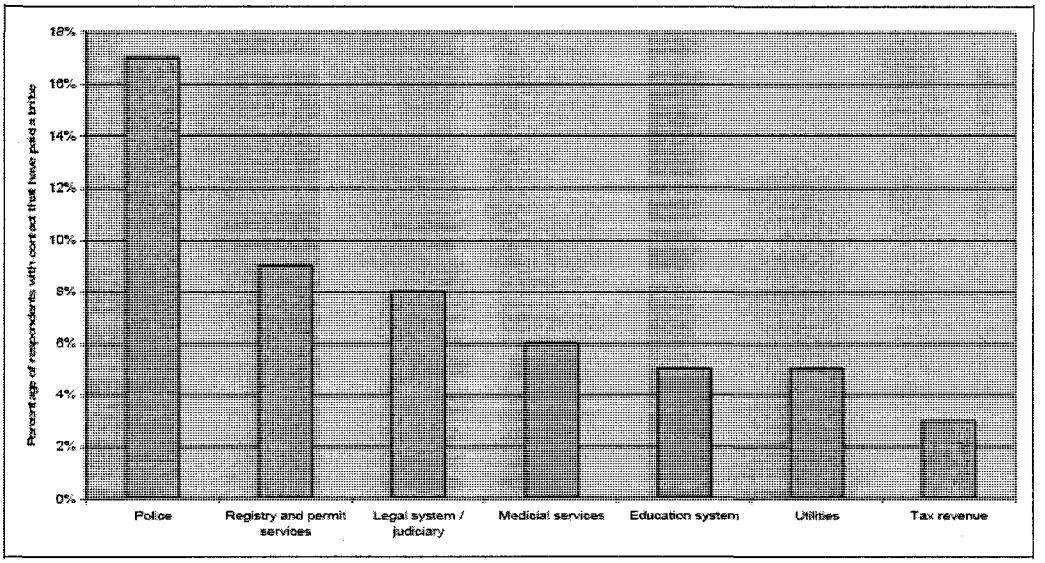
[39] The 2006 GCB asks respondents whether they or anyone in their household has had contact during the past 12 months with seven familiar public sector agencies, including the police, health services, education, and so forth, and whether they have had to pay bribes in their dealings with them. However, perceptions of the levels of corruption in institutions and sectors were affected by income, with the poor holding the most negative views. Moreover, age followed a clear pattern; those under 30 viewed all sectors as either just as corrupt as did those aged 30-50, or as more corrupt than those aged 30-50 viewed them. The belief that corruption was extreme in all sectors fell for those aged 51-65, and was lowest of all among those older than 65 years of age. Furthermore, 14% of respondents less than 30 years of age indicated they had bribed in the past 12 months, versus 4% of those over the age of 65.

[40] The groupings used in this report are:

- *EU and other Western European Countries (EU+)*: Austria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom
- *South East Europe*: Albania, Bulgaria, Croatia, Kosovo, Macedonia, Romania, Serbia, and Turkey
- *Newly Independent States (NIS)*: Moldova, Russia, and Ukraine
- *Africa*: Cameroon, Congo-Brazzaville, Gabon, Kenya, Morocco, Nigeria, Senegal, and South Africa
- *Latin America*: Argentina, Bolivia, Chile, Colombia, Dominican Republic, Mexico, Panama, Paraguay, Peru, and Venezuela
- *Asia – Pacific*: Fiji, Hong Kong, India, Indonesia, Japan, Korea (South), Malaysia, Pakistan, the Philippines, Singapore, Taiwan, and Thailand
- *North America*: Canada and the United States.

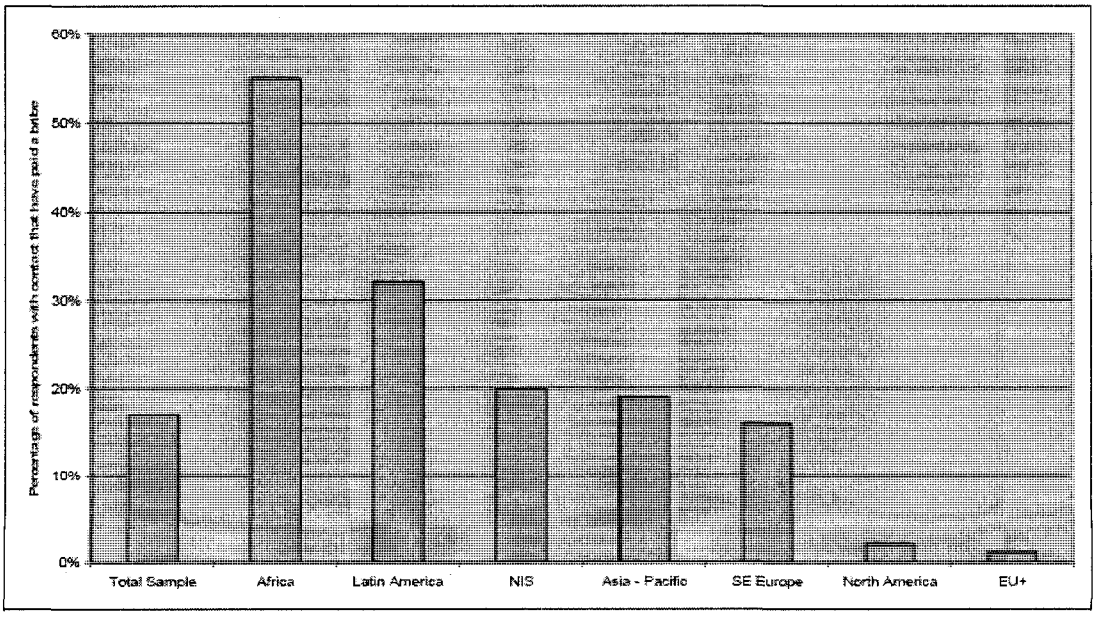
[41] In the EU+ and North America, political parties were viewed as the most corrupt, followed by business in EU+ and parliament & legislature in North America.

Figure 2.1: Worldwide bribery in 2006: respondents who have had contact and paid a bribe, by sector (%)



Source: Transparency International Global Corruption Barometer 2006

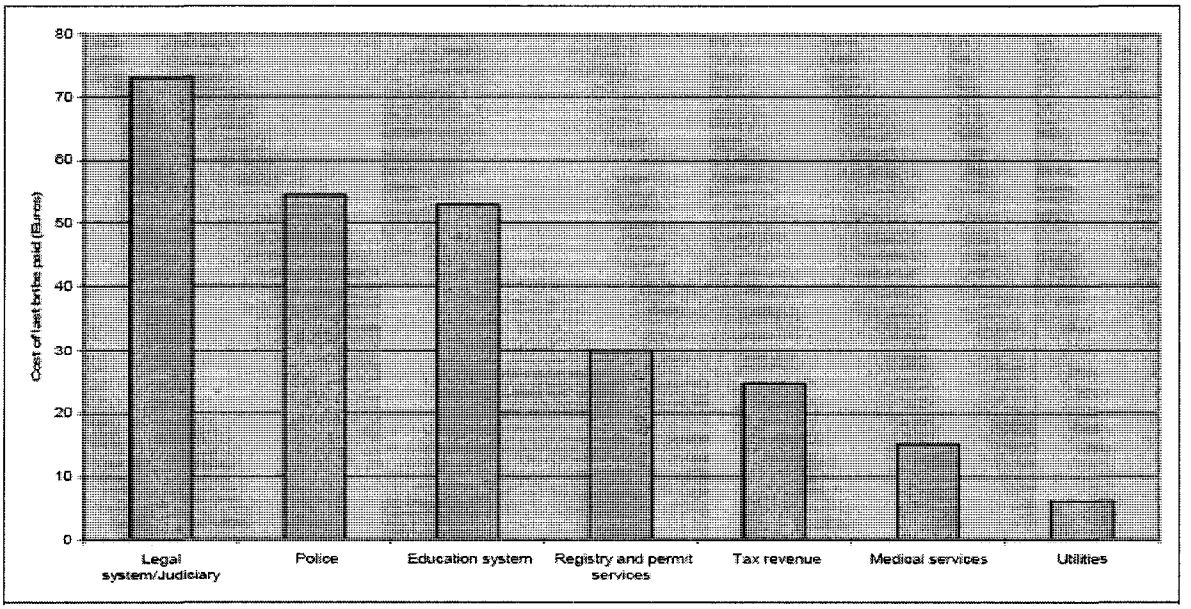
Figure 2.2: Police bribery in 2006: Percentage of Respondents with contact who have paid a bribe to the police, by regional grouping (%)



Source: Transparency International Global Corruption Barometer 2006

Furthermore, bribery for access to services is most common in Africa. Within Africa, the largest bribes are paid to legal system and judiciary, followed by the police and education system, as shown by Figure 2.3.[42] On the other hand, within Latin America, the largest bribes were paid for medical services, and bribes paid to the legal system and judiciary were the second largest, as shown by Figure 2.4.

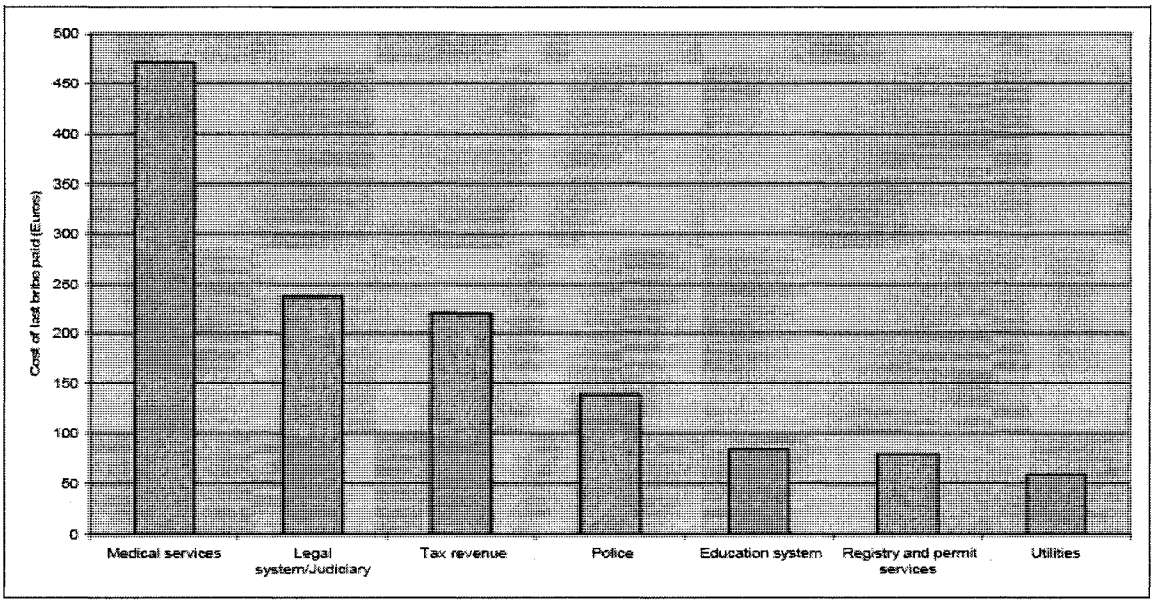
Figure 2.3: The average cost of the last bribe paid (€) in Africa in 2006



Source: Transparency International Global Corruption Barometer 2006

[42] More than half of the respondents in Africa who have had contact with the police in the past 12 months paid a bribe. In Latin America, approximately one in three respondents who have had contact with the police paid a bribe. Only a very small proportion of respondents from North America and the European Union and other Western European (EU+) regional groupings have paid a bribe to the police.

Figure 2.4: The average cost of the last bribe paid (€) in Latin America in 2006



Source: Transparency International Global Corruption Barometer 2006

What is more, political life is viewed as being most affected by corruption, followed closely by the business environment, in the 2006 GCB.[43] On the other side, corruption is reported as affecting family life very little in Eastern Europe and the Newly Independent States, but a great deal in Africa and South East Europe (70% of respondents in Africa and 59% in South East Europe think that their family lives are affected to a moderate or large extent).[44] In addition, 43.7% of the respondents in the 2003 GCB

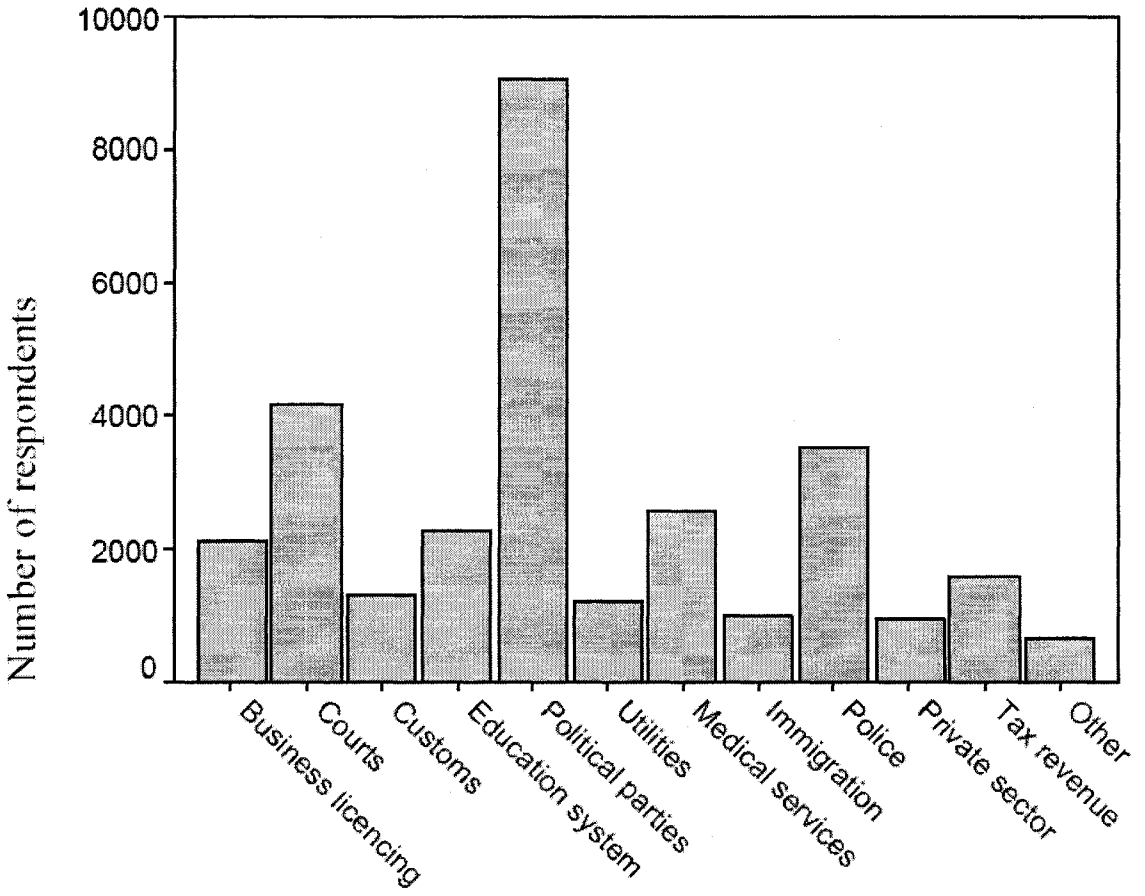
[43] Perceived corruption in political life in the United States has increased in the last two GCB (2005 and 2006).

[44] In the 2004 GCB, those who were under the age of 30 responded that they viewed corruption's impact on personal, political, and business life as more harmful than those who were over the age of 65. Young people also had the deepest pessimism about the future, with half indicating that they believed corruption would increase in the coming three years, but just over one in three of those older than 65 held the same perspective.

believed that corruption was very significant in affecting the culture and values in the society.

Interestingly, respondents' first choice for eliminating corruption from an institution, in the 2003 GCB, would be political parties (29.7%) followed by courts (13.7%), and the police (11.5%), as Figure 2.5 shows.[45]

Figure 2.5: Respondents' first choice for eliminating corruption from an institution

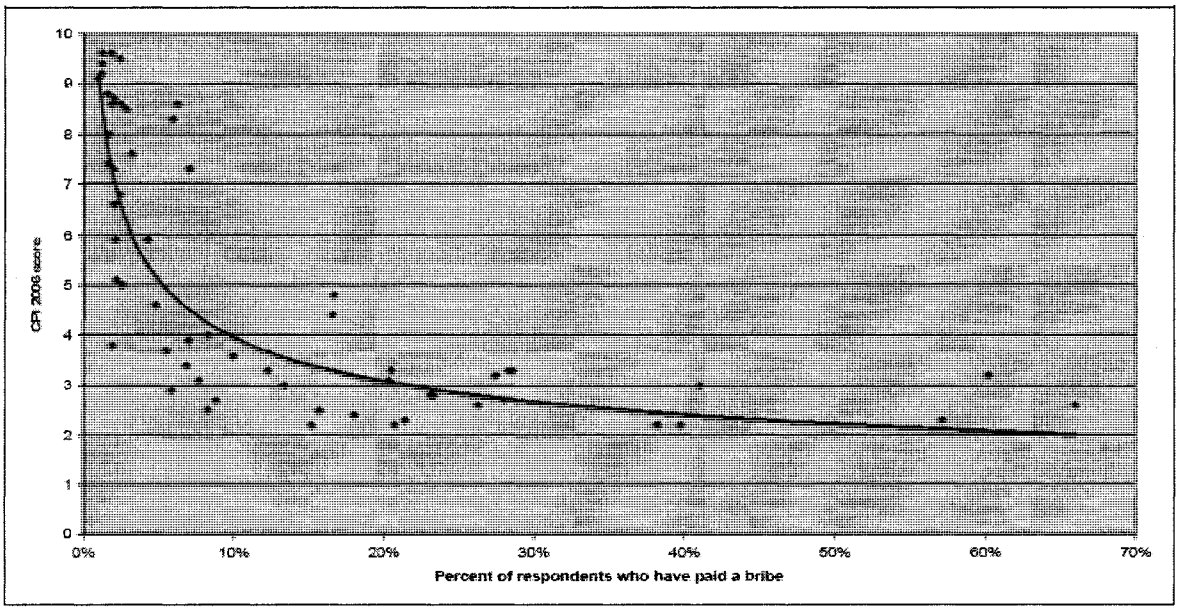


Source: Transparency International Global Corruption Barometer 2003

[45] The question asked was "if you had a magic wand and you could eliminate corruption from one of the following institutions: business licensing, courts, customs, education system, political parties, utilities (telephone, etc), medical services, immigration and passports, police, private sector, tax revenue, and other, what would your first choice be?".

To relate the public's experience of bribery to experts' perception of corruption, the CPI, which measures experts' perception of public sector and political corruption, can be compared –to some extent– with the findings of the GCB. For instance, the correlation between scores on the 2006 CPI and the number of bribes paid in the countries polled in the 2006 GCB is 0.63 (Figure 2.6).

Figure 2.6: Comparing expert perceptions of corruption (2006 CPI) with experience of bribery



Source: Transparency International Global Corruption Barometer 2006

2.3.3 Evaluating Corruption Measurements

The lack of a widely agreed upon definition of what counts as corruption is an obstacle to measuring it. Likewise, it is virtually impossible to come up with precise objective measures of corruption since corruption is clandestine. However, tracking perceptions about corruption can be a useful way of measuring it and monitoring the success of governments' anti-corruption strategies.

The above indices reflect people's self-reported perception rather than objective measures. Yet, this perception can be different from reality and from one source to another. However, Wei (1997b) argues that the pairwise correlations among the indices are high, despite the different sources of the surveys. For example, the correlation between the BI and TI indices and that between BI and GCR indices are 0.88 and 0.77 respectively. These high correlations suggest that statistical inference on the causes and consequences of corruption is not very responsive to the choice of corruption index.

On the other hand, Dilyan et al. (2007) provide evidence from the International Crime Victimization Survey that reported corruption perception may be weak predictor of actual corruption experience, and they suggest that corruption perception indices measure corruption perception and there is little compelling evidence that they measure corruption experience. Corruption experience might require more objective measures of corruption. They also argue that the respondent assessment could be attitudinal if the respondent did not have any personal experience with corruption. These attitudes may also be affected by individual characteristics. For instance, a more educated respondent living in an urban area might be more knowledgeable about politics and the operation of the bureaucracy, and might be more critical of certain behaviors. It is also likely that he/she might have heard of more concrete examples of corruption from personal contact or the media, and this might cause him/her to report higher corruption perception. Generally, specific, well-publicized events might have a large impact on the respondents' perception of corruption. In addition, someone who benefits from a corrupt climate, such as an entrepreneur with political ties, may be reluctant to label or view corrupt acts as corruption. Attitudes will also be influenced by country characteristics, which include the

norms of behavior of political leaders or officials, and the political culture in general. Therefore, corruption perception can be different than corruption experience, and thus in order to understand the causes and determinants of actual corruption and to test theories about actual corruption, better measures of actual corruption might be needed. Corruption perception indices might have to be regarded as measuring corruption perception, but not necessarily corruption experience, but this is no way diminishes their importance or usefulness. In their opinion, many studies using corruption perception indices might be usefully rethought as telling us something about the determinants and implications of corruption perceptions, and political trust more generally.

In a similar vein, Olken (2007) examines the empirical relationship between beliefs about corruption and a more objective measure of it in the context of a road-building program in rural Indonesia.[46] He suggests that perceptions data should be used for empirical research on the determinants of corruption with considerable caution, and that there is little alternative to continuing to collect more objective measures of corruption, difficult though that may be.[47]

The bottom line is that one should undertake a careful analysis of the validity of corruption indicators. In addition, there is need for further collection and analysis of quantitative and qualitative survey information from firms and households to help in

[46] To construct an objective measure of corruption, Olken assembled a team of engineers and surveyors who dug core samples in each road, after the roads built by the project were completed to estimate the quantity of materials used, surveyed local suppliers to estimate prices, and interviewed villagers to determine the wages paid on the project. He constructed an independent estimate of the amount each road actually cost to build from these data. Then, he compared this estimate to what the villagers reported was spent on the project on a line-item by line-item basis. The objective measure of corruption in this case is formed from the difference between what the villagers claimed the road cost to build and what the engineers estimated it actually cost to build, which he called "missing expenditures". He also conducted a household survey to obtain data on villagers' beliefs about corruption. In this survey, villagers were asked their beliefs about the likelihood of corruption in the road project.

[47] Furthermore, Olken argued that villagers from more ethnically heterogeneous villages are less likely to report trusting their fellow villagers, and more likely to attend project monitoring meetings than those in homogenous villages.

improving our understanding of how corruption impacts different social groups in various countries, which will also contribute to more effective design and implementation of anti-corruption strategies. Furthermore, those measuring corruption should make efforts both to minimize measurement error and to be transparent about the error that inevitably remains. On the other hand, imprecision does not mean that indicators are unreliable. Rather, explicit margins of error allow users to be clear about the conclusions that can and cannot be made with confidence based on a particular measure.

2.3.4 Corruption Measurement in this Paper

In this study, I use the Corruption Perception Index (CPI) by Transparency International as the measure of corruption. I will also check my findings by replacing the CPI with the Control of Corruption (CC) index from the World Bank Governance Indicators Database as an alternative measure of corruption.

In this analysis, I take the CPI data as given and assume that they are based on a representative sample of carefully collected, truthful responses to the questions being asked. I ignore the potential bias or measurement error in the data collection procedures. However, I should be careful when interpreting the collected data and the empirical results they yield.

CHAPTER THREE

THE BACKGROUND LITERATURE

Corruption has attracted a great deal of attention in recent years due to its adverse effects on economic development and other aspects of a society. Many anti-corruption efforts have recently tried to address attitudes toward corruption and raise awareness about its costs for a country's economic and political development, convincing the pubic that corruption is an extremely damaging pattern of interaction for a society as a whole and that the collective damage over time will outweigh any possible short-term personal benefits. Yet, corruption and anti-corruption efforts are also an old phenomenon. For example, in Ancient Egypt, the pharaohs searched for ways to reduce corruption of their scribes (tax collectors) who were paid high salaries in order to reduce the incentives to enrich themselves by cheating. Additionally, scribes working in the field were controlled by a group of special scribes from the head office (Torgler and Valev, 2006). On the other hand, to provide guidance for fighting corruption, some empirical research on the determinants and effects of corruption has been done recently.

3.1 The Effects of Corruption

The empirical results on the effects of corruption are relatively few and controversial. This seems to be because the characteristics of corruption are context specific.

3.1.1 The Positive View of Corruption

Leff (1964) and Huntington (1968) argue that corruption might raise the rate of economic growth due to the fact that in economies plagued by bureaucratic holdups, bribery may let firms get things done and would enable individuals to avoid the obstacle of bureaucratic procedures that cause hindrance. They also claim that a system based on bribery will lead to an efficient process for allocating licenses and government contracts, and that happens because the most efficient firms will be able to afford to pay the highest bribes. In addition, government employees who get a chance to charge bribes would work harder especially when bribes act as a piece rate.

Moreover, Lui (1985) suggests that bribes may form part of a Nash equilibrium strategy in a non-cooperative game, where inefficiency in public administration is reduced by the minimization of waiting costs. In a similar context, Acemoglou and Verdier (1998) suggest that some degree of corruption may be part of an optimal allocation in the presence of incomplete contracts since public officials, though corrupt, can help in the enforcement of property rights. A related idea is expressed in Acemoglou and Verdier (2000) that corruption may generally be the necessary price to pay for correcting market failures. Furthermore, Barreto (2001) finds a significantly positive direct relationship between growth of GDP per capita and corruption.

3.1.2 The Negative View of Corruption

On the other side, Myrdal (1968) argues that corrupt officials may actually cause administrative delays, instead of speeding up, in order to attract more bribes. Kaufmann and Wei (1998) provide some indirect evidence in line with Myrdal's argument. Moreover, Blackburn, Bose, and Haque (2002) argue that the distortions that bribes are

intended to alleviate should be treated as endogenous to the bureaucratic process since they are frequently the result of corrupt practices to begin with.

Shleifer and Vishny (1993) show how corruption might affect economic welfare. Additionally, Murphy, Shleifer, and Vishny (1991) argue that in situations where rent seeking provides more lucrative opportunities than productive work does, the more talented and highly educated individuals will be more likely to engage in rent seeking than in productive work which leads to adverse consequences for their country's growth rate.

There is some discussion in the literature on whether the negative effect of corruption on growth works through private investment or through reduced public investment. Mauro (1995) argues that corruption affects growth primarily through the mechanism of a change in private investment. If the corruption index, drawn from Business International, improved by one standard deviation (2.38), this is estimated to increase investment by as much as 5 percent of GDP and to cause the annual per capita GDP growth rate to rise by half a percentage point. In their systematic study of the effects of corruption on a government's public finance, Tanzi and Davoodi (1997) claim that corruption actually increases public investment, particularly investment in unproductive projects. It also skews public expenditure allocations toward operations and maintenance, and away from needed health and education since these types of expenditures are not as easy for officials to extract rents from. This kind of distortion results in lowering the productivity of the public capital stock. In a similar vein, Wei (1999, 2000a, 2000b) claims that corruption acts like a tax deterring Foreign Direct Investment. Furthermore,

Hakkala, Norback, and Svaleryd (2005) argue that corruption has a negative effect on the probability that a foreign firm will invest in a country.

On the other side, Pellegrini and Gerlagh (2004) claim that there is no significant relationship between corruption and GDP growth, though corruption impacts economic growth indirectly through the negative effects on investment, schooling, trade policies, and political stability.

Recent research has also shown that corruption lowers the quality of public infrastructure, biases state expenditures toward military expenditures, and lowers expenditures on education and health care. In a continuation to his analysis, Mauro (1997) shows that corruption distorts the composition of public expenditure, and corrupt governments may tend to spend relatively less on education since there is limited opportunity to collect bribes from this type of spending.

It is of particular relevance to developing countries that corruption might also reduce the effectiveness of aid flows through the diversion of funds. Many donor countries have focused increasingly on issues of good governance, and in some cases some donors have scaled back their assistance where governance is judged to be very poor. Moreover, when corruption takes the form of tax evasion or the improper use of discretionary tax exemptions, it may bring about loss of tax revenue which might affect the level of public expenditure and might lead to adverse budgetary consequences. What is more, the allocation of public procurement contracts through a corrupt system may lead to lower quality of public infrastructure and services. Mauro (1996) gives an example of that phenomenon– as corrupt bureaucrats could allow the use of cheap materials in the construction of buildings or bridges that would subsequently collapse.

Depken, LaFountain, and Butters (2006) measure the impact of public corruption on a country's creditworthiness, its willingness and ability to repay its sovereign debts. They find that public corruption reduces creditworthiness as measured by sovereign credit ratings. Their estimates indicate that a one-standard-deviation increase in corruption causes credit ratings to fall by almost a full rating category on average. Moreover, a one-standard-deviation decrease in corruption can save a country about $10,100 annually per $1,000,000 of debt.

In addition, according to Al-Marhubi (2000), corrupt countries experience significantly higher inflation rates. Huang and Wei (2003) claim that monetary regimes – pegged exchange rate, currency board, or dollarization – may not be good means to increase the credibility of a government's resolve to maintain low inflation and can fail in countries where underlying corruption is serious. Bahmani-Oskooee and Nasir (2002) argue that more corruption significantly depreciates real exchange rates. Furthermore, Lambsdorff (1998) shows that exporters from less corrupt countries face disadvantages in import countries with a high corruption level. Additionally, Welsch (2004) analyzes the influence of corruption on environmental characteristics and finds a significantly positive impact on ambient pollution.

3.1.3 The Mainstream View of the Effects of Corruption

It is now generally accepted that efficiency-improving and growth-promoting corruption is the exception, rather than the rule.

However, results from the above studies may overestimate the impact of corruption on the dependent variables since the existing empirical analysis is mainly based on cross-sectional approaches, and it does not control for unobserved country-

specific characteristics that do not vary over time. Moreover, Islam (2004) points out that the unobserved fixed effects and high multicollinearity among explanatory variables are likely to bias the estimation of the impact of corruption on growth of per capita GDP. What is more, many of these studies employ small samples.

3.2 Curbing Corruption

Recently, many anti-corruption efforts have attempted to fight and curb corruption by raising awareness about its costs and addressing attitudes toward corruption.

Besley and McLaren (1993) analyze the view that corruption is best combated by using efficiency wages. According to their argument, there are two reasons why higher wages might improve performance in the collection of taxes. The first reason concerns the incentives of tax inspectors to evade (take bribes). The second concerns the quality (honesty) of those who are employed and has been analyzed by Weiss (1980) among others. Their results suggest that the efficiency wage strategy may not be a good idea much of the time, even for a relatively high level of corruption. For the efficiency wage to make sense, one needs an equitably distributed tax burden, a corrupt group of possible collectors, and strong monitoring. Without these conditions, the government may be better off paying a wage at which nobody behaves honestly, relying on the monitoring of tax inspectors as a way of raising revenues.

Lindauer et al. (1988) argue that cutting the size of civil services across Africa in order to allow for wage hikes might actually deliver better public services. Moreover, sharp increases in Indonesian civil service wages to combat corruption and other

problems have been proposed by the 1970 Commission of Four on corruption and by the Asian Development Bank (Palmier, 1983).

Huther and Shah (2000) claim that successful anti-corruption programs are those which address the underlying governance failures, resulting in lower opportunities for gain and greater likelihood of sanctions, and thus anti-corruption programs have to be targeted to a country's existing quality of governance.

3.3 Determinants of Corruption

A number of recent studies have investigated the determinants of corruption, as the recent availability of corruption measures has helped to quantify the extent of corruption and has allowed international comparisons.

Tanzi (1998) divides the causes of corruption into: (A) factors contributing directly to corruption, such as regulations and authorizations, taxation, and spending decisions, and (B) indirect causes of corruption such as quality of bureaucracy, the level of public sector wages, transparency of rules, laws, and processes, and institutional controls.

Government wages. Moreover, Tanzi (1998) and Lindbeck (1998) suggest that wages paid to civil servants are important in determining the degree of corruption. Lindbeck (1998) ascribes the low level of corruption in Sweden in 20th century to the fact that high-level administrators earned 12-15 times the salary of an average industrial worker at the turn of this century. There has been some speculation in the economic literature that high wages may reduce the number of corrupt acts. On the other hand, it might be the case that high wages lead to demands for higher bribes from those who continue to be corrupt.

Therefore, although the number of corrupt acts is reduced, the total amount of money paid due to corruption may not necessarily decrease since high wages do not remove the greed on the part of some officials, although they increase the opportunity cost of losing one's job (Tanzi, 1998).

Per capita income and openness to foreign trade. Treisman (2000) argues that rich countries are usually rated as having less corruption than poor countries to the extent that 50 to 73 percent of the variation in corruption indices is explained by variations in per capita income levels. He also suggests that openness to foreign trade seemingly reduces corruption, although the size of the effect is small. It may require a radical opening rather than a marginal shift to make an obvious difference to a country's level of perceived corruption. Moreover, his regressions find no clear evidence that higher government wages reduce government corruption, though this might be because of the endogeneity problem and the small sample size as he pointed out.

Stage of development. In a similar context, Myrdal (1968) and Huntington (1968) suggest that in the early stages of developmental changes in the social and economic system, there will be greater incentives and opportunities for corruption. They expect an inverted U relationship between corruption and economic development; corruption increases in the early stage of growth and then decreases with economic development.

Country size. Several authors (Fisman and Gatti, 2000; Treisman, 1999) claim to provide evidence that governmental corruption is less severe in small than in large countries. Knack and Azfar (2000) demonstrate that this relationship is an artifact of sample selection. Most available corruption indicators provide ratings only for those countries in which multinational investors have the most interest. These indicators tend to

include almost all large nations, but among small nations only those that are well governed. They argue that when using either a new corruption indicator with largely increased sample size or an alternative corruption indicator that covers all World Bank borrowers without regard to country size, the relationship between corruption and country size disappears. They also show that the relationship between corruption and trade intensity –a variable strongly related to population– disappears using samples less subject to selection bias.

Imports relative to GDP. Ades and Di Tella (1999) used proxy for imports/GDP to find that higher imports are associated with lower corruption, as reflected in the Business International (BI) ratings and in ratings from the Global Competitiveness Report (GCR). Similarly, Treisman (2000) finds that the imports/GDP ratio is associated with better ratings on the BI index and on the 1996 and 1997 CPI. In addition, Wei (2000) argues that natural openness leads to better governance. On the other hand, Knack and Azfar (2000) confirm that imports/GDP is unrelated to corruption in samples less subject to selection bias. Besides, Bliss and Di Tella (1997) analyze the relationship between competition and corruption to conclude that they cannot say that increases in competition lead to a lower level of corruption. Their results show that everything in their model depends on the structure of uncertainty about costs that corrupt officials face.

Income inequality. Gupta et al. (1998) find a statistically significant positive correlation between corruption and income inequality. However, this correlation could stem from reverse causation as more corruption leads to greater income inequality. Moreover, they confirm that there is a statistically significant positive correlation between corruption and poverty; high poverty rates can cause high corruption.

Natural resource endowment. Leite and Weidmann (1999) argue that natural resource abundance is an important determinant of a country's level of corruption since it creates opportunities for rent-seeking behavior.[48] They suggest that the extent of corruption depends on natural resource abundance, government polices, and the concentration of bureaucratic power.

Free press. Freille et al. (2005) test the relationship between aggregate press freedom and corruption, by performing a modified extreme bounds analysis for a 10-year panel, and their results supported the theoretical view that restrictions in press freedom lead to higher corruption level.

Capital account restrictions. Dreher and Siemers (2005), in a theoretical model, show a mutual relationship between corruption and capital account restrictions. They argue that capital account restrictions induce higher corruption, and, in turn, higher corruption is associated with more restrictions on capital account. They test their model by using panel data for 112 countries over the period 1984-2002. However, their empirical relationship was not completely robust.

Religion. Some recent empirical studies (La Porta et al., 1997, 1999, and Treisman, 2000) claim that different religions may impact corruption due to the kinds of relations between state and church and differences in the faithful's respect for social hierarchies which may lead to different levels of tolerance for the government's abuse of public power.

Gender differences. In a different vein, Swamy et al. (1999) investigate the differential incidence of corruption by gender. Their within-country data from Georgia show that

[48] In the framework of their analytical model, natural resource discoveries were interpreted as technology shocks.

when women comprise a larger share of the labor force and where women hold a larger share of parliamentary seats, corruption is less severe. They also argue that micro data from the World Values Surveys and an Enterprise Survey in Georgia show that women are less involved in bribery and are less likely to condone bribe-taking.[49] Conversely, Shaw (2005) argues that women in Ukraine tend to have a higher propensity to bribe to enter an educational institution and to bribe on exams, which contradicts the literature suggesting that women are less corrupt than men. He gathered data from 1588 students attending educational institutions throughout Ukraine and also finds that students in Ukraine with fathers in agriculture have a higher probability of bribing on exams and for credit, compared to students with fathers in the private or entrepreneurial sector, although Cabelkova and Hanousek (2004) find that business people have a higher willingness to give a bribe in Ukraine because they are likely to benefit from corruption.

Political institutions. Lederman et al. (2005) use a cross-country panel to confirm the role of political institutions in determining the prevalence of corruption, arguing that democracies, parliamentary systems, political stability, and freedom of press are all associated with lower corruption. Moreover, they find that common results in the previous empirical literature that related to openness and legal tradition do not hold once political variables are taken into account.

Social and cultural norms. Furthermore, Fisman and Miguel (2006) develop a natural experiment to construct a revealed preference measure of official corruption. The natural experiment arises from the stationing in New York City of thousands of diplomats

[49] The authors claimed that the gender differential they are observing in the results from Georgia may be the difference between average men and exceptional women since only those women who are exceptionally capable or honest may become owners or managers of firms when employers discriminate against women, and thus we are in the better part of women's distribution. However, the authors asserted that the gender-based differences in corrupt acts exist and that corruption levels could be reduced, at least at the margin, by increasing women's participation in public life.

(government officials from 146 countries around the world) in a setting of zero legal enforcement of parking violations due to diplomatic immunity.[50] They claim that their measure of corruption is correlated with the existing measure of home country corruption, suggesting that cultural and social norms related to corruption are ingrained, and factors other than legal enforcement are important determinants of corruption.[51] In my view, the main concern about this experiment is whether parking violations should be considered as corruption. Although the authors state on page 1 that "this act of illegality fits well in a standard definition of corruption, the abuse of entrusted power for private gain", I do not believe that all illegal acts should be considered corruption, and parking violations do not fit any of the corruption definitions discussed in Chapter One. I do agree that diplomats' behavior reflects their underlying propensity to break rules when enforcement is not a consideration. Diplomats' behavior could also be interpreted as a sign for differential legal enforcement level across countries. Yet, the majority does not view parking violations as corruption, unless they are accompanied by other corrupt acts such as bribing the ticket writer to avoid a parking citation. Therefore, diplomats' behavior in this situation is not an indication of their home country's cultural tolerance

[50] Consular personnel and their families benefit from diplomatic immunity, a privilege which allowed them to avoid paying parking fines prior to November 2002. However, in October 2002, there was a crucial change in legal enforcement with the implementation of the Clinton-Schumer Amendment, named after the two senators from the state of New York, proposed by the Bloomberg administration to deal with the diplomatic parking problem. This law gave the city permission to tow diplomatic vehicles and revoke their official U.N. parking permits, and have 110% of the total amount due deducted from U.S. government aid to the offending diplomats' countries of origin. Diplomatic parking violations fell substantially after this reform.

[51] Between November 1997 and the end of 2002 in New York, diplomats accumulated over 150,000 unpaid parking tickets, resulting in outstanding fines of more than $18 million. The ten worst parking violators, and accordingly the ten most corrupt countries according to the authors' corruption measure, are Kuwait, Egypt, Chad, Sudan, Bulgaria, Mozambique, Albania, Angola, Senegal, and Pakistan. The ten lowest parking violators, and accordingly the ten least corrupt countries according to their measure, are Turkey, Sweden, Panama, Oman, Norway, Latvia, Japan, Jamaica, Israel, and Ireland (some of these countries have high rates of parking violations but do pay the fines). However, this rank is not consistent with the rank from Transparency International (the CPI) or the World Bank Control of Corruption Indicator (the CC), which contradicts their claim.

for corruption, and the authors' approach, based on rule-breaking in parking, is not a revealed-preference measure of corruption for government officials, in my view. The results of their experiment should be reinterpreted in terms of the importance of cultural norms concerning legal enforcement, but not corruption.[52]

Global sensitivity analysis. Serra (2006) tests the robustness of previous empirical evidence on the determinants of corruption by implementing a global sensitivity analysis based on the Edward E. Leamer (1985) Extreme-Bounds Analysis (EBA).[53] In her study, Serra concludes that only five variables are robustly correlated with corruption. These variables are as follows:

- Economic development; richer countries tend to have less corruption than poorer ones.
- Political instability; countries with more political instability tend to be more corrupt.
- Uninterrupted democracy; when democratic institutions have been continuously held for decades, they exert a certain control on corruption.
- Colonial heritage; countries which are former colonies tend to have more corruption.
- Protestant religion; Protestant countries seem to be less corrupt according to this study.[54]

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[52] Although I agree that culture can be a contributor to corruption, that cannot be inferred clearly from this experiment.

[53] An explanatory variable is "robust", according to the EBA, only if its estimated coefficient remains statistically significant and maintains the same sign in all the regressions run with different sets of control factors. For more information see Serra (2006) and Leamer (1985).

[54] In Serra's study, different religions have substantially diverse effects on corruption. The EBA was applied to a proxy for the Catholic religion, measured as the percentage of the population belonging to the Roman Catholic religion in 1980 in 62 countries, and to a proxy for the Protestant religion, measured as the percentage of the population of each of the 62 countries belonging to the Protestant religion in 1980.

However, Serra's study does not consider the endogeneity and multicollinearity problems among the explanatory variables, and the fact that the EBA does not allow claiming the irrelevance of the totality of the explanatory variables which did not pass the sensitivity test. The EBA does not provide support to any causal links between the dependent and explanatory variables, even if the correlation is robust. Therefore, even if an explanatory variable passes the test, it cannot be considered as a robust determinant of corruption unless there are no doubts about the causality of the correlation identified by the EBA.

Comprehensive analysis. Senior (2006) tests fourteen independent variables for statistical significance as possible causes of corruption.[55] He finds that more informal markets lead to greater corruption, less respect for property rights results in more corruption, more regulation makes possible greater corruption, less press freedom causes more corruption, and less personal honesty brings about greater corruption. However, in the first test of Senior's regression model, there are only 27 observations covering 27 countries and fourteen independent variables, which means that the limited number of degrees of freedom is problem.

Senior also finds that, in his second test, higher government intervention leads to lower corruption, which is a counterintuitive result. However, the independent variables in his model are highly correlated, and this multicollinearity problem is not addressed in his work. In his third test, Senior uses only four independent variables, and he finds that more church attendance gives rise to higher corruption and that higher religiosity in the

[55] These independent variables are:

- Non-Economic Variables: religiosity, personal honesty, free press, and personal freedom.
- Ten Economic Freedoms: trade policy, fiscal burden of government, government intervention in the economy, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, regulation, and informal markets. See Senior (2006), pp. 129-158, for more details.

form of attendance at worship once or more per week is associated with more corruption, which is intuitively unexpected.[56] However, with relevant variables omitted, the problem of model specification bias will be likely in his model, with the result that the coefficients of the variables retained in his model are biased as well as inconsistent, and the error variance is incorrectly estimated. In this case, the usual hypothesis-testing procedures become invalid. Senior includes only one independent variable in his fourth and fifth tests, – personal honesty in the fourth, and GDP per person in the fifth – resulting in severe specification bias.

Resource windfalls. Interestingly, Leeson and Sobel (2007) claim that geography may play an important role in determining corruption in America; states that experience more frequent and severe natural disasters attract larger quantities of Federal Emergency Management Agency (FEMA) disaster relief which creates a resource windfall that increases public corruption.[57] This may explain why some states like Louisiana and Mississippi have long and notorious histories of corruption, while others such as

[56] Senior obtains data on religiosity from a Survey of World Values by the University of Michigan (1991 and 1997), which includes a table of the percentage of the adult populations that attends their place of worship at least once a week. However, it is not a good measure, in my view, since attending the place of worship once a week has different perceptions and implications in different religions. For example, in Islam, most people attend the mosque every Friday and but are not considered highly religious at all. This is due to the fact that in Islam there are five prayers a day, and religious people could be considered to be those attending mosque at least once a day.

[57] Disaster relief windfalls open up new opportunities for bribery of private vendors charged with administering post-disaster supplies via illegal side payments, say. For instance, after the flooding in Buchanan County in Virginia in 2002, county officials went on a frenzy of bribe solicitation for reconstruction contracts that ended in 16 indictments for public corruption. Moreover, Congress has approved $113 billion in disaster relief for Hurricanes Katrina and Rita since September 2005. A study by the Government Accountability Office (2006) estimates that citizens fraudulently appropriated $1 billion of the $ 5.4 billion in FEMA expedited assistance after Hurricanes Katrina and Rita (around 19%). According to a recent Senate investigation, federal prosecutors have charged nearly 300 individuals with abusing FEMA relief since August 2005, many of whom are public employees accused of soliciting bribes from relief-funded contractors. Due to the extensive post-Katrina public corruption, the FBI has set up a "Public Corruption and Government Fraud" hotline to help monitor FEMA relief-related political corruption. For more details, see Leeson and Sobel (2007).

Nebraska and Colorado do not.[58] Thus, according to their argument, a large part of the reason that why Louisiana and Mississippi have historically been more corrupt than states in the Great Plains is the disadvantageous location on the Gulf Coast where hurricanes and other bad weather are commonplace. In addition, they find that every additional $100 per capita in FEMA relief increases the average state's corruption by more than 40%.[59]

Additional evidence across U.S. states. In addition, Glaeser and Saks (2004) use data on corruption convictions across U.S. states and find that, even when corruption is defined on the basis of convictions rather than opinion surveys, many of the basic patterns that hold for countries hold for states as well.[60] States with higher per capita income and more education are generally less corrupt, while states with more ethnic heterogeneity and income inequality are more corrupt. In addition, they found little relationship between the

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[58] Leeson and Sobel use panel data covering the U.S. states from 1990 to 1999. Their corruption data are collected from the Department of Justice's "Report to Congress on the Activities and Operations of the Public Integrity Section". They divide annual related crime convictions in each state by the state's population in that year to derive the annual corruption-related crime convictions per 100,000 residents for each state in each year over their period. In their corruption measure, Louisiana, Mississippi, Florida, North Dakota, and Illinois are among the most corrupt states. Nebraska, Colorado, Utah, and Arizona are among the least corrupt states. Over the same period, 599 natural disasters struck the U.S., and 56 of these occurred in Mississippi, Florida and North Dakota. Only 13 occurred in Utah, Arizona, and Nebraska. In general, the U.S. convicted more than 10,000 public officials of corruption-related crimes between 1990 and 2002 (corruption-related crimes include those such as theft from the government, embezzlement, or other abuse of government resources by a public official; bribery of or by a public official; extortion or other political shakedowns by a public official; kickback payments to or from a public official; election-related crimes (such as vote fraud or campaign finance violations) by a public official; unlawful insider deals (such as negotiating a contract with a private vendor in whose firm the negotiator or his family has a financial interest) by a public official; and other violations of federal criminal code by public officials in their capacity as agents of the government).

[59] They claim that reducing FEMA disaster relief would measurably reduce corruption. Furthermore, public official compensation is negatively related to corruption, though this relationship was statistically insignificant, and the effectiveness of increasing public official compensation to reduce corruption is doubtful.

[60] Between 1990 and 2002, federal prosecutors convicted more than 10,000 government officials of acts of official corruption, as noted in footnote 58. According to their data, the most corrupt states are Mississippi, Louisiana, North Dakota, Montana, Alaska, Illinois, Florida, South Dakota, New York, Ohio, and Kentucky. The least corrupt states are Nebraska, Oregon, New Hampshire, Utah, Minnesota, Iowa, Wisconsin, Arizona, Arkansas, Kansas, and Colorado.

size of the government and corruption,[61] and little connection between measures of regulation and corruption. They also argue that historical levels of education, including high school graduation rates in 1928 and Congregationalism in 1850,[62] predict less corruption today, while the connection between corruption and current level of economic development is weak.

In conclusion, the underlying causes of corruption remain poorly understood and widely debated. Therefore, understanding better the relative importance of the potential causes of corruption is of central importance for anti-corruption strategies and in reforming public institutions to improve governance. In the next two chapters, the empirical work on the determinants of corruption is aimed at providing guidance on strategies for fighting corruption.

[61] The authors considered four measures of government size: gross state product of state and local government in 1990 relative to total gross state product, the number of state legislators per capita in 1997, state and local expenditures per capita in 1995, and average tax burden in 1994 defined as total state tax revenues as a percent of personal income.

[62] The authors use the share of church members in the state that are Congregationalist in 1890 as an instrument for schooling. Congregationalism was not a dominant religion during this time period, but it was generally associated with elites and their commitment to education.

CHAPTER FOUR

THE DATA AND EMPIRICAL METHODLOGY

4.1 Data Description and Sources

Corruption determinants in my regressions are classified into three sets of explanatory variables: economic, political, and sociocultural.

4.1.1 Economic Variables

The first set of explanatory variables includes economic factors: per capita income, the public sector wage level, natural resource endowment, openness to international trade, the cost of business start-up procedures, government final consumption expenditure, military expenditure, and the level of development.

4.1.1.1 Per Capita Income (GDP)

Data on per capita income, adjusted for purchasing power parity (PPP), comes from the World Bank's World Development Indicators (WDI),[63] and measured in constant prices (2000 international dollars). An international dollar would buy in the cited country a comparable amount of goods and services a US dollar would buy in the United States. This term is often used in conjunction with PPP data.

Based on the literature review in Chapter Three, I expect rich countries to have less perceived corruption than poor countries. A possible argument is that economic development and higher per capita income increase the chance of identifying and

[63] Available at: http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,menuPK:476823~pagePK:64165236~piPK:64165141~theSitePK:469372,00.html

punishing illicit rent appropriations and lower the governments' incentives to behave dishonestly. Thus, economic development, measured by per capita income, is argued to exert a major impact on corruption. Yet, corruption may also slow down economic development and thus the reverse causation and endogeneity problem exists.

4.1.1.2 The Government Wage Level (GW)

Higher wages in the public sector are expected to lower corruption since they can deter corruption by increasing the potential loss in case of detection. Thus, the public-private sector wage differential is expected to have an important impact on corruption level. Hence, the object is to control for the public sector wage relative to the private sector's wage in corruption regressions, which can be achieved by using the estimate from the World Bank that measures the ratio of the average government wage to private sector wage (in which private sector wage corresponds to the weighted average wage for all private sector activities in the economy). However, this measure has only a few observations since it is a very difficult estimate to get for a large sample of countries.

Due to the lack of data on the proposed government wage measure, I use cross-national data on government wages from the World Bank which measures the ratio of average government wage to per capita GDP from 1996 to 2000.[64] This ratio is meant to convey information about the standard of living of an average central government employee in relation to living standards in that country. However, this measure fails to capture the total real income of central government employees to the extent that

[64] Available at: http://sima-ext.worldbank.org/publicsector/
For some missing observations, I use the average of 1991 to 1995 instead, if available at the same source. Moreover, in this sample, the observations for Kenya and Nepal have a value of zero, which does not make sense, and I have removed them from the sample.

intangible benefits (such as housing and trips abroad) are an important part of the total rewards these employees receive.

4.1.1.3 Natural Resource Endowment

I use forest area (FA) as a share of total land area, from the World Bank's WDI, as a proxy for natural resource endowment in cross-sectional estimation. I also construct another proxy for natural resource endowment (NRE), used in panel estimation, which is the sum of net exports of fuel, ores and metals, and food (measured as a percentage of merchandise). Net exports data on fuel, ores and metals, and food are from the World Bank's WDI.

The hypothesis to be tested is that natural resource endowment creates opportunities for rent-seeking behavior, and thus increases corruption.

4.1.1.4 Openness to International Trade (T)

Trade policies and market-unfriendly polices are theoretically related to corruption. Trade restrictions, such as the imposition of tariffs, generate a significant amount of rents and rent-seeking activities by providing public officials higher discretionary power, as suggested by the trade literature (Bhagwati, 1982). When domestic firms have to compete with foreign firms, the rents enjoyed by the domestic firms are reduced, thereby diminishing the incentive for corruption (Ades and di Tella, 1999). Therefore, the hypothesis is that more open economies have less corruption.

According to Sachs and Warner (1995), a country is considered closed if one of the following conditions holds:

1- Average tariffs exceed 40 percent.

2- Non-tariff barriers cover more than 40 percent of trade.

3- It has a socialist economic system.

4- The black market premium on the exchange rate exceeds 20 percent.

5- There is a state monopoly on major exports.

If none of these conditions apply, the country is considered open. I use the sum of exports and imports of goods and services measured as a share of GDP as a proxy for the degree of openness to international trade, which comes from the World Bank's WDI.[65]

4.1.1.5 The Cost of Business Start-up Procedures (CB)

The total cost of business start-up procedures as a share of gross national product (GNP) per capita, from the World Bank's WDI. A higher cost is expected to increase corruption.[66]

4.1.1.6 Government Consumption Expenditure (GCE)

General government final consumption expenditure as a share of GDP, from the World Bank's WDI, is expected to have positive correlation with the incidence of corruption since it creates opportunities for rent-seeking behavior, especially in the absence of accountability of government officials.

4.1.1.7 Military Expenditure (ME)

Military expenditure as a share of central government expenditure, from the World Bank's WDI, is expected to have a positive relationship with the incidence of corruption.

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[65] Serra (2006) uses the same measure as a proxy for openness to international trade. However, the objective is to use a direct measure of trade protectionism rather than trade volumes. For this reason, I tried to use the weighted average tariff rate, including all import charges, calculated by weighting each import category by the fraction of world trade in that category, to measure the degree of openness to international trade, but I encountered a lack-of-data problem (some observations covering a few countries are available from UNCTAD).

[66] The value of the observations on this variable for Denmark, New Zealand, and the USA is zero.

4.1.1.8 Level of Development

A dummy variable that accounts for corruption level differences between low- and middle-income versus high-income countries is included in my estimation.[67] Country classification is taken from the World Bank which is based on 2005 GNP per capita:[68]

- Low income, $905 or less
- Lower middle income, $906-$3595
- Upper middle income, $3596-$11115
- High income, $11116 or more

Low- and middle-income countries are expected to have higher perceived corruption than high-income countries.

4.1.2 Political Variables

The second set of explanatory variables includes political factors: rule of law, political stability, government effectiveness, regulatory quality, voice and accountability, country size, and rural population.

4.1.2.1 Governance Indicators

The aggregate Worldwide Governance Indicators (WGI) from the World Bank Governance Indicators Database constructed by Kaufmann, Kraay, and Mastruzzi (2007),[69] measure six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of

[67] The level of development dummy variable is defined in Sections 4.2.1.2 and 4.2.2.2.
[68] Available at: http://go.worldbank.org/K2CKM78CC0
[69] Also available at: www.govindicators.org

law, and control of corruption.[70] The scores lie between -2.5 and 2.5, with higher scores corresponding to better governance. The aggregate indicators are weighted averages of the underlying individual indicators, and the weights are proportional to the estimates of the precision of each individual estimator where greater weights were assigned to sources that are highly correlated with each other.[71] I include the following governance indicators in my regressions.

4.1.2.1.1 Rule of Law (RL)

The Rule of Law index measures the extent to which agents have confidence in and abide by the rules of society, and reflects in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence.[72] The rule of law index measures perception and thus it is not an objective measure of quality of law and order.

Better law and order increases the probability of identifying and punishing illicit rent appropriations and hence lowers the incentives to behave dishonestly. Therefore the hypothesis is that the rule of law is negatively correlated with corruption incidence.

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[70] For more details about the CC measure (which I use as an alternative measure of corruption level) and the WGI, see Section 2.3.2.5.

[71] The governance indicators cover 212 countries and territories for 1996, 1998, 2000, 2002, 2003, 2004, 2005, and 2006. In the 2006 round of the WGI, the indicators were based on several hundred individual variables measuring perceptions of governance, drawn from 33 separate data sources that were compiled by 30 different organizations, using an observed-components model to construct the six aggregate WGI in each period. For the most part, all of the data sources are available annually and only the most recent year's data are used.

[72] For more details about the concept measured and the components of aggregate governance indicators, see Kaufmann, Kraay, Mastruzzi (2007), Appendix B, and Appendix C for details about sources for governance indicators.

4.1.2.1.2 Political Stability (PS)

The Political Stability and Absence of Violence index measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism.

If there is a high probability that public officials will lose office next period due to political instability, public officials will decide to behave more opportunistically, and incumbents will be more corrupt where high instability lowers the probability of future rent appropriation.[73] Therefore, I expect greater political stability to be associated with lower corruption.[74]

4.1.2.1.3 Government Effectiveness (GE)

The Government Effectiveness index measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such quality. I expect a negative relationship between government effectiveness and the incidence of corruption.

4.1.2.1.4 Regulatory Quality (RQ)

The Regulatory Quality index measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. A negative correlation between regulatory quality and the incidence of corruption is expected since better regulatory quality may lead to lower rent-seeking activities.

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[73] The reverse causality also exists since corrupt governments could be the cause of high political instability.

[74] Serra (2006) uses a proxy for political instability which is the average number of governors per year.

4.1.2.1.5 Voice and Accountability (VA)

The Voice and Accountability index measures the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free news media.

When basic political rights are effectively guaranteed to citizens, illicit behavior by public officials can be prevented. Thus, I expect this variable to have a positive impact on corruption ratings and lower perceived corruption.[75]

4.1.2.2 Country Size (P)

The natural logarithm of the total population, from the World Bank's World Development Indicators, is used to denote the country size. Based on the literature review, I expect this variable to have a negative impact on corruption ratings and hence to increase corruption level.

4.1.2.3 Rural Population (RP)

Rural population as a percentage of total population, from the World Bank's WDI, is expected to have a negative correlation with the incidence of corruption.[76] People living in rural area may be less knowledgeable about politics and the operation of bureaucracy and may be less critical of certain behavior. Therefore, higher percentage of the population that is rural may increase the incentive for public officers to behave opportunistically.

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[75] On the other hand, corrupt governors are more likely to limit citizens' control on their power through the instrument of the vote, and therefore reverse causality possibly exists.

[76] The value of the observations on this variable for Hong Kong, Macao, and Singapore is zero.

4.1.3. Sociocultural Variables

The third set of explanatory variables includes the proportion of seats held by women in the national parliament, female labor force, ethnic fractionalization, religion, and legal origin.

4.1.3.1 Gender Differences

The proportion of seats held by women in the national parliament (WP) and the percentage of the labor force that is female (FLF), from the World Bank's WDI, are included to investigate the differential incidence of corruption by gender. I expect a positive effect of these gender variables on corruption rating and hence lower corruption level, based on the discussion in Chapter Three. However, reverse causation may also exist since the more corrupt countries may discriminate more against women, which leads to lower levels of participation by them. Thus corruption could reduce women's share in the labor force, since women's labor supply is more elastic than men's, and high-corruption countries may have fewer working women because women choose not to work in the face of high levels of corruption.[77]

4.1.3.2 Ethnic Fractionalization

The Ethnolinguistic Fractionalization index (ELF), obtained from La Porta et al. (1999),[78] ranges from zero to one and is the average of five different indices of ethnolinguistic fractionalization. These five component indices are:

a. Index of ethnolinguistic fractionalization in 1960, which measures the probability that two randomly selected people from a given country will not belong to the

[77] For more details see Swamy et al. (1999).
[78] The original source is Easterly and Levine (1997).

same ethnolinguistic group. This index is based on the number and size of population groups as distinguished by their ethnic and linguistic status.

b. The probability of two randomly selected individuals speaking different languages.

c. The probability of two randomly selected individuals do not speak the same language.

d. The proportion of the population not speaking the official language.

e. The proportion of the population not speaking the most widely used language.[79]

Alesina et al. (2003) have also constructed a similar measure of ethnic fractionalization (ETH), ranges from zero to one, based on a broader classification of groups and taking into account not only language but also other cleavage such as racial characteristics. I mainly use the ETH measure of ethnic fractionalization in my estimation. I also employ ELF (ethnolinguistic fractionalization index) to check the robustness of the findings on this variable.

Ethnolinguistic fractionalization is expected to be associated with higher corruption. Higher ethnolinguistic fractionalization and the prevalence of strong family ties, together with a lack of national identity and the absence of accountability of government officials, may lead people in positions of power to favor friends, relatives, or same ethnic group, at the cost of lower quality of public service and higher corruption.

4.1.3.3 Membership in Various Religions

Religion, from La Porta et al. (1999), measures the percentage of the population of each country that belonged to the three most widely spread religions in the world in

[79] The sources of the components of the average index are: a. Atlas Narodov Mira (1964), b. Muller (1964), c. Roberts (1962), d. and e. Gunnemark (1991)

1980. The data are available for 1990-1995 for countries of recent formation. The three religions identified here are:

a. Roman Catholic Religion (CR)

b. Protestant Religion (PR)

c. Islam (IR)

The hypothesis is that greater religious membership is negatively associated with corruption incidence since it may lead to lower tolerance for the government's abuse of public power.

4.1.3.4 Origin of the Legal System

The legal origin of each country's Company Law or Commercial Code may have an impact on corruption. There are five possible origins:

a. English Common Law

b. French Civil Law

c. German Civil Law

d. Scandinavian Law

e. Socialist/Communist Law

These legal systems were developed in England, France, Germany, Scandinavia, and the former Soviet Union, but then spread through the world through conquest, colonization, imitation, and voluntary adoption. Socialist/communist law is a manifestation of the state's intention to create institutions to maintain its power and extract resources, with less attention to the economic interests and liberties of its citizens. Thus, the main goal of socialist/communist law is to keep the communist party in power, not to protect property or freedom. Similarly, civil law, developed in Western Europe,

has been largely an instrument for the state to expand its power, in a more constrained way than socialist/communist law, since the time of codification in the 19th century. On the other hand, the development of the English common law tradition, starting in the 17th century, has been shaped by parliament and the aristocracy at the expense of the crown, and has reflected the intention to limit the power of the sovereign.[80]

Generally, legal systems differ in the relative power of the state and private property owners, and consequently in the levels of protection granted to individual citizens against the abuse of power by public officials. Serra (2006) suggests that countries adopting a common-law legal system are less corrupt because they tend to adopt a majoritarian political system. A set of dummies for a country's legal origin (British, French, German, Scandinavian, and Socialist), introduced by La Porta et al. (1999), is included in my regressions, as defined in the next section.

4.2 The Empirical Methodology

To check the robustness of the results to different hypotheses and for the reasons described below under each method, I use three approaches to estimate corruption models and to investigate corruption determinants: cross-section ordinary least squares (OLS) estimation, panel random effects estimation, and dynamic panel generalized method of moments (GMM) estimation.

4.2.1 The Cross-section OLS Estimation

The main econometric model in the cross-sectional analysis is presented in equation (1):

[80] For more details see La Porta et al. (1999).

$$COR_i = X_i\beta + \nu_i \qquad (1)$$

where COR_i is corruption in country i; X_i is the vector of explanatory variables for country i; and ν_i is a standard white noise disturbance term. I estimate model (1) using the simple ordinary least squares (OLS) technique.

4.2.1.1 Estimation Strategy

Since I am combining a large number of data sets, I have different numbers of observations for different variables in the year 2005. Some regressions are estimated for as few as 90 countries, while other regressions are fit to data for as many as 124 countries. I estimate two specifications to deal with the lack of observations for some variables. Therefore, I estimate model (1) in two specifications. I use the CPI as the corruption measure in these specifications, and then I re-run the same regressions using the CC measure to check the robustness of the results to an alternative corruption measure.

I have tested for the presence of heteroskedasticity in the residuals using Breusch-Pagan/Godfrey test, which is a Lagrange multiplier test of the null hypothesis of no heteroskedasticity. The test statistic was significant at the 5% level in every equation (except in equation (2) where the test statistic was insignificant even at the 10% level) and thus we reject the null hypothesis of no heteroskedasticity, concluding that there is

heteroskedasticity in the error variance.[81] Therefore, I choose the robust standard errors option (White) to address heteroskedasticity problem to correct the standard errors.

The set of explanatory variables (X_i) in equation (1) depends on the specification as follows.

4.2.1.2 The First Specification

The first specification is the default specification which estimates equation (1) where

$$X_i = [GDP_i, LOG(P)_i, RP_i, WP_i, FLF_i, RL_i, PS_i, GE_i, RQ_i, VA_i, ETH_i, PR_i, CB, FA, SOC, DEV] \quad (2)$$

where GDP_i denotes income per capita in country i, P_i is total population, RP_i denotes the proportion of population which is rural, WP_i denotes the proportion of seats held by women in the national parliament, FLF_i is the proportion of the labor force which is female, RL_i is the rule of law index, PS_i denotes political stability, GE_i is the government effectiveness, RQ_i is the regulatory quality, VA_i denotes voice and accountability, ETH_i is the ethnic fractionalization, PR_i is the percentage of the population which professes Protestant religion, CB_i denotes the cost of business start-up procedures, FA_i is the forest area as a percentage of total area, SOC is a dummy variable denoting a country's socialist/communist of the legal system origin (= 1 if

[81] For example, in specification (4), the Obs*R-squared = 29.90 and the probability of chi-squared (17) = 0.027 in Breusch-Pagan/Godfrey test.

socialist/communist legal origin, 0 otherwise), and *DEV* is a dummy variable denoting the level of development (= 1 if low-income, 0 otherwise).

4.2.1.3 The Second Specification

The second specification is the unrestricted specification which adds the ratio of average government wage to per capita GDP to the set of explanatory variables. The number of observations drops in this regression because of the lack of observations for this explanatory variable. Therefore, the set of explanatory variables in this specification is defined as follows.

$$X_i = [GDP_i, LOG(P)_i, RP_i, WP_i, FLF_i, RL_i, PS_i, GE_i, RQ_i, VA_i, ETH_i, PR_i, CB, FA, GW_i, SOC, DEV] \quad (3)$$

where GW_i is the ratio of the government wage to per capita GDP in country i.

4.2.2 The Panel Random Effects Estimation

Next, I test the relationship between corruption and the explanatory variables using cross-section of time series data covering the period 1996-2005. The benefits of the panel data approach include the following.

- It allows accounting for heterogeneity by including country- and time-invariant variables.
- It permits the study of the dynamics of adjustment, and allows a rich model specification.[82]

[82] For more details see Baltagi (2005).

- Moreover, one of the rules of thumb to detect multicollinearity is that the pair-wise or zero-order correlation coefficient between two regressors is high (in excess of 0.8, say), which is the case in my cross-section models, then multicollinearity is a problem.[83] In case of high multicollinearity, one is likely to encounter the problem that the OLS estimators have large variances and covariances, although BLUE, meaning that the coefficients cannot be estimated with great precision or accuracy. The panel data approach provides more informative data, more variability, more degrees of freedom and more efficiency, and less collinearity among the variables, and hence it is a good direction to take to remedy multicollinearity.

My panel is unbalanced since observations for some of the variables in some time periods are missing for some countries. One commonly used econometric model in panel analysis, called the one-way error component model since the composite error term consists of two error components, is presented in equation (4).

$$COR_{it} = \alpha + X_{it}\beta + \mu_i + \nu_{it} \qquad (4)$$

where i = 1, 2, ...N (N denotes the number of countries); t = 1, 2, ...T (T denotes the number of time periods); COR_{it} denotes corruption in country i at time t; X_{it} is the

[83] See table 5.2. For example, the correlations of rule of law with the other WGI (political stability, government effectiveness, regulatory quality, and voice and accountability) are 0.77, 0.97, 0.95, and 0.78 respectively. Moreover, the correlation between rule of law and GDP per capita is 0.92. High zero-order correlations are a sufficient but not a necessary condition for the existence of multicollinearity since it can exist even though the zero-order or simple correlations are comparatively low (less than 0.5, say). See Gujarati (2003), and Green (2008).

vector of explanatory variables for country i at time t; μ_i denotes the unobservable, time-invariant, country-specific effect, and it accounts for any country-specific effect that is not included in the regression;[84] and v_{it} denotes the remainder of the disturbance which is the usual disturbance in the regression. The μ_i are assumed random and independent and identically distributed IID (0, σ_μ^2), v_{it} are independent and identically distributed (0, σ_v^2), and the μ_i are independent of the v_{it}. Moreover, the X_{it} are independent of the μ_i and the v_{it} for all i and t.

I ran the specification test proposed by Hausman (1978) which is based on the difference between the fixed and random effects estimators, where a statistically significant difference is interpreted as evidence against the null hypothesis that the random effects estimator is consistent. However, my robust standard errors are not consistent with the assumptions of the Hausman test variance calculation.[85]

The fixed effects modeling is expensive in terms of degrees of freedom since I have a large number of cross-sectional units. Moreover, Judge et al. (1988) made the observation that if N is large and T is small (as is the case in my panel data set), and if the assumptions underlying the Error Component Model (ECM) hold, ECM estimators are more efficient than Fixed Effects Models (FEM) estimators.[86]

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[84] Baltagi (2005), Chapter 2.

[85] My coefficient covariance method is cross-section SUR panel correlated standard error (PCSE), with number of degrees of freedom correction. For Hausman test caveats, see Wooldridge (2001), Chapter 5.

[86] See Judge et al. (1988), pp. 489-491. Moreover, in ECM it is assumed that the intercept of an individual unit is a random drawing from a much larger population with a constant mean value. The individual intercept is then expressed as a deviation from this constant mean value. Therefore, one advantage of the ECM over FEM is that it is economical in degrees of freedom, as we do not need to estimate N cross sectional intercepts. We need only to estimate the mean value of the intercept and its variance. See Gujarati (2003).

Johnston and DiNardo (1997) argue that, in deciding between fixed effects and random effects models, "there is no simple rule to help the researcher navigate past the Scylla of fixed effects and the Charybdis of measurement error and dynamic selection. Although they are an improvement over cross-section data, panel data do not provide a cure-all for all of an econometrician's problems."[87] Additionally, Hsiao and Sun (2000) argue that fixed versus random effects specification is better treated as an issue of model selection rather than hypothesis testing.

4.2.2.1 Estimation Strategy

I estimate equation (4) using a panel cross-section random effects model. The rationale for using the random effects modeling is explained above. I obtained the GLS estimates of the regression coefficients and computed the Wallace and Hussain (1969) variance estimate. The robust coefficient covariance method is cross-section SUR panel correlated standard error (PCSE), with correction for number of degrees of freedom (to perform the calculations without the leading degrees of freedom correction term).

The set of explanatory variables included depends on the specification. I estimate two specifications, using the CPI as the corruption measure, and then the same two using the CC measure to check the robustness of the results to an alternative corruption measure. The set of explanatory variables (X_{it}) in each specification is as follows.

4.2.2.2The First Specification

The first specification is the default specification, which estimates equation (4) where X_{it} is defined as follows.

[87] Johnson and DiNardo (1997), p. 403.

$$X_{it} = [GDP_{it}, LOG(P)_{it}, RP_{it} + RL_{it}, PS_{it}, GE_{it}, RQ_{it}, VA_{it}, ETH_{it}, PR_{it}, CR_{it}, IR_{it}, WP_{it}, FLF_{it}, SOC, DEV] \quad (5)$$

where CR_{it} denotes the percentage of population that are Catholics in country i at time t, IR_{it} denotes the percentage of population that are Muslims, SOC is the socialist/communist legal system origin dummy (= 1 if socialist/communist legal system origin, 0 otherwise), and DEV is the development level dummy (= 1 if low or middle-income, 0 otherwise).

4.2.2.3 The Second Specification

The second specification is the unrestricted specification that adds to the previous set of explanatory variables the ratio of average government wage to per capita GDP; the endowment of natural resources measured as the percentage of net exports of fuel, ores and metals, and food; openness to trade; general government final consumption expenditure; and military expenditure, as shown in equation (6). The number of observations drops significantly in this specification.

$$X_{it} = [GDP_{it}, LOG(P)_{it}, RP_{it}, RL_{it}, PS_{it}, GE_{it}, RQ_{it}, VA_{it}, ETH_{it}, PR_{it}, CR_{it}, IR_{it}, WP_{it}, FLF_{it}, GW_{it}, NRE_{it}, T_{it}, GCE_{it}, ME_{it}, SOC, DEV] \quad (6)$$

where T_{it} denotes openness to trade in country i at time t, GCE_{it} denotes government final consumption expenditure, and ME_{it} denotes military expenditure.

4.2.3 Dynamic Panel GMM Estimation

The choice by bureaucrats to be corrupt or honest may depend on the past incidence of corruption. Moreover, corruption indices are based on perceptions, and past levels of corruption may significantly influence today's perceived level of corruption, especially when there is a time lag in updating these perceptions. In this analysis, I test the hypothesis that that past level of corruption influences the present corruption level, that corruption incidence has inertia.[88]

The panel-data approach allows capturing the inertia inherent in corruption and allows dealing with the endogeneity and measurement error of various variables by using their lagged values as instruments. I estimate the dynamic panel model of corruption [89] presented in equation (7).

$$COR_{it} = \beta_1 COR_{it-1} + X_{it}\beta_2 + \mu_i + \nu_{it} \qquad (7)$$

where $\mu_i \sim IID(0,\sigma_\mu^2)$ and $\nu_{it} \sim IID(0,\sigma_\nu^2)$, independent of each other and among themselves. In the dynamic panel estimations, corruption in year (t) also depends on corruption in year $(t-1)$. Therefore, the set of right-hand-side variables now includes the lagged dependent variable, corruption in year $(t-1)$. The equation now has the entire history of the right-hand-side variables, so that any measured influence is conditioned on this history and any impact of X_{it} represents the effect of new information.[90]

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[88] See Dutt (2005).
[89] Also known as autoregressive model.
[90] Green (2008), Ch. 15, p. 469.

The lagged dependent variable is among the regressors and is correlated with the error term because of the presence of μ_i, which renders the OLS estimator biased and inconsistent.[91] The random effects GLS estimator is also biased in a dynamic panel data model. Arellano and Bond (1991) and Arellano and Bover (1995) proposed a generalized method of moments (GMM) procedure utilizing the orthogonality conditions that exist between lagged values of COR_{it} and the disturbances v_{it}.[92]

4.2.3.1 Estimation Strategy

Since the OLS estimators are biased and inconsistent because μ_i is stochastic and correlated with the lagged corruption, I estimate the dynamic model in equation (7) using the generalized method of moments (GMM) methodology by utilizing the orthogonality conditions that exist between lagged values of COR_{it} and the disturbances v_{it}, proposed by Arellano and Bover (1995).[93] The basic notion behind GMM is that each of the instruments is orthogonal to a specified function.[94] I include one lag of the corruption index in my dynamic specifications. I estimate two specifications, using the CPI as the corruption measure and then re-run the dynamic regressions using the CC measure, similar to the panel random effects approach. However, there is enormous loss of degrees of freedom in the CC dynamic panel regressions which have fewer observations since the

[91] Moreover, the dynamic panel data regression described above is characterized by two sources of persistence over time; autocorrelation due to the presence of the lagged dependent variable among regressors and individual effects characterizing the heterogeneity among countries which does not change over time.

[92] For more details see Baltagi (2005), Chapter 8; Arellano (2003), Chapter 7; and Hsiao (2003), Chapter 4.

[93] A transformation is applied to the specification of a dynamic panel to remove cross-section fixed effects. The transformation method used is the orthogonal deviations. This transformation has the property that if the innovations are IID, the transformed innovations are also IID. The GMM number of iterations is Arellano-Bond 2-step (update weights once). The GMM weighting matrix is White period (innovations have time series correlation structure that varies by cross-section). Standard errors are robust; White period weights from final iteration.

[94] For estimation under orthogonality conditions, see Wooldridge (2001), Chapter 14, Section 2.

adjusted sample has only two time periods due to missing values of CC for most odd-numbered years.[95] X_{it} depends on the specification as follows.

4.2.3.2 The First Specification

The first specification is the default specification that includes corruption in year $(t-1)$, per capita GDP, log of total population, the percentage of population which is rural, rule of law, political stability, government effectiveness, regulatory quality, voice and accountability, the proportion of seats held by women in the national parliament, and the proportion of the labor force which is female. Thus, X_{it} is defined as follows.

$$X_{it}=[GDP_{it}, LOG(P)_{it}, RP_{it}, RL_{it}, PS_{it}, GE_{it}, RQ_{it}, VA_{it}, WP_{it}, FLF_{it}] \quad (8)$$

4.2.3.3 The Second Specification

The second specification is the unrestricted specification that adds openness to trade and endowment of natural resources to the set of explanatory variables. The number of observations drops with this specification, and there is enormous loss of degrees of freedom, especially in the CC regression. Thus X_{it} includes the following explanatory variables.

$$X_{it}=[GDP_{it}, LOG(P)_{it}, RP_{it}, RL_{it}, PS_{it}, GE_{it}, RQ_{it}, VA_{it}, WP_{it}, FLF_{it}, T_{it}, NRE_{it}] \quad (9)$$

The next chapter describes the results.

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[95] The CC measure only has observations for 1996, 1998, 2000, 2002, 2003, 2004, and 2005. It was necessary to drop 1996, 1998, and 2000 from the sample to account for the dynamic effect.

CHAPTER FIVE

THE EMPIRICAL RESULTS

5.1 The Cross-sectional OLS Results

This section describes the summary statistics of the variables used in the cross-section regressions described in Chapter Four, and presents the results.

5.1.1 Descriptive Summary of the Data

Table 5.1 presents summary statistics of all variables discussed in Chapter Four and used in the cross-sectional regressions. Table 5.2 presents the correlation matrix for these variables. It shows a high positive correlation (0.985) between the two corruption measures used in my regressions, the Corruption Perception Index (CPI) and the Control of Corruption measure (CC). It also shows the correlations of these two corruption measures with the explanatory variables. Most of the correlations have the expected sign: higher per capita GDP, proportion of seats held by women in the national parliament, percentage of females in the labor force, rule of law, political stability, government effectiveness, regulatory quality, voice and accountability, and Protestant religion are associated with lower corruption, whereas higher total population, cost of business start-up procedures, the two measures of natural resource endowment, the socialist/communist legal system origin dummy, and the low-income dummy are associated with higher corruption.

Table 5.1: The Summary Statistics for the Cross-section Variables in 2005*

	CPI	CC	GDP	P	RP	WP	FLF	RL	PS	GE	RQ	VA	ETH	ELF	PR	CB	NRE	FA	GW	SOC	DEV
Mean	4.08	-0.08	10098.9	38312271	44.49	16.07	40.57	-0.11	-0.22	-0.05	-0.06	-0.13	0.45	0.34	11.5	81.4	14.61	29.28	2.63	0.20	0.28
Median	3.2	-0.37	6012	8527777	43	13	43	-0.37	-0.07	-0.28	-0.26	-0.09	0.48	0.24	1.9	22.0	4	28	1.7	0	0
Maximum	9.7	2.5	53583	1.30×10^{9}	90	49	53	2.1	1.58	2.2	1.89	1.51	0.93	0.89	97.8	1442.0	79	95	10.7	1	1
Minimum	1.7	-1.6	593	72000	0	0	13	-2.36	-2.82	-2.21	-2.35	-2.16	-0.43	0.00	0.0	0.0	-39	0	0.2	0	0
Std. Dev.	2.18	1.02	10700.6	1.36×10^{8}	23.52	9.87	8.13	1.02	0.97	1.02	1.00	1.01	0.26	0.30	20.2	165.6	30.35	21.85	2.27	0.40	0.45
Skewness	1.18	0.81	1.36	7.9	0.07	0.84	-1.42	0.52	-0.36	0.50	0.10	-0.08	-0.20	0.51	2.5	5.1	0.65	0.58	1.74	1.49	0.98
Kurtosis	3.21	2.72	4.19	68.5	2.08	3.30	4.97	2.42	2.42	2.34	2.26	1.83	2.31	1.72	9.3	37.0	2.17	2.66	5.53	3.22	1.96
Observations	159	168	147	165	167	156	161	167	167	167	167	167	164	134	162	143	103	162	113	164	168

* Variables for 2005 are as defined in Chapter Four.

Table 5.2: The Correlation Matrix for Cross-section Variables for 2005

	CPI	CC	GDP	P	RP	WP	FLF	RL	PS	GE	RQ	VA	ETH	ELF	PR	CB	NRE	FA	GW	SOC	DEV
CPI	1	0.985	0.920	-0.152	-0.723	0.472	0.343	0.968	0.732	0.954	0.936	0.732	-0.522	-0.477	0.575	-0.557	-0.286	-0.004	-0.367	-0.203	-0.417
CC	0.985	1	0.929	-0.151	-0.717	0.486	0.323	0.980	0.733	0.969	0.955	0.776	-0.558	-0.497	0.558	-0.598	-0.310	-0.016	-0.408	-0.169	-0.444
GDP	0.920	0.929	1	-0.103	-0.715	0.442	0.386	0.923	0.644	0.925	0.923	0.774	-0.562	-0.497	0.512	-0.582	-0.392	0.026	-0.420	-0.155	-0.481
P	-0.152	-0.151	-0.103	1	0.213	-0.112	-0.116	-0.105	-0.170	-0.098	-0.151	-0.264	-0.123	0.089	-0.116	-0.042	-0.253	-0.136	0.020	0.273	0.119
RP	-0.723	-0.717	-0.715	0.213	1	-0.180	-0.087	-0.689	-0.526	-0.729	-0.751	-0.570	0.437	0.513	-0.235	0.555	0.218	0.037	0.481	0.059	0.619
WP	0.472	0.486	0.442	-0.112	-0.180	1	0.530	0.393	0.343	0.431	0.414	0.426	-0.204	-0.208	0.540	-0.065	0.120	0.177	-0.170	-0.096	-0.025
FLF	0.343	0.323	0.386	-0.116	-0.087	0.530	1	0.278	0.267	0.318	0.313	0.356	-0.170	-0.101	0.341	0.020	0.225	0.173	-0.076	0.174	0.080
RL	0.968	0.980	0.923	-0.105	-0.689	0.393	0.278	1	0.766	0.972	0.946	0.782	-0.559	-0.450	0.522	-0.620	-0.384	-0.031	-0.387	-0.157	-0.412
PS	0.732	0.733	0.644	-0.170	-0.526	0.343	0.267	0.766	1	0.740	0.707	0.692	-0.422	-0.311	0.495	-0.436	-0.186	0.163	-0.378	0.102	-0.250
GE	0.954	0.969	0.925	-0.098	-0.729	0.431	0.318	0.972	0.740	1	0.972	0.775	-0.544	-0.426	0.512	-0.655	-0.406	-0.012	-0.442	-0.121	-0.465
RQ	0.936	0.955	0.923	-0.151	-0.751	0.414	0.313	0.946	0.707	0.972	1	0.798	-0.566	-0.512	0.468	-0.661	-0.374	-0.001	-0.448	-0.074	-0.514
VA	0.732	0.776	0.774	-0.264	-0.570	0.426	0.356	0.782	0.692	0.775	0.798	1	-0.477	-0.390	0.488	-0.480	-0.224	0.168	-0.440	-0.083	-0.345
ETH	-0.522	-0.558	-0.562	-0.123	0.437	-0.204	-0.170	-0.559	-0.422	-0.544	-0.566	-0.477	1	0.725	-0.244	0.511	0.348	0.028	0.360	-0.238	0.386
ELF	-0.477	-0.497	-0.497	0.089	0.513	-0.208	-0.101	-0.450	-0.311	-0.426	-0.512	-0.390	0.725	1	-0.140	0.423	0.134	0.002	0.314	-0.258	0.464
PR	0.575	0.558	0.512	-0.116	-0.235	0.540	0.341	0.522	0.495	0.512	0.468	0.488	-0.244	-0.140	1	-0.236	-0.053	0.281	-0.247	-0.183	-0.168
CB	-0.557	-0.598	-0.582	-0.042	0.555	-0.065	0.020	-0.620	-0.436	-0.655	-0.661	-0.480	0.511	0.423	-0.236	1	0.400	0.076	0.641	-0.171	0.501
NRE	-0.286	-0.310	-0.392	-0.253	0.218	0.120	0.225	-0.384	-0.186	-0.406	-0.374	-0.224	0.348	0.134	-0.053	0.400	1	0.184	0.138	-0.076	0.243
FA	-0.004	-0.016	0.026	-0.136	0.037	0.177	0.173	-0.031	0.163	-0.012	-0.001	0.168	0.028	0.002	0.281	0.076	0.184	1	-0.113	-0.136	-0.188
GW	-0.367	-0.408	-0.420	0.020	0.481	-0.170	-0.076	-0.387	-0.378	-0.442	-0.448	-0.440	0.360	0.314	-0.247	0.641	0.138	-0.113	1	-0.233	0.497
SOC	-0.203	-0.169	-0.155	0.273	0.059	-0.096	0.174	-0.157	0.102	-0.121	-0.074	-0.083	-0.238	-0.258	-0.183	-0.171	-0.076	-0.136	-0.233	1	0.009
DEV	-0.417	-0.444	-0.481	0.119	0.619	-0.025	0.080	-0.412	-0.250	-0.465	-0.514	-0.345	0.386	0.464	-0.168	0.501	0.243	-0.188	0.497	0.009	1

The correlation between the average government wage to per capita GDP ratio and the corruption score is surprisingly negative, indicating higher average government wage to per capita GDP ratio is associated with higher corruption. Higher values for rural population and the two measures of ethnic fractionalization are associated with higher corruption.

5.1.2 Results

Table 5.3 shows the results of the OLS cross-section estimation. Columns (1) and (2) use the CPI as a measurement of corruption in the two specifications discussed in Chapter Four, while columns (3) and (4) show the results for the two specifications using the CC measure of corruption to check the robustness of the results with an alternative corruption measure.[96]

In specification (1), the coefficient of determination R^2 = 0.956, meaning that approximately 96 percent of the variation in perceived corruption is explained by the explanatory variables included in this equation.[97] The F-statistic is 143.96 and the probability of F (16, 105) = 0.0000, implying that we can reject the null hypothesis that the explanatory variables together have no impact on perceived corruption. In specification (2), R^2 = 0.957, and the F-statistic = 94.35 where the probability of F (17, 72) is zero. In specification (3), the value of R^2 of 0.972 means that about 97 percent of the variation in perceived corruption is explained by the explanatory variables included in this specification, suggesting that the sample regression line fits the data very well. The p-value of obtaining an F (16, 151) value of as much as 229.03 or greater is zero, leading

[96] See Appendix C for the actual, fitted, and residual graph for some selected models.
[97] For cross-sectional data, such high R^2 is unusual.

to rejection of the null hypothesis that all slope coefficients are simultaneously zero. In specification (4), R^2 = 0.968, and the F-statistic = 131.71 where the probability of F (17, 73) is zero.[98]

5.1.2.1 Per Capita Income

GDP per capita improves a country's corruption rating and hence lowers perceived corruption; rich countries are perceived to be less corrupt than poor countries.[99] In specifications (1), (3), and (4), this result is statistically significant at the 5% significance level, while it is statistically significant at the 10% level in specification (2). A one standard-deviation increase in real GDP per capita (a 10,700 international dollars increase) will improve a country's corruption rating by 0.32, 0.43, 0.11, and 0.21 point in specifications (1), (2), (3), and (4) respectively, and thus lowers perceived corruption, ceteris paribus.

5.1.2.2 Country Size

Country size seems to affect corruption level; larger countries have lower corruption rating and thus higher perceived corruption. Ceteris paribus, each one percent increase in a country's population lowers the country's corruption rating by about 0.14 point in the CPI equations and about 0.04 point in the CC equations, and hence increases perceived corruption by this much. This result is statistically significant at the 1% significance level, except in specification (4) where the coefficient is significant at the 5% level.[100]

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[98] The adjusted R^2 in each specification are 0.95, 0.95, 0.97, and 0.96 respectively.
[99] Higher corruption ranking implies lower perceived corruption, and vice-versa.
[100] Additionally, I have checked the statistical significance of the population density (people per sq. km, from the World Bank WDI) instead of log of population and it is statistically insignificant in every specification.

Table 5.3: The Cross-section OLS Estimation

	CPI		CC	
	(1)	(2)	(3)	(4)
Intercept	5.33024***	5.32682***	0.55787**	0.48027
	(0.69818)	(0.73120)	(0.26030)	(0.35089)
GDP	0.00003**	0.00004*	0.00001**	0.00002**
	(0.00002)	(0.00002)	(0.00001)	(0.00001)
LOG P	-0.12721***	-0.14405***	-0.04525***	-0.04232**
	(0.03455)	(0.03760)	(0.01336)	(0.01750)
RP	-0.01354***	-0.00901*	-0.00282**	-0.00167
	(0.00367)	(0.00456)	(0.00130)	(0.00162)
WP	0.00935*	0.01457**	0.00479**	0.00563*
	(0.00481)	(0.00690)	(0.00196)	(0.00313)
FLF	0.02181***	0.02559**	0.00220	-0.00016
	(0.00829)	(0.00976)	(0.00364)	(0.00415)
RL	1.48480***	1.62758***	0.72050***	0.67694***
	(0.23340)	(0.28390)	(0.07406)	(0.09721)
PS	-0.08557	-0.02279	-0.04344	-0.01133
	(0.09216)	(0.11549)	(0.04437)	(0.05590)
GE	0.38415	0.24771	0.16034	0.14652
	(0.31205)	(0.37609)	(0.10152)	(0.12223)
RQ	0.15424	0.19137	0.07636	0.09451
	(0.22573)	(0.31125)	(0.07750)	(0.10874)
VA	-0.47358***	-0.58063***	-0.06859*	-0.08603*
	(0.10745)	(0.12975)	(0.04043)	(0.04778)
ETH	-0.00479	-0.08815	0.10156	0.05792
	(0.22032)	(0.27897)	(0.08457)	(0.11019)
PR	0.00612**	0.00636**	0.00085	0.00215
	(0.00246)	(0.00276)	(0.00098)	(0.00139)
CB	0.00032	0.00045	0.00006	0.00002
	(0.00022)	(0.00031)	(0.00006)	(0.00012)
FA	0.00315	0.00184	-0.00090	-0.00102
	(0.00281)	(0.00360)	(0.00099)	(0.00133)
GW		-0.03506		0.00970
		(0.03444)		(0.01657)
SOC	-0.51070***	-0.58042**	-0.09688*	-0.06884
	(0.15746)	(0.22321)	(0.05320)	(0.06874)
DEV	0.33051**	0.33784*	0.02514	0.02197
	(0.12600)	(0.17192)	(0.04928)	(0.06758)
R^2	0.95640	0.95704	0.97163	0.96843
Adj. R^2	0.94976	0.94689	0.96739	0.96108
N	122	90	124	91

Notes: Heteroskedasticity-consistent standard errors using White's (1980) heteroskedasticity correction in parentheses. *** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level.

5.1.2.3 Rural Population

Surprisingly, each one standard-deviation increase in the proportion of the population that is rural (a 23.5% increase) is associated with a drop in a country's corruption index and an increase in perceived corruption by about 0.32 point in specification (1) (the CPI equation). In specification (3) (the CC equation), the sign of the estimated coefficient remains unchanged and the size is about -0.07 point. This result is statistically highly significant in specification (1) as the p-value is less than 1 percent. The p-value of the estimated coefficient is less than 5 percent in specification (3), and less than 10 percent in specification (2). However, the estimated coefficient is statistically insignificant at the 10% level in specification (4).

5.1.2.4 Gender Differences

Interestingly, the proportion of seats held by women in the national parliament is associated with lower corruption in all models. This result is statistically significant at the 5% level in specifications (2) and (3), and at the 10% level in specifications (1) and (4). Each one standard-deviation increase in the proportion of seats held by women in the national parliament (a 9.87% increase) improves a country's corruption index and lowers perceived corruption by about 0.14 point in specification (2), and about 0.05 point in specification (3), ceteris paribus.

On the other hand, the proportion of females in the labor force is associated with lower corruption only in the CPI estimates in both models.[101] Each one standard-deviation increase in the females in the labor force (an 8.13% increase) will improve a country's corruption index by about 0.24 point, ceteris paribus. However, this coefficient is not statistically different from zero at the 10% level the CC estimates in both models.

[101] Statistically significant at the 1% level in model (1), and at the 5% level in model (2).

5.1.2.5 Rule of Law

The most immediately striking result in Table 5.3 is the strong positive correlation between the rule of law and a country's corruption rating and hence negative correlation between the rule of law and perceived corruption. This result is statistically highly significant in all models in both CPI and CC regressions since the p-value of the estimated coefficient is less than 1 percent in every specification. The estimated coefficient ranges from 1.4 to 1.7 in CPI regressions and from 0.7 to 0.9 in CC regressions. This implies that, in model (2) for example, a one standard-deviation increase in the rule of law index (i.e., a 1.02 point increase in perceived rule of law and the quality of enforcement) would lead to an increase of 1.66 point in the corruption rating and hence lowers perceived corruption by this much.

5.1.2.6 Political Stability

The estimated impact of political stability on corruption is statistically insignificant even at the 10% level in all specifications in both CPI and CC regressions. The estimated coefficient also has an unexpected negative sign which, if significant, would mean that more political stability lowers corruption rating and increases perceived corruption.

Without accounting for both government effectiveness and the rule of law, the effect of political stability on corruption becomes statistically highly significant and the sign of the estimated coefficient changes to positive suggesting that higher political stability increases corruption rating and lowers perceived corruption (the size of the effect also increases). Once we account for government effectiveness and the rule of law, the impact of political stability on corruption turns to be statistically insignificant at the 10%

level. However, the correlations between political stability and both government effectiveness and the rule of law are high, so multicollinearity may be obscuring its true impact on corruption.[102]

5.1.2.7 Government Effectiveness

Government effectiveness does not affect corruption in all models since the estimated slope coefficient is statistically insignificant at the 10% significance level in every specification. On the other hand, without accounting for the rule of law, the impact of government effectiveness on corruption becomes highly significant and the size of the effect increases. Nevertheless, the correlation between government effectiveness and the rule of law is very high.[103] Consequently, multicollinearity may be obscuring its true impact on corruption.

5.1.2.8 Regulatory Quality

The impact of regulatory quality on corruption is statistically insignificant in all specifications. However, without accounting for the rule of law and government effectiveness, regulatory quality turns out to be statistically highly significant and positively impacts corruption rating. Nevertheless, due to the multicollinearity problem, there is no way we can know what its independent ceteris paribus effect is.

5.1.2.9 Voice and Accountability

The effect of voice and accountability on corruption is statistically significant at the 1% level in specifications (1) and (2), and at the 10% level in specifications (3) and (4). The estimated slope coefficient in all specifications has a negative sign which is counterintuitive, since it would suggest that higher voice and accountability level

[102] The correlations between political stability and both government effectiveness and the rule of law are 0.74 and 0.77 respectively. See Table 5.2.
[103] The correlation between government effectiveness and the rule of law is 0.97. See Table 5.2.

decreases corruption rating and increases perceived corruption. On the other hand, without accounting for the other governance indicators (rule of law, political stability, government effectiveness, and regulatory quality), the estimated coefficient is statistically significant and the sign becomes positive as expected. Once we account for any of these governance indicators, the sign of the coefficient for voice and accountability becomes negative. Yet, the correlations between voice and accountability and each of the other governance indicators are high. As a result, multicollinearity may be obscuring its true impact on corruption.

5.1.2.10 Ethnic Fractionalization

Ethnic fractionalization does not affect corruption in all specifications in both CPI and CC regressions. The sign of the estimated coefficient also changes from negative in the CPI regressions to positive in the CC regressions. I have also checked the statistical significance of ELF as an alternative measure of ethnic fractionalization,[104] and the result is about the same; the estimated coefficient is not statistically different from zero in all specifications.

5.1.2.11 Protestant Religion

A higher percentage of the population professing the Protestant religion positively impacts corruption rating and thus lowers corruption perception in the CPI regressions. This result is statistically significant at the 5% level in specifications (1) and (2). The estimated coefficient is about 0.006. However, this result is statistically insignificant at the 10% level in both CC regressions.[105]

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[104] See Section 4.1.3.2 for more details about this measure.

[105] I have also checked the statistical significance of the Catholic and Islam religions and both are statistically insignificant at the 10% level in my regressions.

5.1.2.12 Cost of Business Start-up Procedures

The cost of business start-up procedures as a percentage of GDP per capita does not affect corruption level in all models.

5.1.2.13 Natural Resource Endowment

Natural resource abundance, measured by the forest area (FA) proxy, does not affect corruption in neither CPI nor CC estimates.[106] I have also tested the statistical significance of the other proxy for natural resource endowment (NRE) that was defined in Chapter Four (the sum of net exports of fuel, ores and metals, and food as a percentage of net exports) to check the robustness of this result, and the estimated coefficient for NRE is not statistically different from zero at the 10% level.

5.1.2.14 Government Wages

I include government wages only in models (2) and (4) due to the lack of observations. In both models, the estimated slope coefficient for government wages is statistically insignificant at the 10% level, and its sign changes from negative in the CPI regression to positive in the CC regression. The insignificance of this factor could be due to the lower data quality for this regressor, and this highlights the need and importance of a more accurate measure of the public-private sector wage differential.

5.1.2.15 Legal System Origin

To find out if corruption level differs among countries with different legal origin, I have checked the statistical significance of different dummy variables denoting English, French, socialist/communist, German, and Scandinavian legal system origin. None of the differential intercept coefficients is statistically significant at the 10% level except for the socialist/communist legal system origin dummy.

[106] The sign also changes from positive in the CPI regressions to negative in the CC regressions.

Table 5.3 shows the results of the socialist/communist legal system origin dummy. The differential intercept coefficient is statistically highly significant in model (1), as its p-value is less than 1 percent, and statistically significant at the 5% level in specification (2), and has a negative sign as expected. The conclusion is that the mean corruption level in socialist/communist countries is statistically significantly higher by about 0.5 point.

However, in the CC equations, this result is statistically insignificant at the 10% level in specification (4), and statistically significant only at the 10% level in specification (3), although the differential intercept coefficient retains same sign.

5.1.2.16 Level of Development

I also include a dummy variable to find out if corruption level differs for low-income versus middle- and high-income countries, as defined in Chapter Four. The differential intercept coefficient for the development level dummy is statistically significant at the 5% level in model (1), and at the 10% level in model (2) in the CPI regressions, and has unexpected positive sign. This means that the mean corruption level in low-income countries is statistically lower by 0.3 point than in middle- and high-income countries. However, this result is statistically insignificant in the CC regressions, although the differential intercept coefficient retains the same unexpected sign.

5.1.2.17 Interaction between Legal Origin and Level of Development

I have also checked for interaction between the two qualitative regressors (the legal system origin and the level of economic development), i.e. whether the mean corruption level is different for countries with socialist/communist legal system origin and low income than for countries with other legal origin and low income. Thus, the

effect of these two dummy variables on the mean corruption level may not be only additive but multiplicative as well. I added the product of these dummies to specifications (1) in a separate regression.[107] I find that the interaction dummy is statistically significant at the 5% level with a positive sign, meaning that the mean corruption level of countries with socialist/communist legal system origin and low income is lower than the mean corruption level of countries with only socialist legal origin or low income alone by 0.6 point.[108]

5.1.2.18 Middle-East and North Africa (MENA) Dummy

I have checked if corruption level is different in the MENA region, other things constant, than in other regions around the world. I re-ran the regressions with a MENA dummy added to each specification. Table 5.4 presents the results.[109] I find that the differential intercept coefficient for the MENA region is statistically insignificant even at the 10% level in all models, indicating that mean corruption in the MENA region does not differ significantly from mean corruption in other regions, other things constant.[110]

[107] See Gujarati (2003), Chapter 11. The results for these two regressions are not included in Table 5.3.
[108] The socialist/communist dummy is still statistically significant and the sign remains unchanged in this regression but the development dummy is now statistically insignificant and the sign remains unchanged.
[109] I present the results in a separate table since adding the MENA dummy affects the estimated slope coefficients for the other regressors and their p-values even though it is statistically insignificant.
[110] The sign of the differential intercept coefficient changes from negative (in specifications (1), (2), and (3)) to positive (in specification (4)).

Table 5.4: The Cross-section OLS Estimation with MENA Dummy

	CPI		CC	
	(1)	(2)	(3)	(4)
Intercept	5.61362***	5.74799***	0.57345	0.43320
	(0.76344)	(0.89817)	(0.30782)	(0.41356)
GDP	0.00003**	0.00004*	0.00001**	0.00002**
	(0.00002)	(0.00002)	(0.00001)	(0.00001)
LOG P	-0.13120***	-0.15178***	-0.04546***	-0.04148**
	(0.03434)	(0.03929)	(0.01350)	(0.01815)
RP	-0.01400***	-0.00985**	-0.00285**	-0.00158
	(0.00369)	(0.00465)	(0.00132)	(0.00168)
WP	0.00895*	0.01401**	0.00477**	0.00569*
	(0.00491)	(0.00710)	(0.00198)	(0.00316)
FLF	0.01853**	0.02175**	0.00202	0.00027
	(0.00887)	(0.00991)	(0.00420)	(0.00450)
RL	1.53286***	1.67882***	0.72311***	0.67126***
	(0.24194)	(0.28788)	(0.07662)	(0.09957)
PS	-0.09662	-0.03206	-0.04407	-0.01027
	(0.09055)	(0.11472)	(0.04413)	(0.05656)
GE	0.38280	0.25951	0.16058	0.14414
	(0.31795)	(0.38172)	(0.10232)	(0.12355)
RQ	0.13221	0.13366	0.07492	0.10182
	(0.22973)	(0.31955)	(0.07950)	(0.11314)
VA	-0.50252***	-0.61278***	-0.07017*	-0.08253*
	(0.11099)	(0.12982)	(0.04192)	(0.04895)
ETH	-0.01725	-0.12340	0.10082	0.06190
	(0.22254)	(0.29316)	(0.08556)	(0.11176)
PR	0.00612**	0.00646**	0.00085	0.00214
	(0.00250)	(0.00285)	(0.00099)	(0.00139)
CB	0.00030	0.00039	0.00006	0.00002
	(0.00022)	(0.00032)	(0.00006)	(0.00012)
FA	0.00272	0.00093	-0.00092	-0.00092
	(0.00291)	(0.00385)	(0.00099)	(0.00133)
GW		-0.03164		0.00940
		(0.03322)		(0.01654)
SOC	-0.51402***	-0.58862***	-0.09704*	-0.06792
	(0.15757)	(0.22167)	(0.05338)	(0.06996)
DEV	0.31564**	0.29945*	0.02419	0.02665
	(0.12843)	(0.17449)	(0.05030)	(0.06933)
MENA	-0.19868	-0.27092	-0.01109	0.03063
	(0.19668)	(0.21655)	(0.09694)	(0.10862)
R^2	0.95669	0.95762	0.97163	0.96846
Adj. R^2	0.94961	0.94688	0.96708	0.96058
N	122	90	124	91

Notes: Heteroskedasticity-consistent standard errors using White's (1980) heteroskedasticity correction in parentheses. *** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level.

5.2 The Panel Random Effects Results

This section describes the summary statistics of the variables used in the panel analysis and presents the results.

5.2.1 Descriptive Summary of the Panel Data

The summary statistics of all regressors used in the panel regressions are shown in Table 5.5. Table 5.6 shows the correlation matrix for panel variables. It shows a high positive correlation (0.978) between the two corruption measures, the CPI and the CC. It also shows the correlation of these two corruption measures with the explanatory variables. Most of these correlations have the expected sign: higher values for per capita GDP, proportion of seats held by women in the national parliament, percentage of females in the labor force, rule of law, political stability, government effectiveness, regulatory quality, voice and accountability, Protestant religion, and openness to trade are associated with lower corruption, whereas higher values of total population and natural resource endowment are associated with higher corruption. There is a negative correlation between each corruption measure and the average government wage to per capita GDP ratio, the two measures of ethnic fractionalization, rural population, Catholic and Muslim religion, socialist/communist legal system origin dummy, and low- and middle-income dummy. Moreover, there is a positive correlation between each corruption measure and government final consumption expenditures and military expenditure.

Table 5.5: Panel Descriptive Statistics for 1996-2005 for 159 Countries

	CPI	CC	GDP	P	RP	RL	PS	GE	RQ	VA	ETH	ELF	PR	CR	IR	WP	FLF	GW	NRE	T	GCE	ME	SOC	DEV
Mean	4.6157	-0.0405	8884.239	36044776	46.00054	-0.0868	-0.19965	-0.018	-0.031	-0.133	0.415721	0.335426	11.52346	30.35366	23.95146	13.10831	39.7262	2.6179	17.07777	85.80255	15.97406	2.542857	0.20122	0.755952
Median	3.8	-0.32	5058	8142581	44	-0.33	-0.1	-0.26	-0.07	-0.16	0.4789	0.2373	1.9	11.45	1.6	11	42	1.7	9	76	15	2	0	1
Maximum	10	2.54	53583	1.30×10^{9}	93	2.27	1.69	2.57	2.07	1.71	0.9302	0.8902	97.8	97.3	99.8	49	54	10.7	79	456	70	40	1	1
Minimum	0.4	-2.08	459	71079	0	-2.37	-3.3	-2.34	-3.88	-2.24	-10.4264	0	0	0	0	0	10	0.2	-39	2	4	0	0	0
Std. Dev.	2.3881	1.0304	9473.118	1.29×10^{8}	23.67708	1.011228	0.99178	1.0237	0.9899	1.0033	0.578091	0.295427	20.13263	35.45565	35.85321	9.229252	8.626943	2.257	28.85179	48.73288	7.134541	2.867484	0.401023	0.429637
Skewness	0.7247	0.7583	1.402608	7.952051	0.033798	0.509214	-0.43446	0.5776	-0.227	-0.005	-11.8017	0.50863	2.480887	0.817025	1.253741	1.036936	-1.244314	1.7413	0.384305	2.064959	1.886115	5.592125	1.490505	-1.191804
Kurtosis	2.2613	2.7128	4.287332	70.22639	2.082742	2.416174	2.57676	2.6225	2.9359	1.883	185.3974	1.71686	9.324857	2.053785	2.871722	3.71738	4.321326	5.5427	1.959236	11.23734	11.1334	54.46891	3.221605	2.420396
Observations	1046	1154	1673	1820	1837	1158	1151	1156	1160	1163	1804	1474	1782	1804	1804	1311	1786	1248	1363	1727	1619	1470	1804	1848

Table 5.6: The Correlation Matrix for Panel Variables for 1996-2005

	CPI	CC	GDP	P	RP	RL	PS	GE	RQ	VA	ETH	ELF	PR	CR	MR	WP	FLF	GW	NRE	T	GCE	ME	SOC	DEV
CPI	1	0.9776	0.88542	-0.1518	-0.6631	0.94666	0.7579	0.9483	0.879	0.7377	-0.3944	-0.3763	0.6184	-0.0716	-0.3127	0.5196	0.2991	-0.3532	-0.2831	0.2627	0.585	0.1177	-0.198	-0.837
CC	0.9776	1	0.91337	-0.1419	-0.6634	0.9731	0.8013	0.9656	0.8947	0.7926	-0.4242	-0.3865	0.5804	-0.0342	-0.3295	0.5083	0.2937	-0.3572	-0.3373	0.2632	0.5745	0.0669	-0.156	-0.848
GDP	0.8854	0.9134	1	-0.1217	-0.6835	0.89709	0.6988	0.9103	0.8365	0.7899	-0.4387	-0.4144	0.5246	0.0773	-0.4201	0.494	0.3896	-0.4076	-0.3583	0.1622	0.5568	0.0186	-0.142	-0.935
P	-0.1518	-0.1419	-0.12174	1	0.2629	-0.1074	-0.1501	-0.0881	-0.1872	-0.1948	-0.0536	0.131	-0.0966	-0.1822	-0.0512	-0.0402	-0.0886	0.0478	-0.237	-0.191	-0.1746	0.0225	0.189	0.112
RP	-0.6631	-0.6634	-0.68347	0.2629	1	-0.6159	-0.5048	-0.654	-0.6474	-0.5557	0.4094	0.5288	-0.2255	-0.2135	0.2521	-0.2701	-0.0976	0.4181	0.1109	-0.2878	-0.4788	-0.264	0.069	0.619
RL	0.9467	0.9731	0.89709	-0.1074	-0.6159	1	0.8285	0.9632	0.8875	0.8017	-0.4365	-0.3763	0.5283	-0.0786	-0.292	0.4268	0.2632	-0.3633	-0.3789	0.2617	0.5385	0.0799	-0.143	-0.837
PS	0.7579	0.8013	0.69876	-0.1501	-0.5048	0.82849	1	0.7854	0.7721	0.7462	-0.4442	-0.3755	0.4778	0.0309	-0.325	0.405	0.257	-0.3626	-0.2796	0.3058	0.3317	-0.2295	0.055	-0.603
GE	0.9483	0.9656	0.91034	-0.0881	-0.654	0.96323	0.7854	1	0.9052	0.7758	-0.4129	-0.3395	0.5268	-0.0289	-0.3324	0.479	0.2974	-0.3492	-0.3836	0.2696	0.5388	0.0528	-0.166	-0.839
RQ	0.879	0.8947	0.83648	-0.1872	-0.6474	0.88748	0.7721	0.9052	1	0.8111	-0.3728	-0.3757	0.4701	0.1114	-0.4403	0.4365	0.3094	-0.3842	-0.3001	0.2771	0.4769	0.0226	-0.086	-0.751
VA	0.7377	0.7926	0.78991	-0.1948	-0.5557	0.80173	0.7462	0.7758	0.8111	1	-0.3725	-0.2839	0.4958	0.2067	-0.5903	0.4856	0.4381	-0.42	-0.2852	0.0672	0.4867	-0.1918	-0.024	-0.696
ETH	-0.3944	-0.4242	-0.43869	-0.0536	0.4094	-0.4365	-0.4442	-0.4129	-0.3728	-0.3725	1	0.7406	-0.1836	-0.0343	0.1484	-0.1222	-0.0218	0.342	0.2997	-0.0505	-0.2904	-0.0105	-0.230	0.401
ELF	-0.3763	-0.3865	-0.41436	0.131	0.5288	-0.3763	-0.3755	-0.3395	-0.3757	-0.2839	0.7406	1	-0.1117	-0.1372	0.0932	-0.0739	0.0196	0.3913	0.0862	-0.0438	-0.287	-0.1815	-0.268	0.351
PR	0.6184	0.5804	0.52465	-0.0966	-0.2255	0.52831	0.4778	0.5268	0.4701	0.4958	-0.1836	-0.1117	1	-0.2485	-0.2862	0.6243	0.3829	-0.2401	-0.1096	-0.0815	0.4019	-0.1708	-0.135	-0.487
CR	-0.0716	-0.0342	0.07735	-0.1822	-0.2135	-0.0786	0.0309	-0.0289	0.1114	0.2067	-0.0343	-0.1372	-0.2485	1	-0.4907	0.0912	0.0435	-0.0342	0.31	-0.1469	-0.0673	-0.2987	-0.129	-0.019
MR	-0.3127	-0.3295	-0.42009	-0.0512	0.2521	-0.292	-0.325	-0.3324	-0.4403	-0.5903	0.1484	0.0932	-0.2862	-0.4907	1	-0.3833	-0.5459	0.197	-0.0204	0.0338	-0.1765	0.3328	-0.051	0.359
WP	0.5196	0.5083	0.49401	-0.0402	-0.2701	0.42681	0.405	0.479	0.4365	0.4856	-0.1222	-0.0739	0.6243	0.0912	-0.3833	1	0.5101	-0.2315	0.0391	-0.0682	0.4382	-0.2846	-0.035	-0.446
FLF	0.2991	0.2937	0.38965	-0.0886	-0.0976	0.26318	0.257	0.2974	0.3094	0.4381	-0.0218	0.0196	0.3829	0.0435	-0.5459	0.5101	1	-0.0952	0.0838	-0.0106	0.306	-0.286	0.283	-0.379
GW	-0.3532	-0.3572	-0.40764	0.0478	0.4181	-0.3633	-0.3626	-0.3492	-0.3842	-0.42	0.342	0.3913	-0.2401	-0.0342	0.197	-0.2315	-0.0952	1	0.0942	0.0113	-0.1502	0.025	-0.266	0.312
NRE	-0.2831	-0.3373	-0.35828	-0.237	0.1109	-0.3789	-0.2796	-0.3836	-0.3001	-0.2852	0.2997	0.0862	-0.1096	0.31	-0.0204	0.0391	0.0838	0.0942	1	-0.1955	-0.1739	-0.1016	-0.037	0.354
T	0.2627	0.2632	0.16219	-0.191	-0.2878	0.26166	0.3058	0.2696	0.2771	0.0672	-0.0505	-0.0438	-0.0815	-0.1469	0.0338	-0.0682	-0.0106	0.0113	-0.1955	1	0.0191	0.1574	0.087	-0.140
GCE	0.585	0.5745	0.55681	-0.1746	-0.4788	0.53846	0.3317	0.5388	0.4769	0.4867	-0.2904	-0.287	0.4019	-0.0673	-0.1765	0.4382	0.306	-0.1502	-0.1739	0.0191	1	0.3256	-0.085	-0.553
ME	0.1177	0.0669	0.01863	0.0225	-0.264	0.07992	-0.2295	0.0528	0.0226	-0.1918	-0.0105	-0.1815	-0.1708	-0.2987	0.3328	-0.2846	-0.286	0.025	-0.1016	0.1574	0.3256	1	-0.091	-0.064
SOC	-0.1983	-0.156	-0.14185	0.189	0.0693	-0.1426	0.0553	-0.1655	-0.0863	-0.0245	-0.2301	-0.2683	-0.1351	-0.1294	-0.0512	-0.0352	0.2832	-0.2664	-0.0366	0.0866	-0.0847	-0.0912	1	0.240
DEV	-0.8369	-0.848	-0.9355	0.1122	0.619	-0.8375	-0.6032	-0.8387	-0.7505	-0.6961	0.4011	0.3506	-0.4874	-0.0189	0.3594	-0.4456	-0.3787	0.3119	0.3542	-0.1399	-0.5532	-0.0642	0.240	1

5.2.2 Panel Random Effects Results

I estimate two specifications to check the robustness of the results to alternative hypotheses as discussed in Chapter Four. Table 5.7 shows the results of the panel cross-section random effects estimation. Columns (1) and (2) use the CPI as a measurement of corruption to estimate the two specifications, while columns (3) and (4) show the results of these two specifications using the CC measure of corruption, to check the robustness of the results with an alternative corruption measure.

In specification (1), the value of R^2 of 0.815 means that about 82 percent of the variation in perceived corruption is explained by the explanatory variables included in this specification. The p-value of obtaining an F (16, 609) value of as much as 167.33 or greater is zero, leading to rejection of the null hypothesis that all slope coefficients are simultaneously zero. In specification (2), R^2 = 0.853, and the F-statistic = 89.48 where the probability of F (21, 324) is zero. In specification (3), the coefficient of determination R^2 = 0.86, meaning that approximately 86 percent of the variation in perceived corruption is explained by the explanatory variables included in this equation. The F-statistic is 301.91 and the probability of F (16, 786) = 0.0000, implying that we can reject the null hypothesis that the explanatory variables together have no effect on perceived corruption. In specification (4), R^2 = 0.886, and the F-statistic = 145.29 where the probability of F (21, 394) is zero.[111]

[111] The adjusted R^2 in each specification are 0.81, 0.84, 0.86, and 0.88 respectively.

Table 5.7: The Panel Cross-section Random Effects Estimation

	CPI		CC	
	(1)	(2)	(3)	(4)
Intercept	5.15660***	4.45567***	0.46929***	0.09061
	(0.49853)	(0.85009)	(0.11001)	(0.30852)
GDP	0.00002**	0.00002*	0.00001***	0.00002***
	(0.00001)	(0.00001)	(0.000004)	(0.000005)
LOG P	-0.0756***	-0.08811**	-0.02071**	-0.02617*
	(0.02564)	(0.03734)	(0.00822)	(0.01580)
RP	-0.01007***	-0.0086***	-0.00255**	-0.00189*
	(0.00309)	(0.00296)	(0.00108)	(0.00103)
RL	0.95576***	1.14069***	0.47967***	0.56867***
	(0.15672)	(0.14945)	(0.04229)	(0.05156)
PS	-0.07586	-0.11004	-0.00965	0.00276
	(0.05301)	(0.06943)	(0.01682)	(0.01904)
GE	0.55537***	0.34692**	0.20576***	0.09549*
	(0.12721)	(0.14118)	(0.04876)	(0.04954)
RQ	0.02127	0.09541	0.00178	-0.03086
	(0.08079)	(0.06996)	(0.02811)	(0.02929)
VA	-0.14252	-0.06616	0.06352*	0.08978**
	(0.11574)	(0.13908)	(0.03389)	(0.03612)
ETH	-0.22652	-0.36434**	-0.02897	-0.05435
	(0.13990)	(0.17734)	(0.04597)	(0.06107)
PR	0.01073***	0.01622***	0.00283***	0.00474***
	(0.00365)	(0.00558)	(0.00051)	(0.00111)
CR	-0.00181	-0.00144	-0.00063	-0.00016
	(0.00115)	(0.00174)	(0.00065)	(0.00086)
IR	-0.00092	-0.00041	0.00070	0.00047
	(0.00153)	(0.00209)	(0.00060)	(0.00063)
WP	0.00730*	0.01052**	0.00255*	0.00437***
	(0.00372)	(0.00454)	(0.00144)	(0.00165)
FLF	0.01888***	0.02804**	-0.00011	0.00036
	(0.00710)	(0.01137)	(0.00224)	(0.00307)
GW		-0.01948		0.02364**
		(0.03154)		(0.0111)
NRE		0.00005		-0.00049
		(0.00173)		(0.00056)
T		0.00219**		0.00077**
		(0.0010)		(0.0004)
GCE		-0.00328		-0.00107
		(0.00662)		(0.00312)
ME		0.06442*		0.02036**
		(0.03344)		(0.00887)
SOC	-0.47259***	-0.8376***	-0.1156***	-0.13382*
	(0.15698)	(0.19175)	(0.03427)	(0.06979)
DEV	-0.43775**	-0.13969	-0.20593*	-0.00027
	(0.22023)	(0.21194)	(0.10798)	(0.08057)
R^2	0.81468	0.85293	0.86006	0.88563
Adj. R^2	0.80981	0.84340	0.85721	0.87954
N	626	346	803	416

Notes: Standard errors are in parentheses. Cross-section SUR (PCSE) standard errors and covariance (number of degree of freedom correction). Wallace and Hussain estimator of component variances.
*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level.

5.2.2.1 Per Capita Income

Per capita GDP is statistically highly significant in the CC regressions (specifications (3) and (4)) as its p-value is less than 1 percent. In the CPI regressions, per capita GDP is statistically significant at the 5% level in specification (1), and at the 10% level in specification (2). The estimated slope coefficient has a positive sign in all regressions. Holding everything else constant, each one standard-deviation increase in real per capita GDP (a 9,473 international dollars increase) improves corruption rating by 0.19 point in the CPI regressions and by 0.09 to 0.19 point in the CC regressions. Therefore, rich countries are perceived to have less corruption than poor countries.

5.2.2.2 Country Size

Larger countries seem to have higher perceived corruption than smaller ones. This result is statistically significant at the 1% significance level only in specifications (1), statistically significant at the 5% level in specifications (2) and (3), and at the 10% level in specifications (4). The estimated slope coefficient retains the same negative sign in all regressions and ranges from 0.08 to 0.09 in the CPI regressions and from 0.02 to 0.03 in the CC regressions.

5.2.2.3 Rural Population

Each one percent increase in the proportion of population that is rural is associated with a drop in corruption rating and an increase in perceived corruption by about 0.01 point in the CPI regressions, and about 0.002 to 0.003 in the CC regressions. This result is statistically significant at the 1% level in both CPI regressions (specifications (1) and (2)), statistically significant at the 5% level in specification (3), and at the 10% level in specification (4) in the CC regressions. The sign of the estimated

slope coefficient is negative in all specifications suggesting that higher proportion of population that is rural increases perceived corruption.

5.2.2.4 The Rule of Law

As in the cross-sectional regressions, the most striking result in Table 5.7 is the strong impact of the rule of law on corruption. Holding everything else constant, when the perception about the strength of the rule of law in a country increases by one standard-deviation (a 1.01 point increase in the rule of law index), the country's corruption index improves by 0.97 to 1.15 point in the CPI equations and by 0.48 to 0.58 point in the CC regressions, and hence the perceived corruption will drop by such amount. This result is statistically highly significant in all specifications in both CPI and CC regressions since the p-value of the estimated coefficient is less than 1 percent in every case.

5.2.2.5 Political Stability

Political stability does not impact corruption in all specifications in both CPI and CC equations since the estimated slope coefficient is not statistically different from zero even at the 10% level in every case.

Similar to the cross-sectional regressions, without accounting for both government effectiveness and the rule of law, the effect of political stability on corruption becomes statistically highly significant in all specifications in both CPI and CC equations and the sign of the estimated coefficient is positive, indicating that higher political stability increases corruption rating and lowers perceived corruption. Once we account for government effectiveness and the rule of law together, the impact of political stability on corruption turns to be statistically insignificant at the 10% level. However, the high

correlations between political stability and these two governance indicators may obscure the true impact of political stability on corruption due to multicollinearity.

5.2.2.6 Government Effectiveness

Government effectiveness positively impacts corruption rating and lowers perceived corruption. This result is statistically significant at the 1% level in specifications (1) and (3), at the 5% level in specification (2), and significant at the 10% level in specification (4). The estimated coefficient ranges from 0.4 to 0.6 in the CPI equations, and from 0.1 to 0.2 in the CC regressions. This result is inconsistent with the cross-sectional findings.

5.2.2.7 Regulatory Quality

The influence of regulatory quality on corruption is statistically insignificant even at the 10% level in all specifications. This finding is parallel to the cross-sectional result.

As in the cross-sectional analysis, without accounting for both government effectiveness and the rule of law, regulatory quality becomes statistically highly significant and positively impacts corruption rating and thus lowers perceived corruption. However, multicollinearity may be obscuring its true effect on corruption because of the high correlations between regulatory quality and both government effectiveness and the rule of law.[112]

5.2.2.8 Voice and Accountability

The impact of voice and accountability on corruption is statistically insignificant in both CPI specifications, while it is statistically significant at the 5% level in specification (4), and at the 10% level in specification (3) in the CC equations. In the CC

[112] The correlations between regulatory quality and both government effectiveness and the rule of law are 0.91 and 0.89 respectively.

regressions where the variable is significant, the estimated slope coefficient has a positive sign implying that higher perception of voice and accountability in a country improves the country's corruption rating and hence lowers perceived corruption.

Nevertheless, the correlations between voice and accountability and each of the other governance indicators are very high, so multicollinearity may be obscuring its true impact on corruption.[113]

5.2.2.9 Ethnic Fractionalization

The estimated coefficient for ethnic fractionalization is not statistically different from zero at the 10% significance level in all specifications, except in specification (2) where it is statistically significant at the 5% level, and hence ethnic fractionalization does not seem to affect corruption. The estimated coefficient has a negative sign in specification (2) where the variable is significant indicating that ethnic fractionalization lowers corruption rating and hence increases perceived corruption. With the ELF index of ethnolinguistic fractionalization, the estimated slope coefficient retains the negative sign in all specifications and is statistically insignificant at the 10% level in the CPI estimates, though it turns out to be statistically significant in the CC estimates.

5.2.2.10 Membership in Various Religions

A higher percentage of the population professing the Protestant religion lowers perceived corruption. The estimated coefficient is statistically significant at the 1% level in all specifications. This result differs from the cross-sectional result where the percentage of the population professing the Protestant religion is statistically insignificant even at the 10% level in the CC regressions. In the panel regressions, the estimated

[113] The correlations between voice and accountability and each of the other governance indicators (rule of law, political stability, government effectiveness, and regulatory quality) are 0.80, 0.75, 0.78, and 0.81 respectively.

coefficient is around 0.01 to 0.02 in the CPI equations and ranges from 0.003 to 0.005 in the CC regressions. On the other hand, the percentage professing the Catholic religion is statistically insignificant at the 10% level in all specifications and the estimated slope coefficient has a negative sign in all specifications. The percentage of the population professing the Islam is statistically insignificant as well at the 10% in all specifications, and the estimated coefficient has a negative sign in the CPI equations and a positive sign in the CC equations.

Therefore the impact of the membership in various religions on corruption is not robust, and this is puzzling and may require more study.

5.2.2.11 Gender Differences

The proportion of seats held by women in the national parliament is associated with lower perceived corruption and a higher corruption rating. This result is statistically significant at the 1% level in specification (4), statistically significant at the 5% level in specification (2), and at the 10% level in specifications (1) and (3). Holding everything else constant, each one standard-deviation increase in the proportion of seats held by women in national parliament (a 9.23% increase) improves a country's corruption index and lowers perceived corruption by about 0.07 to 0.1 point in the CPI regressions and about 0.02 to 0.04 point in the CC regressions. This result is parallel to the cross-sectional finding, although the magnitude of this effect is higher in the case of the cross-sectional regressions.

However, the proportion of females in the labor force is statistically significant only in the CPI equations (at the 1% significance level in specification (1) and at the 5% level in specification (2)), while it is statistically insignificant even at the 10% level in the

CC equations (3) and (4), similar to the cross-sectional finding. The estimated coefficient is around 0.02 to 0.03 in the CPI equations, where the variable is significant, and retains the positive sign in all specifications in which the variable was included, except in specification (3) where the coefficient has a negative sign though it is statistically insignificant at the 10% level.

5.2.2.12 Government Wages

I include government wages, the endowment of natural resources, openness to trade, general government final consumption expenditure, and military expenditure only in specification (2) in the CPI regressions and specification (4) in the CC regressions due to the lack of observations on these variables.

The estimated coefficient for government wages is statistically significant at the 5% level in specification (4) (the CC regression), although statistically insignificant in specification (2) (the CPI regression). In the CC regression, the estimated coefficient has a positive sign denoting that higher level of government wages improves the corruption rating and lowers corruption level, and the size of the effect is 0.024.

5.2.2.13 Natural Resource Endowment

In agreement with the cross-sectional results, natural resource abundance, measured as the sum of net exports of fuel, ores and metals, and food as a percentage of net exports (NRE proxy), does not impact corruption in either specification. The sign of the estimated coefficient is positive in specification (2) and negative in specification (4).

5.2.2.14 Openness to Trade

Openness to trade positively impacts the corruption index. The estimated coefficient is statistically significant at the 5% level in both specifications, although the

magnitude of this effect is small; each one standard-deviation increase in the sum of exports and imports relative to GDP (a 48.73% increase) improves corruption rating by 0.002 point in specification (2), and by 0.04 point in specification (4) and hence lowers perceived corruption by this amount.

5.2.2.15 Government Consumption Expenditures

The estimated coefficient for government final consumption expenditures is statistically insignificant even at the 10% level in both specifications, and its sign is negative.

5.2.2.16 Military Expenditure

The estimated coefficient for military expenditures is statistically significant at the 5% significance level in specification (4), and at the 10% level in specification (2). The sign of the estimated coefficient is positive in both specifications, implying that higher military expenditure improves the corruption rating and lowers perceived corruption, which is counterintuitive.

5.2.2.17 Legal System Origin

As in the cross-sectional analysis, I have checked the statistical significance of different dummy variables denoting English, French, socialist/communist, German, and Scandinavian legal origin. As in the cross-sectional regressions, none of the differential intercept coefficients is statistically significant except the socialist/communist legal system origin dummy. The results for the socialist legal origin dummy are shown in Table 5.7.

The socialist/communist legal system origin differential intercept is statistically significant at the 1% significance level in all specifications except in specification (4)

where it is significant at the 10% level. The differential intercept coefficient has the expected negative sign in all specifications, similar to the cross-sectional findings, and ranges from 0.5 to 0.8 in the CPI regressions and 0.12 to 0.13 in the CC regressions. Therefore, the mean corruption level in countries with a socialist/communist legal system origin is statistically significantly higher by about 0.3 to 0.8 point, in the CPI estimates, and by about 0.1 point in the CC estimates.

5.2.2.18 Level of Development

A dummy variable denoting the level of development is included (= 1 if low or middle-income, = 0 otherwise).[114] The estimated differential intercept for the development level dummy is statistically significant at the 5% level in specifications (3), and at the 10% level in specification (3), while it is statistically insignificant at the 10% level in specifications (2) and (4). The estimated differential intercept has the expected negative sign in all regressions, opposite to the cross-sectional finding. The mean corruption level in low and middle-income countries is statistically higher by about 0.4 point in the CPI equation where the dummy variable is significant, and about 0.2 point in the CC equation compared to the mean corruption level in high-income countries.

I have also checked the statistical significance of the differential intercept coefficient for the MENA region dummy, as in the cross-sectional regressions, by including the MENA dummy in all equations and re-running the regressions. The

[114] The level of development dummy in the cross-sectional analysis was defined to be equal to 1 for low income and 0 otherwise. I checked the statistical significance of the same level of development dummy as used in the cross-sectional regressions as defined above, and found that this differential intercept coefficient was statistically insignificant in the panel regressions. The reverse is true (the differential intercept coefficient for the level of development dummy used in panel regressions is statistically insignificant in the cross-sectional regressions).

differential intercept for the MENA dummy was statistically insignificant even at the 10% level in these specifications, implying that the mean corruption in the MENA region does not differ than the mean corruption in other regions, other things constant.

5.3 GMM Dynamic Panel Results

Table 5.8 shows the results of the GMM dynamic panel estimation. Specifications (1) and (2) use the CPI as the corruption measure, while specifications (3) and (4) use the CC measure instead, to estimate the two dynamic panel models described in Chapter Four.

5.3.1 Lagged Corruption

The lagged corruption has a statistically significant effect on the current level of corruption. The lagged corruption coefficient estimate is statistically significant at the 1% level in specifications (1) and (2) (the CPI regressions), and at the 5% level in specifications (3) and (4) (the CC regressions), which justifies the use of a dynamic model. The lagged corruption coefficient estimate is about 0.6 in the CPI regressions, and ranges from 0.5 to 0.6 in the CC regressions. The conclusion is that last year's corruption level does strongly influence this year's perceived level of corruption. Therefore, bureaucrats' choice to be corrupt or honest is affected by the past incidence of corruption.

5.3.2 Per Capita Income

Opposite to the panel random effects results, per capita GDP is statistically insignificant at the 10% level in all regressions. The sign of the estimated slope coefficient is positive in all specifications except in specification (3) where the sign is negative.

Table 5.8: GMM Dynamic Panel Estimation

	CPI		CC	
	(1)	(2)	(3)	(4)
COR (t-1)	0.57966***	0.59598***	0.57466**	0.46869**
	(0.06134)	(0.06128)	(0.22659)	(0.19427)
GDP	0.0000005	0.000004	-0.00001	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
LOG P	-0.58263	-0.39161	-0.41172	-1.38739*
	(0.68788)	(0.65321)	(0.45957)	(0.73951)
RP	0.00361	0.01602	0.04203***	0.03629**
	(0.01617)	(0.01768)	(0.01131)	(0.01434)
RL	0.40387***	0.38493***	0.44433***	0.48222***
	(0.14180)	(0.14256)	(0.07853)	(0.08742)
PS	-0.2004***	-0.12804**	-0.07614**	-0.00616
	(0.05314)	(0.05108)	(0.03858)	(0.04894)
GE	0.21019***	0.22747***	0.11925	0.14065
	(0.07900)	(0.08557)	(0.08049)	(0.09914)
RQ	0.03242	0.05858	-0.03608	-0.02206
	(0.06660)	(0.06974)	(0.06717)	(0.08394)
VA	0.10963	0.10197	0.17886**	0.16066*
	(0.08618)	(0.08425)	(0.08546)	(0.09384)
WP	0.00274	-0.00259	0.00350	0.00281
	(0.00498)	(0.00483)	(0.00218)	(0.00263)
FLF	0.02695	0.04590**	0.00430	-0.00001
	(0.01977)	(0.01812)	(0.01223)	(0.01153)
T		0.00222*		0.000002
		(0.00115)		(0.00103)
NRE		-0.00545*		0.00024
		(0.00290)		(0.00158)
Periods	5	5	2	2
Cross-sections	118	99	142	105
N	424	359	276	183

Notes: Standard errors are in parentheses. Transformation method is orthogonal deviations. White period instrument weighting matrix. White period standard errors and covariance (number of degree of freedom correction). *** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level.

5.3.3 Country Size

Country size is statistically insignificant even at the 10% level in the GMM results except in specification (4) where it is statistically significant at the 10% level. The estimated coefficient has a negative sign in all specifications, implying that larger countries have lower corruption rating and higher perceived corruption, which is consistent with the OLS cross-section and panel random effects finding.

5.3.4 Rural Population

The proportion of the population which is rural is statistically insignificant at the 10% level in each CPI regression (specifications (1) and (2)), although it is statistically significant in each CC regression (significant at the 1% level in specification (3), and at the 5% level in specification (4)). The estimated coefficient has a positive sign in all specifications, indicating that a greater percentage of rural population improves corruption rating and lowers perceived corruption, which is opposite to the OLS cross-section and panel random effects findings.

5.3.5 The Rule of Law

Consistent with the OLS cross-section and panel random effects results, an increase in the rule of law index (an increase in perceived rule of law and better quality of law enforcement) improves corruption rating and lowers perceived corruption. This result is statistically highly significant in all specifications in both the CPI and the CC regressions as the p-value of the estimated slope coefficient is less than 1 percent in every case. The estimated coefficient is about 0.4 in the CPI regressions, and ranges from 0.4 to 0.5 in the CC regressions. Hence, the size of the rule of law effect on corruption in the

GMM dynamic panel estimation is lower than in the OLS cross-section and panel random effects findings.

5.3.6 Political Stability

Increased political stability lowers the corruption rating and increases perceived corruption, which is counterintuitive. This result is statistically significant at the 1% level in specification (1), at the 5% level in specifications (2) and (3), and statistically insignificant at the 10% level in specifications (4). The estimated coefficient retains the same negative sign in all specifications and ranges from -0.1 to -0.2 in the CPI regressions and is about -0.08 in the CC regressions where it is significant.

5.3.7 Government Effectiveness

Greater government effectiveness improves the corruption index and lowers perceived corruption. This result is statistically significant at the 1% level only in the CPI regressions (specifications (1) and (2)), and statistically insignificant at the 10% level in the CC regressions (specifications (3) and (4)) although the estimated coefficient retains the same positive sign.

5.3.8 Regulatory Quality

Regulatory quality is statistically insignificant even at the 10% level in all specifications. The sign of the estimated slope coefficient is positive in the CPI regressions and negative in the CC regressions.

5.3.9 Voice and Accountability

The effect of voice and accountability on corruption is statistically insignificant at the 10% level in the CPI regressions, while it is significant in the CC regressions (at the 5% level in specifications (3) and at the 10% level in specification (4)). The sign of the estimated slope coefficient is positive in all specifications.

5.3.10 Gender Differences

Unlike the OLS cross-section and panel random effects findings, neither of the gender explanatory variables (the proportion of seats held by women in the national parliament and the percentage of females in the labor force) is statistically significant even at the 10% level in any specification, except females in the labor force in specification (2) where it is statistically significant at the 5% level with a positive estimated coefficient. The estimated coefficient for each of the gender regressors in each of the specifications retains the same positive sign, except the proportion of seats held by women in the national parliament in specification (2) and females in the labor force in specification (4) where the coefficients have negative signs though they are statistically insignificant.

5.3.11 Openness to Trade

Openness to international trade is statistically significant at the 10% level in specification (2), while it is statistically insignificant at the 10% level in specification (4). The estimated coefficient has a positive sign in both specifications.

5.3.12 Natural Resource Endowment

Natural resource endowment measured by the proxy NRE (the sum of net exports of fuel, ores and metals, and food as a percentage of net exports) is statistically

insignificant at the 10% level in specification (4), while it is statistically significant at the 10% level in specification (2), where the estimated coefficient has a negative sign indicating that greater natural resource endowment lowers corruption rating and increases perceived corruption.

CHAPTER SIX

CONCLUDING REMARKS

This study explores the determinants of corruption, using cross-sectional, panel random-effects, and dynamic panel analysis to check the robustness of the results to alternative specifications and estimation methods. The panel analysis is a good direction in which to address the multicollinearity problem, besides its other advantages. Moreover, since endogeneity may bias the OLS cross-sectional estimates, the panel-data approach allows dealing with the endogeneity and measurement error of various variables. In addition, it allows capturing the inertia inherent in corruption. Therefore, because of greater information set in panel data, panel results should be viewed as somewhat stronger than cross-section. However, the results of the dynamic panel estimation are sensitive to the choice of instrumental variables, and thus the dynamic results should be interpreted with particular caution. Moreover, there is an enormous loss of degrees of freedom in the dynamic panel regressions with the CC corruption measure as the dependent variable. There is a much smaller number of observations for these regressions since the sample consists of only two periods, after adjusting the sample for missing intervening years.[115] For these reasons, I have less confidence in my dynamic results. The main result I obtain from the dynamic panel estimation in this work is strong evidence that lagged corruption has a statistically significant effect on the current corruption level. The lagged corruption coefficient estimate is statistically significant in

[115] See footnote 95.

all dynamic specifications, which justifies the use of a dynamic model. This improves our understanding of corruption determinants and highlights the importance of incorporating dynamic models of corruption in future research. Furthermore, the dynamic estimation confirms the importance of the rule of law in determining corruption level.

Since the underlying determinants of corruption in previous research remain poorly understood and widely debated, this study uses two different indexes of perceived corruption, the CPI measure and the CC measure, to check the robustness of the results with alternative corruption measures. Moreover, the study uses a large array of explanatory variables that may influence corruption. These include a large set of economic variables, a set of political variables, and a group of sociocultural variables. This work aims at improving our understanding of the determinants of corruption and suggesting a number of ways to reduce corruption by identifying its true determinants.

Some specialists in the field of anti-corruption argue that the best way to fight corruption is by fighting corruption, that is, by means of yet another anti-corruption campaign, the creation of more anti-corruption commissions and ethics agencies, and the persistent drafting of new laws, decrees, and rules of conduct.[116] However, some of these regulations do not address the more fundamental determinants of corruption and hence can be counterproductive, and may even create further opportunities for bribery. This study finds the following results.

The first interesting result in this study indicates that the rule of law strongly impacts corruption and that a higher level of law and order (a better quality of law enforcement) is correlated with lower corruption. Strikingly, this result is statistically significant at the 1% level in all models in cross-sectional, panel, and dynamic panel

[116] See Kaufmann (2005).

analysis. The effect of the rule of law on corruption has never been investigated empirically as far as I know, and therefore this finding significantly contributes to the profession's understanding of the determinants of corruption. Indeed, the rule of law is among the most important determinants of corruption across countries and over time. Moreover, variables usually found to be highly important in determining corruption, such as income per capita, lose their relative importance after accounting for the rule of law. One interesting implication of this result is that a potential approach to curbing corruption may be first strengthening the rule of law, and therefore the attention given to the rule of law should be raised. This result should help in designing and assessing the impact of anti-corruption efforts.

Another interesting finding is that rich countries are perceived to have lower corruption than poor countries, all else equal. This result is statistically significant in all cross-sectional and panel random effects regressions. This result is consistent with Treisman (2000) and Serra (2006) and inconsistent with Barreto's (2001) finding of a positive effect of per capita GDP growth on corruption. It is also contrary to Pellegrini and Gerlagh (2004), who found an insignificant relationship between corruption and GDP growth.

Likewise, the cross-sectional and panel random effects analysis provide evidence that the country size impacts corruption, larger countries having lower corruption rating and higher perceived corruption, which supports the findings of Fisman and Gatti (2000) and Treisman (1999).

Another finding from the cross-sectional and panel random effects analysis is that a larger percentage of rural population is associated with higher corruption level, which

has never previously been investigated theoretically or empirically to my knowledge. This finding adds to what was known before about corruption determinants.

Interestingly, a higher proportion of seats held by women in the national parliament is associated with lower corruption level in the cross-sectional and panel random effects analysis, supporting the finding of Swamy et al. (1999) in their within-country data from Georgia. In addition, the proportion of females in the labor force is associated with lower corruption level only in the CPI regressions in the cross-sectional and panel random effects analysis, while it is statistically insignificant in the CC regressions in both cross-sectional and panel estimation, and thus the results on this variable are sensitive to the choice of corruption measure. This finding, using cross-sectional and panel data, resolves some of the gender issues in corruption determinants that few previous researchers had examined in their country-level data.

Political stability does not impact corruption in my analysis since it is statistically insignificant in all cross-sectional and panel random effects regressions. This result is contrary to Lederman et al. (2005) and Serra (2006) who found that political stability lowers corruption level.[117] However, without accounting for government effectiveness and the rule of law, political stability becomes highly significant and positively affects corruption rating and hence lowers perceived corruption.

Furthermore, government effectiveness positively impacts corruption rating and lowers perceived corruption. However, this result is not entirely robust.[118]

Regulatory quality is not significantly associated with corruption. The cross-sectional, panel, and dynamic panel analysis find the same robust result. Moreover, a

[117] Political stability was insignificant in the Treisman (2000) regressions.
[118] Government effectiveness is statistically significant in all panel random effects and dynamic panel regressions, while it is statistically insignificant in all cross-sectional equations.

higher level of voice and accountability is significantly associated with lower corruption. Yet, this finding is not robust.[119] The results on the worldwide governance indicators add to the existent empirical work on corruption determinants since this is the first time they have been examined empirically.

Another exciting result is that ethnic fractionalization does not significantly impact corruption in my models, contradicting Fearon and Laitin (1996) and La Porta et al. (1999) who do suggest that ethnic fractionalization lowers the quality of the government and hence may increase corruption.[120] This result is robust. I have also examined an alternative measure of ethnic division, and the result is about the same. Therefore, my work reveals that ethnic division is unimportant in determining corruption, although most of the previous research had suggested that it is important.

The impact of religion on corruption is not clear in my regressions and may require further research. In the cross-sectional analysis, higher membership in the Protestant religion positively affects corruption rating in the CPI estimates (consistent with Treisman (2000) and Serra (2006)), while it is statistically insignificant in the CC estimates. Catholic membership and Muslim membership are statistically insignificant. In the panel analysis, Protestant membership lowers corruption level, while Catholic and Muslim membership are statistically insignificant. The results on the membership in various religions are sensitive to specification. To better inform our understanding of the effect of religion on corruption, further research may account for other political and

[119] Voice and accountability is consistently found to be statistically significant with a positive coefficient in the CPI panel and dynamic panel regressions, while it is insignificant in the CC panel and dynamic panel regressions. In the cross-sectional regressions, voice and accountability is statistically significant with a negative coefficient.

[120] Treisman (2000) finds that ethnolinguistic fractionalization is significant in his regressions that do not control for development, while insignificant in those that do.

sociocultural factors such as the duration of colonialism and a proxy for religiosity, although the latter is hard to measure.

Moreover, the cross-sectional and panel analysis provide evidence that the mean corruption level in countries with a socialist/communist legal system origin is statistically significantly higher. On the other hand, the differential intercept coefficients for the other legal origin dummies (English, French, German, and Scandinavian) are statistically insignificant.[121] This finding adds to what was known before about corruption determinants since this work is the first time these dummies have been examined.[122] Additionally, the panel estimation finds that the mean corruption level in low and middle-income countries is statistically higher than the mean corruption level in high-income countries.[123]

Natural resource abundance does not significantly impact corruption in any of my analyses, which contradicts the Leite and Weidmann (1999) argument that natural resource abundance is an important determinant of a country's level of corruption. I constructed a more reasonable measure of natural resource endowment (the sum of net exports of fuel, ores and metals, and food as a percentage of net exports) to check the robustness of this finding, but the result was about the same.

The government wage level positively improves corruption rating and hence lowers corruption level in panel analysis in the CC regression, which supports the Tanzi (1998) and Lindbeck (1998) findings. Nevertheless, this result is not robust. The cross-sectional analysis and the CPI panel regression find that government wage level is

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[121] When I examined the statistical significance of the legal origin qualitative variable which has five categories, I used only four dummy variables, taking the Scandinavian category as the base case.

[122] La Porta et al. (1999) had examined the effect of these legal origin dummies on government quality.

[123] In the panel regressions, the level of development dummy is statistically significant only in specifications (1) and (3).

statistically insignificant, which is consistent with Treisman (2000) and may support the Besley and McLaren (1993) view that the efficiency wage strategy, in the collection of taxes, may not be a good idea much of the time and may require some conditions for the efficiency wage to make sense.[124] However, due to data limitations, I use the ratio of average government wage to per capita GDP which does not really measure what I want to (the public-private sector wage differential). The above mentioned studies suffer from the same drawback. This emphasizes the need and importance of a more accurate estimate for the public-private sector wage differential. Therefore further research is needed when more precise data on this variable become available.

The cross-sectional estimation finds that the cost of business start-up procedures, which has never been examined before, does not significantly affect corruption level. Moreover, the degree of openness to international trade lowers corruption level, although the size of this effect is small, as suggested by the panel analysis. This result is consistent with the Treisman (2000) finding. However, this result is not robust.

The government final consumption expenditure does not significantly impact corruption. On the other hand, military expenditure lowers perceived corruption, which is counterintuitive. However, these two explanatory variables have been included in only two specifications and thus the robustness of the results on these variables has not been checked.

In summary, this study adds the rule of law, lagged corruption, and the proportion of population that is rural to the list of the determinants of corruption level that was revealed by past research. Furthermore, previous research had suggested that ethnic division and natural resource abundance were important determinants of corruption,

[124] See Section 3.2 for more details.

while my work has revealed them to be unimportant. In addition, the study resolves some issues that previous researchers had raised on the effects of political stability and gender on corruption. The study also examined the impact of some other factors on corruption such as regulatory quality, voice and accountability, the cost of business start-up procedures, the level of economic development, and the legal system origin. My econometric models and findings are more convincing than the ones that had been used previously because I use a variety of reasonable and rich specifications with larger samples and better data. I also use two different measures of corruption to check the robustness of the results.

Successful anti-corruption efforts should address the underlying determinants of corruption, and this study contributes to the profession's understanding of the determinants of corruption and their relative significance. This should be of help in designing anti-corruption programs, and should also aid in assessing the impact of existing anti-corruption efforts. Although it is impossible to achieve a zero corruption level, since some corruption is the inevitable consequence of the greed in human nature, governments can still make big improvements. The results of this work highlight the importance of the rule of law and per capita GDP in the battle against corruption. Thus, although policy cannot do much to change some of the factors that impact corruption such as country size and the proportion of seats held by women in the national parliament,[125] the battle against corruption can be won, first by strengthening the rule of law, and secondly by improving per capita GDP, although this is not an easy task for policymakers. The practical steps a government can take to strengthen the rule of law remain an urgent priority for further research.

[125] The magnitude of the effects of these variables on corruption is smaller.

Moreover, further research could explore the effect of institutions on corruption with better data on the quality of institutions. The impact of the level of foreign and international aid on corruption could also be investigated. In addition, future research could try further refinements in dynamic analysis with better instruments. Furthermore, investigating the effects of corruption and suggesting practical remedies for corruption remain on the top of the research agenda. Besides, further research could explore the determinants and effects of corruption on the country level to compare the results with the international evidence, and successful local anti-corruption efforts could be analyzed to spread them into other places and guide the fight against corruption.

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APPENDICES

A. Sources for the Transparency International 2005 Corruption Perceptions Index (CPI)[a]

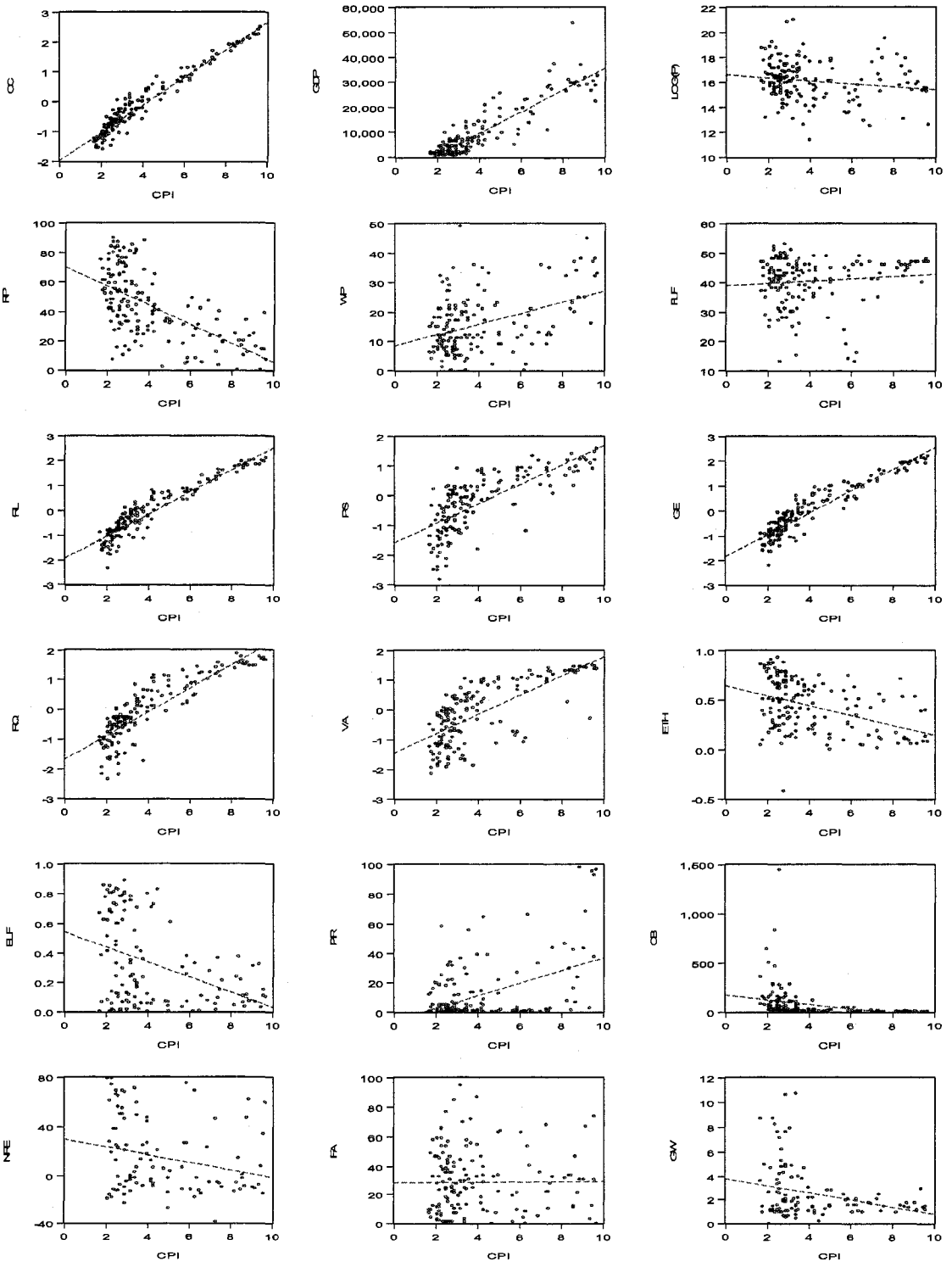
Source	Name	Year	Internet	Who was surveyed?	Subject asked	Number of replies	Number of Countries
Colombia University, The Center for International Earth Science Information Network (CU)	State Capacity Survey	2003	http://www.ciesin.org/	US-resident country experts (policy analysts, academics, and journalists)	Severity of corruption within the country	224	95
Economist Intelligence Unit (EIU)	Country Risk Service and Country Forecast	2005	www.eiu.com	Expert staff assessment	The misuse of public office for private (or political party) gain	Not applicable	156
Freedom House (FH)	Nations in Transit	2005	http://www.freedomhouse.org/research/nattransit.htm	Assessment by US, regional, and in-country experts	Extent of corruption as practiced in governments, as perceived by the public and as reported in the media as well as implementation of anticorruption initiatives	Not applicable	29
International Institute for Management and Development, Lausanne, Switzerland (MD)	World Competitiveness Yearbook	2003 2004 2005	www.imd.ch	Executives in top and middle management; domestic and international companies	Bribing and corruption exist in the economy	4000 (2003) 4166 (2004) 4000 (2005)	51
Information International (II)	Survey of Middle Eastern Business-people	2003	www.information-international.com	Senior businesspeople from Bahrain, Lebanon and UAE	How common are bribes, how costly are they for doing business, and how frequently are public contracts awarded to friends and relatives in neighboring countries	382 assessments from 165 respondents	31
Merchant International Group (MIG)	Grey Area Dynamics	2005	www.merchantinternational.com	Expert staff and network of local correspondents	Corruption, ranging from bribery of government ministers to inducements payable to the "humblest clerk"	Not applicable	155

[a] Sources:

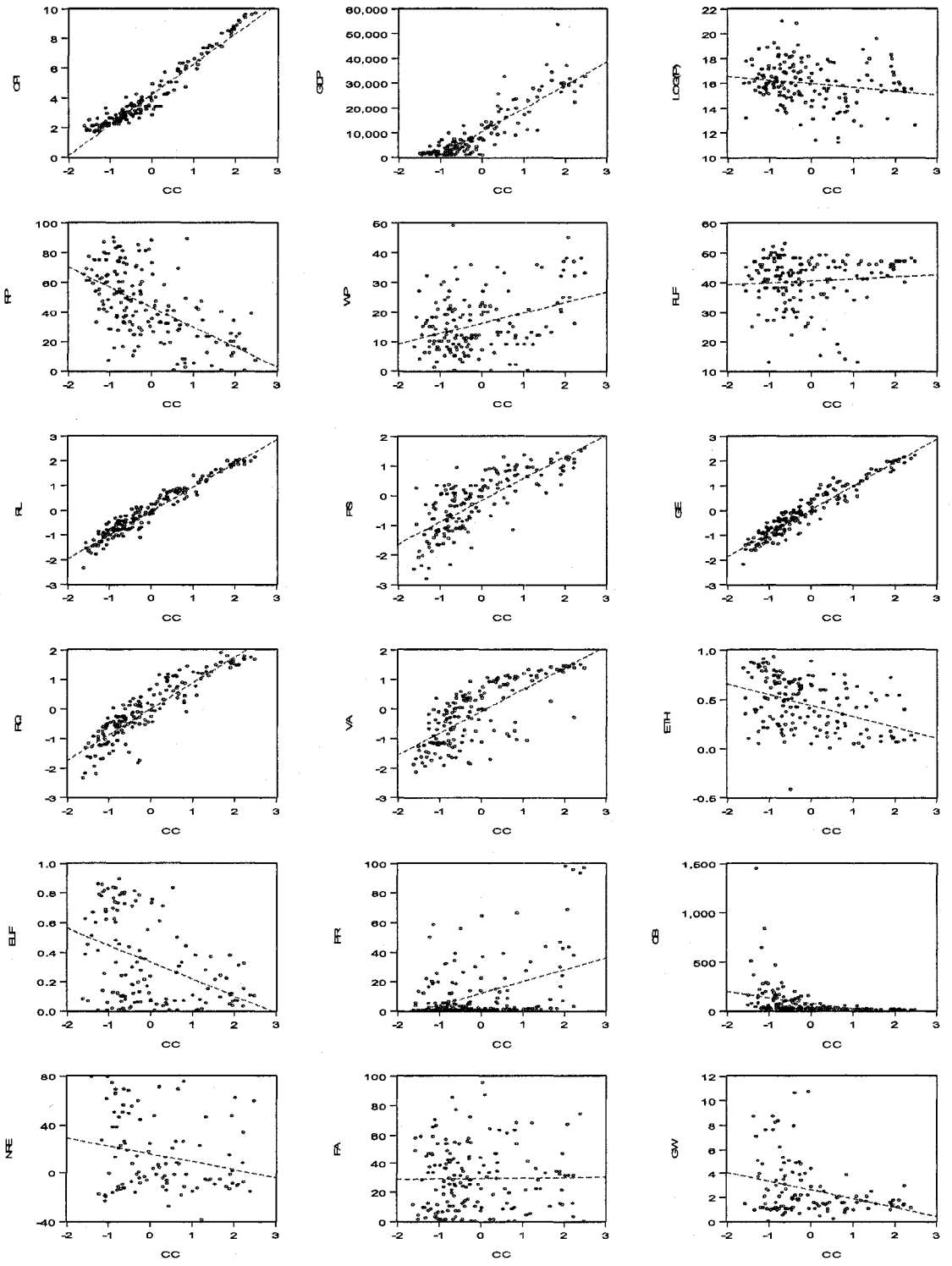
- Transparency International, http://www.transparency.org/policy_research/surveys_indices/global/cpi
- Internet Center for Corruption Research, http://www.icgg.org/corruption.index.html

Political & Economic Risk Consultancy (PERC)	Asian Intelligence Newsletter	2003 2004 2005	www.asiarisk.com/	Expatriate business executives	How bad do you consider the problem of corruption to be in the country in which you are working as well as in your home country?	1000 (2003) 1000 (2004) 1000 (2005)	14 (03) 14 (04) 12 (05)
World Markets Research Center (WMRC)	Risk Ratings	2005	www.wmrc.com	Expert staff assessment	The likelihood of encountering corrupt officials, ranging from petty bureaucratic corruption to grand political corruption	Not applicable	186
United Nations Economic Commission for Africa (UNECA)	Africa Governance Report	2005	http://www.uneca.org/agr/	National expert survey (between 70 and 120 in each country)	"Corruption Control". This includes aspects related to corruption in the legislature, judiciary, and at the executive level as well as in tax collection. Aspects of access to justice and government services are also involved	2800	28
World Economic Forum (WEF)	Global Competitiveness Report	2003/04 2004/05 2005/06	www.weforum.org	Senior business leaders; domestic and international companies	Undocumented extra payments or bribes connected with various government functions	7741 (03/04) 8700 (04/05) 10993 (05/06)	102 (03/04) 104 (04/05) 117 (05/06)

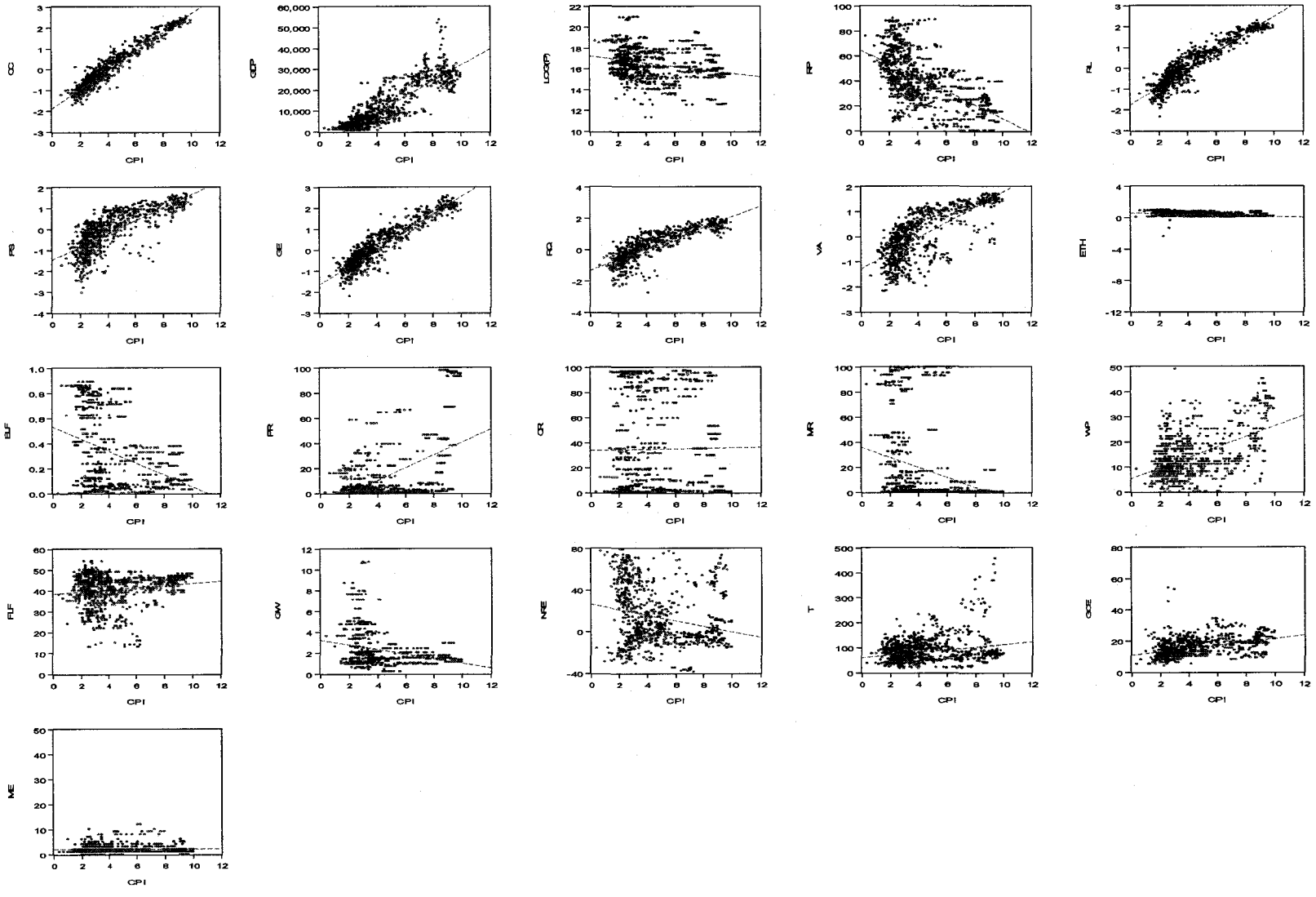
B.1 The Correlations between the CPI and other Variables in Cross-Section Data in 2005



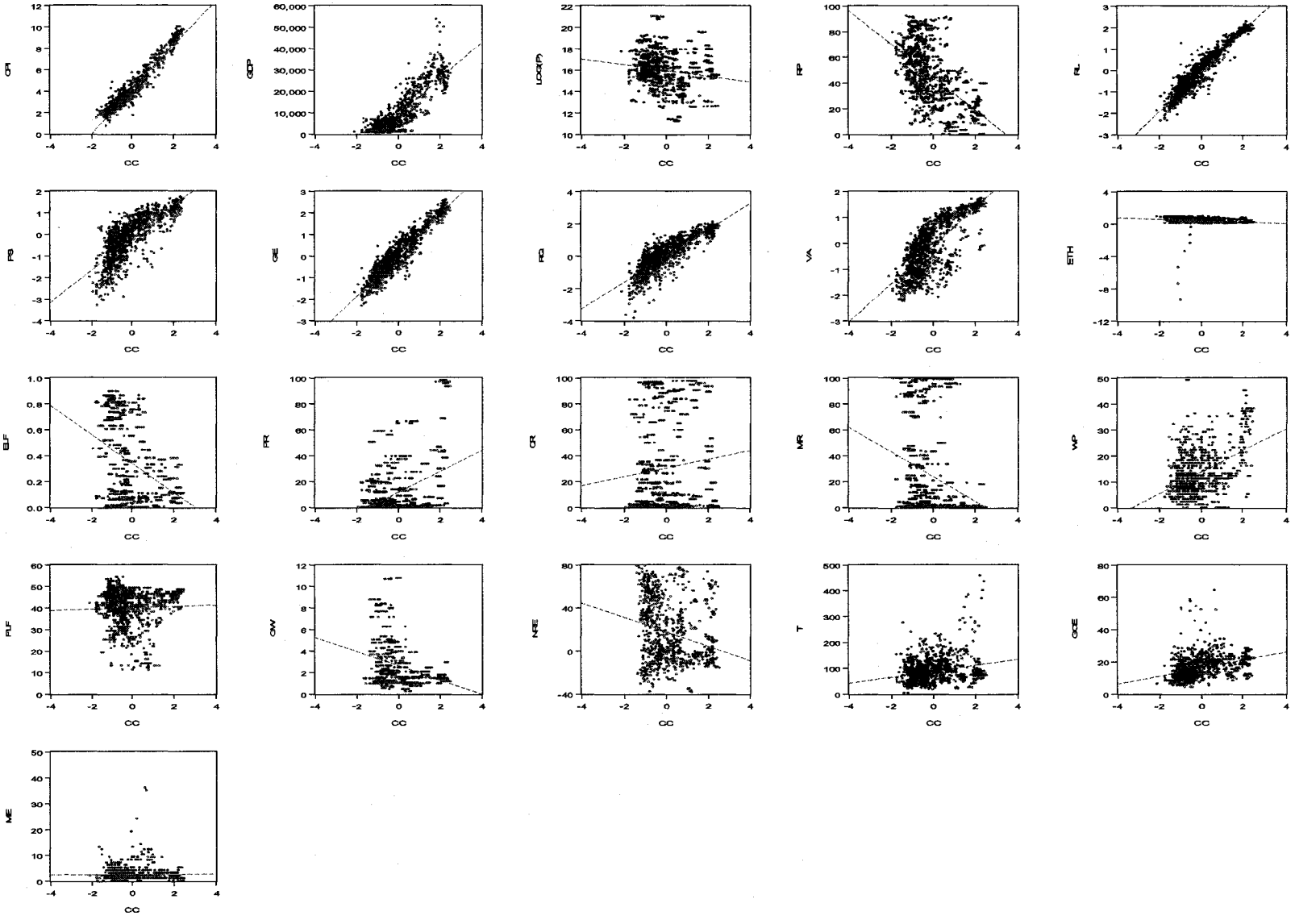
B.2 The Correlations between the CC Measure and other Variables in Cross-Section Data in 2005



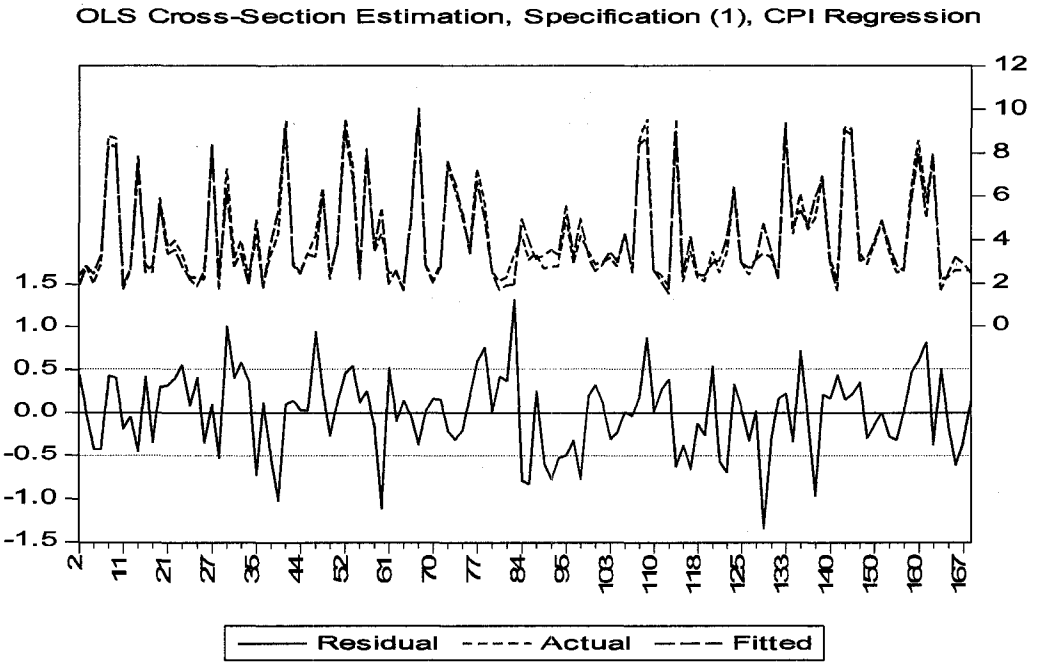
B.3 The Correlations between the CPI and other Variables in Panel Data for 1996-2005

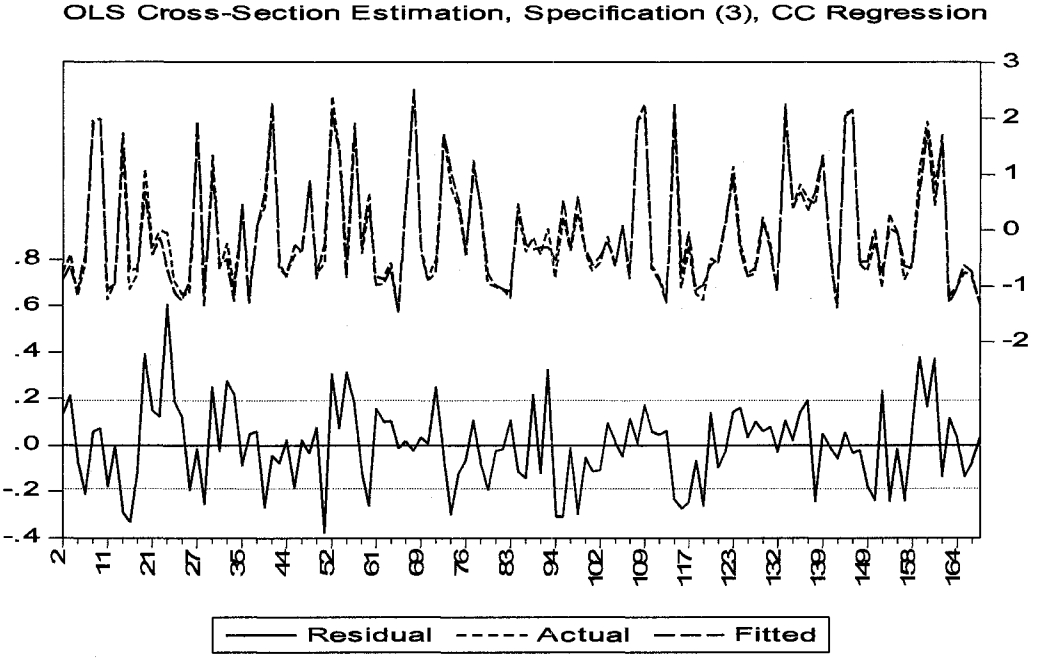


B.4 The Correlations between the CC Measure and other Variables in Panel Data for 1996-2005

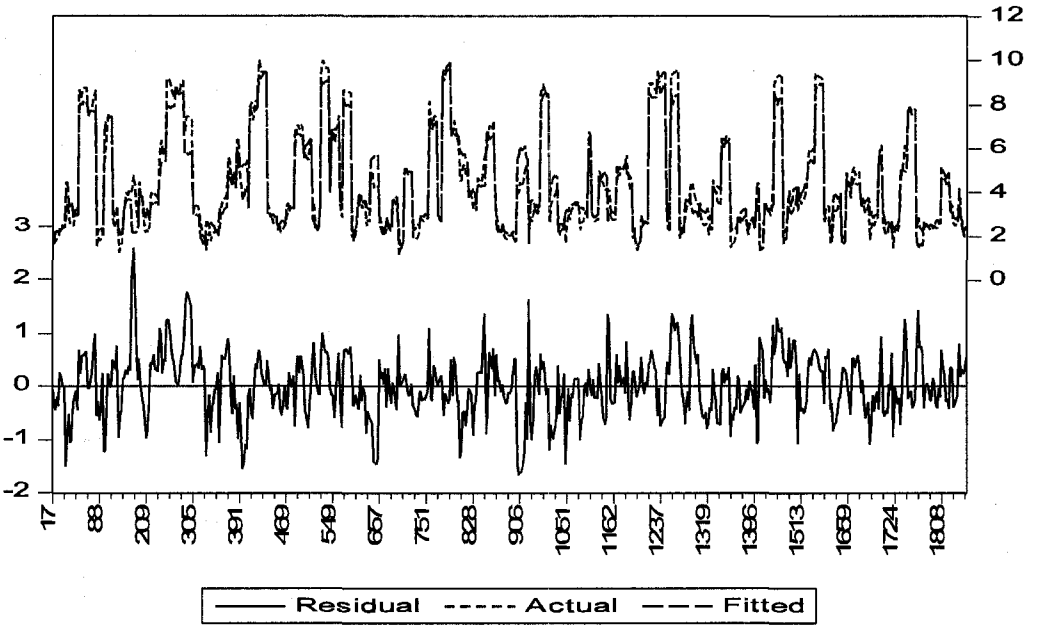


C. The Actual, Fitted, and Residual Graph for Selected Models

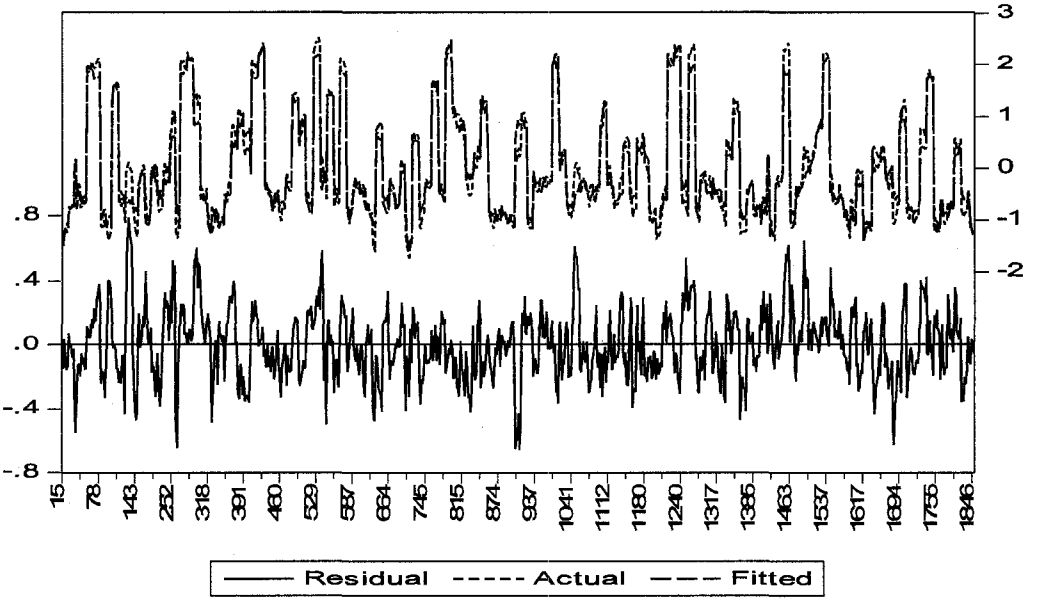




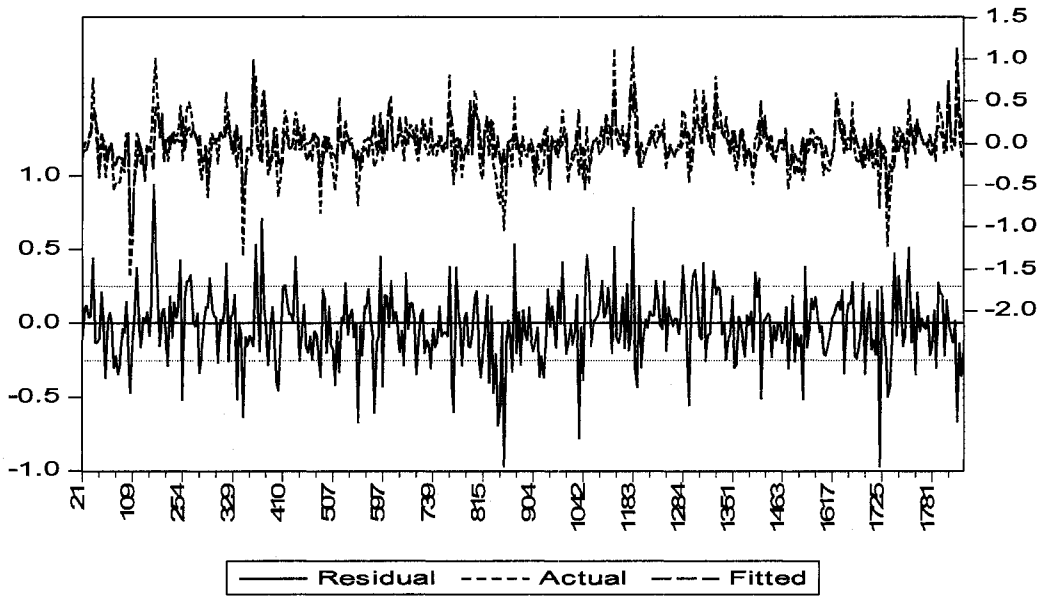
Panel Random Effects Estimation, Specification (1), CPI Regression



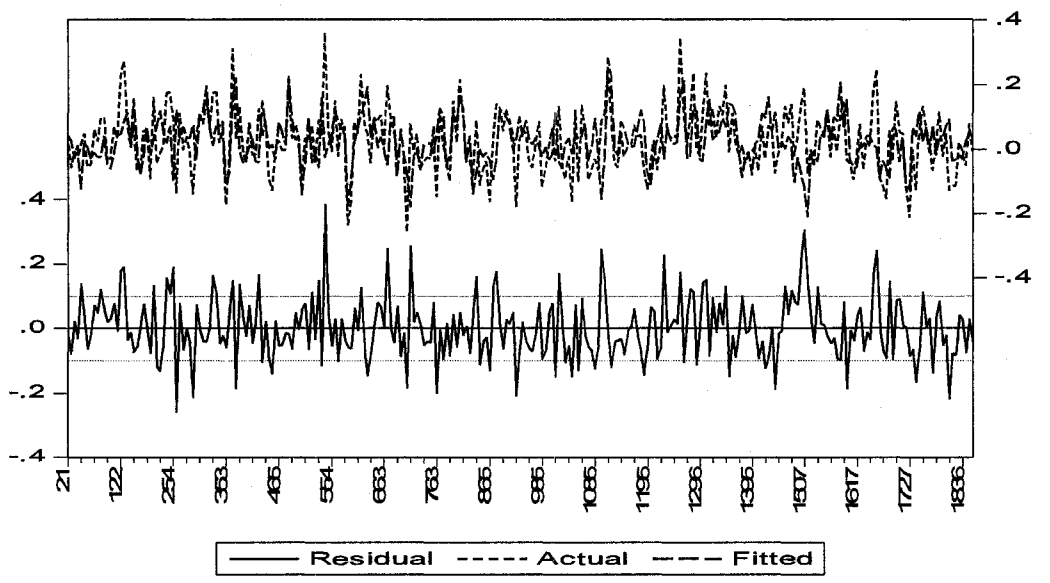
Panel Random Effects Estimation, Specification (3), CC Regression



GMM Dynamic Panel Estimation, Specification (1), CPI Regression



GMM Dynamic Panel Estimation, Specification (3), CC Regression



LIST OF ABBREVIATIONS

BEEPS	Business Environment and Enterprise Performance Survey
BI	Business International
BPI	The Bribe Payers' Index
CB	The Cost of Business Start-up Procedures
CC	Control of Corruption
ECM	Error Component Model
CIESIN	Center for International Earth Science Information Network
CPI	Corruption Perception Index
CR	Catholic Religion
EIU	Economist Intelligence Unit
ELF	Ethnolinguistic Fractionalization
ETH	Ethnic Fractionalization
FA	Forest Area
FEM	Fixed Effects Model
FEMA	Federal Emergency Management Agency
FH	Freedom House
FLF	Female Labor Force
GCB	Global Corruption Barometer
GCE	Government Final Consumption Expenditure
GCI	Global Competitiveness Index
GCR	Global Competitiveness Report
GE	Government Effectiveness
GMM	Generalized Method of Moments
GW	The Ratio of Average Government Wage to Per Capita GDP
HIID	Harvard Institute for International Development
ICRG	International Country Risk Guide
II	Information International
IMD	International Institute for Management Development
IR	Islam
ME	Military Expenditure
MIG	Grey Area Dynamics Ratings by the Merchant International Group
NRE	Natural Resource Endowment
P	Population (Country Size)
PERC	Political and Economic Risk Consultancy
PR	Protestant Religion
PS	Political Stability and Absence of Violence
RL	Rule of Law

RP	The Percentage of Population that is Rural
RQ	Regulatory Quality
T	Openness to International Trade
TI	Transparency International
UNECA	United Nations Economic Commission for Africa
VA	Voice and Accountability
WDI	World Development Indicators
WEF	World Economic Forum
WGI	Worldwide Governance Indicators
WMRC	World Markets Research Center
WP	The Proportion of Seats Held by Women in the National Parliament