



Venice Summer Institute 2005

Workshop on “Political Economy and Development”

20–21 July 2005

Venice International University, San Servolo



Complementary Controls of Corruption

Gisela Waisman

CESifo
Poschingerstr. 5, 81679 Munich, Germany
Phone: +49 (89) 9224-1410 - Fax: +49 (89) 9224-1409
office@CESifo.de
<http://www.cesifo.de>

Complementary Controls of Corruption

Gisela Waisman*
IIES - Stockholm University

March 2005

JEL-classification: D7, H1.

Keywords: political economy, corruption, judicial independence, media independence, elections.

Abstract

This paper explores the interaction of three institutions that provide checks and balances to corruption: the electoral system, the media and the judiciary. Based on evidence of the vulnerability of the media when not protected by the judiciary, I assume that such protection is the main link between the two institutions. I consider an extension in which an investigating media protects the judiciary as well. The theoretical model shows that when the judiciary and media are more dependent and the elections less competitive, corruption flourishes. Furthermore, strengthening one institution increases the marginal effectiveness of the others in the control of corruption. The results of the empirical analysis are consistent with the predictions of the model.

1 Introduction

Corruption is conventionally defined as the abuse of public power for personal gain or the benefit of a group to which one owes allegiance. This problem hits the whole world, but with very different levels of intensity. The average level of corruption is perceived to be substantially lower in the countries belonging to the OECD than in those outside. More generally, it is perceived to be much lower in rich than in poor countries. Nine developing countries out of ten score less than 5 against a clean score of 10 in the Transparency International Corruption Perceptions Index 2003.

*I am grateful to my supervisor Torsten Persson for his advice, to Timothy Besley and Andrea Prat for graciously providing me with data and to Nicola Gennaioli, David Strömberg and Jakob Svensson for helpful comments. Financial support was given by Tore Browaldh's Research Foundation. All errors are mine.

Increasingly, evidence gathered by the World Bank and Transparency International suggests that corruption sands rather than greases the economic machinery of society. Corruption is commonly regarded as one of the most serious obstacles to development. Despite knowing its negative consequences, it seems to be very hard to curb, which may be due to the fact that developing countries also have other characteristics in common. These are, in general, characterized by poor political accountability, both because the probability that corrupt governments are punished is low and because there are informational problems related to government activities. Developing countries have weak institutions that are less capable of fighting corruption.

The media plays an essential role in the battle against corruption. It serves as an instrument to disseminate ideas, information and promote public debate. The exposure of cases, in many occasions, has triggered substantial political change. Without an independent media, it is difficult to see how citizens can acquire sufficient information to make meaningful political choices or hold government representatives accountable for their decisions. But the media will only be able fulfil its watchdog role and to reach its full potential in the work to expose and curb corruption if this is met by supportive external political, economic and legal conditions.

Frank Vogl, the Vice Chairman of Transparency International¹, points out that "The fundamental service of the media to strengthen democracy and expose the corrupt will only be attained when the media is protected by independent and honest judges and assisted by courageous public prosecutors and official regulators. One cannot speak about the press working to curb corruption without, in the same breath, speaking of an independent and honest judiciary"².

Horacio Verbitsky, one of Argentina's leading investigative journalists, honored with the Committee to Protect Journalists (CPJ) International Press Freedom Awards in 2001, provides one example of the close link between the media and the judiciary: "In 1990, President Menem increased the membership of the (Argentinean) Supreme Court from 5 to 9 members. He got the resignation of 2 of the biggest members and overnight he appointed 6 out of 9 members of the

¹Transparency International is an international non-governmental organization devoted to combating corruption.

²Transparency International Working Paper: Curbing Corruption: The Media's Work Recommendations for Action by Frank Vogl. Available at http://www.transparency.org/working_papers/vogl-recommendations/index.html

Supreme Court. This packing of the Supreme Court was the key instrument to control the press during his presidency".³

These statements refer to an interaction between different institutions that provide checks and balances on corruption. The nature of this interaction is important for deciding what strategy might best help a country in the fight against corruption. If different institutional measures are substitutes, strengthening one makes the others less effective in the control of corruption. It would then be appropriate to concentrate on the institution that it is easiest to strengthen first. If institutions are instead complements, strengthening one increases the marginal effectiveness of the others. It would then be best to attack corruption on several fronts at the same time.

The purpose of my paper is to analyze, both analytically and empirically, the interaction of three such institutions: the media, the judiciary and the electoral system. I define corruption as the rents extracted by the incumbent from tax revenues. Voters are less likely to re-elect the incumbent if he is corrupt, even more so when informed by the media of the extent of the problem. The judiciary can remove an incumbent proved to be corrupt from office. Based on evidence of the vulnerability of the media when not protected by the judiciary, I assume that such protection is the main link between the two institutions. I consider an extension in which an investigating media protects the judiciary as well.

Related literature

A vast literature analyzes the causes and determinants of corruption; see e.g. Svensson (2004) for a general survey of this literature. I only refer to a few papers of interest for the problem analyzed here.

In an empirical paper, Treisman (2000) analyzes why corruption is perceived to be more widespread in some countries than in others. He considers the risk of getting caught and being punished to be the most obvious cost of corruption, which in part depends on the effectiveness of the country's legal system. Among many other factors, he recognizes that freedom of the press engenders reporters with a mission and the right to expose abuse.

Persson, Tabellini and Trebbi (2003) relate corruption to the different features of the electoral system. Their results suggest that the details of electoral rules have a strong influence on political corruption.

³From transcript of nightline interview with Horacio Verbitsky available at <http://www.cpj.org/awards01/verbitsky.html>

Adserà, Boix and Payne (2003) show that the space left for rent appropriation shrinks as democratic institutions are established and the information among citizens about the state of the world and the policy-maker's decisions increases. According to their results, the presence of democratic mechanisms of control and an increasingly informed electorate, measured through the frequency of newspaper readership, explain the distribution of corrupt practices and governmental ineffectiveness.

Besley and Prat (2002) develop a simple model of democratic politics where the actual freedom of the press is endogenous. A key feature of the model is the possibility that the government can influence the media through threats and promises. This influence is endogenously determined along with re-election rates for politicians and the extent of inefficiency/malfeasance in the political process. In equilibrium, the features of the media market determine the ability of the government to capture the media and control political outcomes.

Djankov, McLiesh, Nenova and Shleifer (2001) examine the patterns of media ownership in 97 countries around the world. They find that government ownership of the media is generally associated with less press freedom, fewer political and economic rights and inferior social outcomes in the areas of education and health. Government ownership of the press typically has a negative effect on citizens' rights, government effectiveness and corruption.

Strömberg (2002) shows that if politicians bias the government in favor of informed voters, then mass media will influence public policy, since the media supplies most of the information people use in voting.

Finally, McMillan and Zoido (2004) look at the case of Peru to check which of the democratic checks and balances - opposition parties, the judiciary or a free press - is most critical. The most forceful of all checks and balances on the Peruvian government's power, by Montesino's revealed preference, was the news media. Mc Millan and Zoido observe that democratic institutions form a system of incentives shaping and constraining government behavior.

Outline

The rest of the paper is organized as follows. In section 2, I present a theoretical model allowing me to analyze the interaction among elections, media and judiciary. This model embeds an investigation game in a simple probabilistic voting model where voters may hold a corrupt incumbent accountable. In this game, it is more favorable for the media and the judiciary to investigate if they

both do so. When this is the case, the three institutional controls do reinforce each other in the control of corruption.

Section 3 begins with a description of the data on corruption and the institutional characteristics to be used in the empirical analysis. My econometric estimates in this section show that the three institutional controls of corruption are indeed complementary in a cross country sample of 74 and 95 countries, respectively. Appendix 4 and 5 present extensions of my model that provide identical predictions.

2 The Model

2.1 General description of the model

I develop a simple model where three institutions, the media, the judiciary and the electoral system, interact to restrict corruption. An incumbent politician (government) decides how much rents to extract from tax revenues, taking into account the effect on his chances of being thrown out of office, either by the judiciary or by the voters. The incumbent can only be replaced by another politician with similar preferences.

Voters dislike corruption, both because higher rents mean less provision of public goods and because they think that a corrupt incumbent cannot be trusted. I assume that voters know how much public goods they enjoy, but cannot directly observe rent extraction (or they can only do it at too high a cost for an individual citizen). Thus, they need the media to report how corrupt the incumbent is. For simplicity, I assume that there exists only one newspaper in the country.

The judiciary has the possibility of removing the incumbent from office when he is found to be corrupt. But the judiciary cannot directly use the media's information to start a process against the incumbent; it must make its own investigation to find verifiable evidence that stands in court. If the incumbent is thrown out of power, he is replaced by another politician with similar preferences, but can still run for elections in the following period. This is justified by considering the incumbent as a group of members of a political party that share the benefit of being in power.

Both the media and the judiciary decide whether to investigate the incumbent, based on their perceived benefits and costs. For simplicity, I will assume that an investigating institution always finds out the level of corruption, that

the media reports the level of corruption found, and the judiciary removes the incumbent if he is found to be corrupt. It is easy to amend the model and make these certain outcomes probabilistic, as shown in Appendix 4.

The main cost faced by an institution if it decides to investigate is the fact that the incumbent and his political party could damage it, both economically and by means of violence. There exist many examples of threats to journalists and judges from corrupt governments. One such is provided by the Observer International (Guardian Unlimited - February 18, 2001): "Zimbabwe's President Robert Mugabe's government yesterday expelled two foreign journalists, giving them 24 hours to leave the country. The action is the latest in a series of assaults on journalists, judges and opposition politicians. Supporters of the Mugabe government have already beaten and threatened Zimbabwean journalists and earlier this month the printing press of the independent Daily News was destroyed in a massive bomb blast. In the past week the government has threatened Supreme Court judges and arrested opposition politicians on spurious charges."

The main mechanism linking media and judiciary in my model is the fact that the judiciary can offer protection to the media, reducing the cost of threatening the incumbent when both institutions investigate. This implies that it is more beneficial for the media to investigate when the judiciary also does so. In an extension in Appendix 5 the judiciary's benefits also depend on whether the media investigates.

In the model, the incumbent is potentially corrupt, while the media and the judiciary are not. In real life, both the media and the judiciary can be paid by the government to follow its orders. The model could be considered as more realistic by reinterpreting their capture as being "more dependent".

2.2 Timing of events

The timing in the model is as follows:

1. The incumbent chooses the level of corruption.
2. An investigation subgame takes place
 - I The judiciary and the media independently and simultaneously choose whether to investigate. If the media investigates, it finds corruption and reports this to its readers. If the judiciary investigates, it finds

corruption and starts a process to throw out the incumbent. The incumbent is then replaced by another politician with similar preferences. If the judiciary and the media make the same choice, the subgame ends here.

II If the uninformed media observes that the judiciary has started a process against the incumbent at stage **I**, it may decide to investigate itself and vice versa. Any investigation at stage **II** has the same consequences as investigation at stage **I**.

3. Elections are held. If the incumbent loses the election, he is replaced by an opponent with similar preferences.

2.3 Elections

In the country, there is a continuum of citizens of measure 1, indexed by i , all with the same income y . Voters derive utility from disposable income, the consumption of public goods and a direct disutility from (reported) corruption according to the following utility function

$$u = y(1 - t) + 2\alpha (yt - r)^{\frac{1}{2}} - \beta\hat{r}.$$

Here, $2\alpha (yt - r)^{\frac{1}{2}}$ is the benefit from the public expenditure, yt is the tax revenue, r is the level of private rents extracted by the incumbent (the level of corruption) and \hat{r} is the level of corruption reported by the media. β is a positive parameter showing how much informed voters dislike corruption as such, on top of the indirect effect through lower public spending.

I assume that the voters use a backward-looking behavior to discipline an incumbent who cannot commit on the level of public expenditure. Voters set a reservation utility for reelecting the incumbent. The only reason for not reelecting the incumbent is to punish him ex post, and since the opponent has identical preferences, it is (weakly) optimal for the voters to carry out this punishment.

This agency model is here combined with the probabilistic voting model adapted to multidimensional redistribution problems by Lindbeck and Weibull (1987). Voters not only do care about the policies adopted by the incumbent (which determine the level of corruption), but also about other attributes such as his ideology or personal characteristics. This ideological dimension is a permanent feature which the incumbent cannot affect. It will be referred to as the unpopularity of the incumbent with respect to the opponent.

I assume voters to differ in their reservation utility and in their preference for the incumbent relative to the opponent. Specifically, the voters are characterized by an exogenously given reservation utility ω_i , uniformly distributed on the support $[\bar{\omega} - \frac{1}{2}, \bar{\omega} + \frac{1}{2}]$. The incumbent has an average unpopularity in the population δ , which also is uniformly distributed on the support $[-\frac{1}{2}z_V, +\frac{1}{2}z_V]$.

Voter i will reelect the incumbent if

$$u \geq \omega_i + \delta.$$

The incumbent's probability of being thrown out by the voters (not elected) is

$$P_V = \Pr\left(\frac{1}{2} + u - \delta - \bar{\omega} < \frac{1}{2}\right) = \frac{1}{2} - \frac{1}{z_V} \left[y(1-t) + 2\alpha (yt-r)^{\frac{1}{2}} - \beta\hat{r} - \bar{\omega} \right]. \quad (1)$$

I will identify parameter z_V with the non-competitiveness of elections. If parameter z_V is high, the average unpopularity of the incumbent in the population has wide support, which means that few voters change their vote when their utility changes. Then, z_V is inversely related to the number of swing voters.

A low value of z_V and/or a high value of $\bar{\omega}$ could be interpreted as being easy for the citizens to participate in the political life of the country and run for public office. This would ensure that the opposition is an appealing alternative to the incumbent, so that it punishing a corrupt incumbent through elections is worthwhile.

2.4 Investigation game

The game at stage 2 is based on a simple technology choice model first formulated by Jean Tirole⁴. Given the assumptions of the model, when deciding whether to investigate or not, the media looks directly at the benefits and costs of the investigation, production and publication of newspaper articles. Similarly, the judiciary looks directly at the benefits and costs of investigating, conducting a process against the incumbent and throwing him out of office.

If the media reports a corruption scandal, it sells more newspapers and may additionally receive more income from (private) advertising. These benefits could be reduced if the media receives less income from government's advertising as a punishment. The investigating journalist could himself benefit through

⁴See Shapiro and Varian (1999).

better career prospects. These benefits become larger if the reported scandal ends in removing the incumbent from office. Similarly, throwing the incumbent out of power provides a better career for the investigating judges. I will assume that the benefits are public knowledge.

I will identify two kinds of costs faced by the players if they decide to investigate. One is the time and money invested in the process. If both institutions investigate, the media's costs are reduced as it can include part of the judiciary's investigation results in its reports. As with the benefits, I will assume this first cost component to be public knowledge.

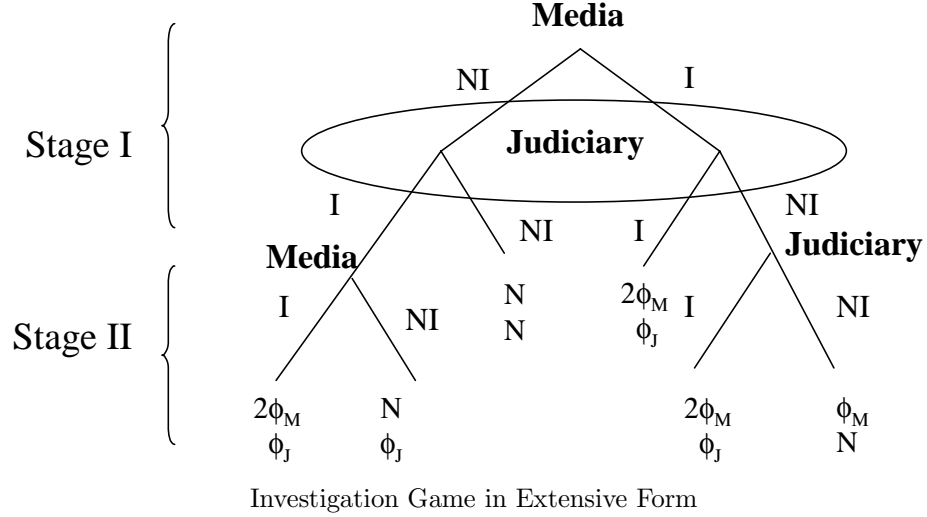
The second component is given by the fact that the incumbent and his political party could damage an institution that investigates him, both economically and by means of violence. As will be revealed by the analysis, the degree of dependence of the media and the judiciary will determine the probability of these institutions investigating the incumbent. When it chooses to investigate and report corruption, the media takes into account the fact that a judiciary independent enough to investigate offers better protection against the risk of punishment by the incumbent. Each institution is uninformed about the realization of the other institution's cost of threatening the incumbent, although its distribution is common knowledge. I consider the judiciary's protection to be the main mechanism linking media and judiciary.

Consider first the benefits and costs for the media and judiciary if only one institution investigates. Formally, let b_H be the benefit of an improved reputation, k_H the cost in terms of time and money and c_H the cost faced by institution $H = J, M$ when threatening the incumbent. For simplicity, I will assume that the benefits and first component of the cost are identical for both institutions, that is, $b_J = b_M = b$ and $k_J = k_M = k$. I assume c_J to be uniformly distributed on the support $\left[a - \frac{1}{z_J}, a \right]$, where z_J is the degree of dependence of the judiciary. Similarly, c_M is uniformly distributed on the support $\left[a - \frac{1}{z_M}, a \right]$, where z_M is the degree of dependence of the media. A more dependent judiciary (media) is more likely to have a high cost for threatening the incumbent, so that its average cost is higher.

I will assume for simplicity that if both institutions investigate, the media's net benefits double, while the judiciary's stay unchanged. If an institution decides not to investigate, it receives a positive constant benefit N , that can be considered as a constant value of choosing the "safe" alternative of status quo.

To simplify the solution of the model, I assume that $a = b - k$ and express the net benefits of investigation in terms of the variable $\phi_H = b - k - c_H$. If

c_J is uniformly distributed on the support $\left[a - \frac{1}{z_J}, a \right]$, then ϕ_J is uniformly distributed on the support $\left[0, \frac{1}{z_J} \right]$. Similarly, ϕ_M is uniformly distributed on the support $\left[0, \frac{1}{z_M} \right]$.



At stage **I**, both players simultaneously decide whether to investigate. If they both make the same decision, the game ends. Otherwise, the player that did not investigate gets another chance.

Each player has three possible strategies:

- i** Never investigate
- ii** Wait until stage **II** and investigate only if the other player did investigate at stage **I**
- iii** Investigate at stage **I**.

Note that the judiciary faces the same decision in both stages, so if it chose not to investigate at stage **I**, it will not change its decision at stage **II**. The judiciary obtains ϕ_J if it chooses to investigate and N otherwise, so it will investigate with the following probability:

$$P_J = \Pr(\phi_J \geq N) = 1 - \frac{N}{\frac{1}{z_J}} = 1 - N z_J. \quad (2)$$

The judiciary is less likely to investigate the more dependent it is.

If the media's benefits from investigation are very high, if $\phi_M \geq N$, the media will choose to investigate at stage **I**. Otherwise, the media will wait until stage **II**. The media will only choose to investigate in this second stage if its benefits are not low ($\phi_M \geq \frac{N}{2}$) and the judiciary investigated at stage **I**.

The overall probability that the media investigates is

$$\begin{aligned} P_M &= \Pr(\phi_M \geq N) + P_J \Pr\left(N > \phi_M \geq \frac{N}{2}\right) \\ &= [1 - N z_M] + [1 - N z_J] \frac{N}{2} z_M, \\ P_M &= 1 - \frac{N}{2} z_M (1 + N z_J). \end{aligned} \quad (3)$$

The media's investigation probability is decreasing in the dependence of both the media and the judiciary, but responds more to a change in the own dependence. For future reference, note that the level of reported corruption in (1) is obtained by multiplying the level of corruption times the probability the voters are informed, that is $\hat{r} = P_M r$.

2.5 Equilibrium level of corruption

The incumbent receives utility from the rents he extracts today and from future exogenous benefits of remaining in power. He can only receive rents today if he is not thrown out by the judiciary, and he can only receive rents tomorrow if he is not thrown out by the voters.

The incumbent then chooses the level of rents (corruption) so as to maximize his expected utility

$$\max_r E(V_I) = (1 - P_J) r + (1 - P_V) R.$$

Taking into account the expressions for P_V , P_J and P_M in (1), (2) and (3), we can solve for the optimal level of corruption

$$r = yt - \left\{ \frac{\alpha R}{N z_J z_V - \beta R \left[1 - \frac{N}{2} z_M (1 + N z_J)\right]} \right\}^2.$$

In Appendix 3, I show the following:

Proposition 1 *The level of corruption is increasing in the dependence of the judiciary (z_J), in the dependence of the media (z_M) and in the non-competitiveness of elections (z_V).*

Higher dependence of the media or the judiciary reduces the probability that both institutions investigate the incumbent. Less competitive elections makes it more likely that the incumbent is re-elected despite being corrupt. As a consequence of these changes, extracting rents becomes less costly for the incumbent and he chooses a higher level of corruption.

The main novelty of the model, however, concerns how these three institutions interact in their control of corruption. Here, the model delivers the following result (also formally derived in Appendix 3)

Proposition 2 *All three institutions complement each other in the control of corruption; that is, the cross derivatives $\frac{\partial^2 r}{\partial z_J \partial z_M}$, $\frac{\partial^2 r}{\partial z_J \partial z_V}$ and $\frac{\partial^2 r}{\partial z_M \partial z_V}$ are all negative.*

It might be easiest to understand the complementarity of the institutional controls if we consider strengthening the institutions. For example, a reform that raises the independence of the judiciary (lower z_J) in itself reduces the level of corruption. But the negative cross derivative, $\frac{\partial^2 r}{\partial z_J \partial z_M} < 0$, also means that a second reform increasing the independency of the media (lower z_M) would now exercise a stronger negative effect on corruption than with a more dependent judiciary. Strengthening one institution increases the marginal effectiveness of the other two. Stated differently, the checks and balances reinforce each other.

3 Empirical Analysis

3.1 Data

3.1.1 Rents

Due to the nature of corruption, it is impossible to directly observe relative corruption among countries. One then needs to rely on indexes of "perceived" corruption based on survey responses of businessmen and local residents. While such ratings are by definition "subjective", different organizations using different techniques derive similar ratings that do not change much from year to year. To set a proxy for r in the model, I use three alternative indexes of perceived corruption: the Corruption Perceptions Index assembled by Transparency International⁵ and two governance indicators produced by the World Bank⁶.

⁵ Available at <http://www.transparency.org/cpi/1999/cpi1999.html>

⁶ Available at <http://www.worldbank.org/wbi/governance/pubs/govmatters3.html>

The goal of the "Corruption Perceptions Index" (CPI) is to provide data on extensive perceptions of corruption within countries. It constitutes a "poll of polls", computed as the simple average of a number of different surveys assessing each country's performance. The results of these surveys are highly positively correlated, which suggests that they measure some common features of the country in question.

The 1999 CPI combines assessments from nine sources in the past three years to reduce abrupt variations in scoring. Such changes may be due to high-level political scandals that affect perceptions, but they do not reflect actual changes in corruption. All sources generally apply a definition of corruption such as the misuse of public power for private benefits. The CPI ranges between 10 (highly clean) and 0 (highly corrupt). As I model the rents kept by the incumbent, I have rescaled the CPI to range from 0 (highly clean) to 1 (highly corrupt). According to the CPI, the country with lowest corruption in my sample is Finland with an index equal to 0.02. The most corrupt country is Cameroon with $CPI = 0.85$.

The two other measures are governance indicators assembled by Kaufmann, Kray and Mastruzzi in the World Bank Institute (WBI) for the year 2000. They present a set of estimates of six dimensions of governance constructed using an unobserved components model⁷. The governance indicators reflect the statistical compilation of responses on the quality of governance given by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries, as reported by a number of survey institutes, think tanks, non-governmental organizations, and international organizations. They are measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes. I have rescaled them to range from 0 (best governance) to 1 (worst governance).

"Control of Corruption" (COCORR) measures perceptions of corruption, conventionally defined as the exercise of public power for private gain. This particular aspect of corruption measured by the various sources differs somewhat, ranging from the frequency of "additional payments to get things done" to the effects of corruption on the business environment, to measuring "grand corruption" in the political arena or in the tendency of elite forms to engage

⁷The authors assume each source to be a noisy indicator for actual levels of governance, which is the "unobservable component" they seek to determine. Based on this model, an average score and a measure of precision are obtained for a large variety of countries. Those sources which better correlate with the resulting aggregate index receive more weight, while those which contribute less, enter the index with less weight. The quality of the sources is therefore endogenously determined and is not an expert's opinion on the validity and reliability of a source.

in "state capture". In my sample, the least corrupt country according to CO-CORR is Finland with an index equal to 0.005 and the most corrupt one is Angola with a value of 0.91.

"Government Effectiveness" (GOVEFF) combines responses on the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures and the credibility of the government's commitments to policies into a single grouping. The main focus of this index is on "inputs" required for the government to be able to produce and implement good policies and deliver public goods. In my sample, government effectiveness varies between 0.04 for Singapore (least corrupt) and 0.8 for Angola (most corrupt).

The model in this paper identifies corruption with the rents extracted from tax revenues by the incumbent. This concept is better measured by the Corruption Perceptions Index and Control of Corruption. I include the regression results for all three measures of corruption, as they are all highly correlated (in the range of 0.9 or higher).

Tables including more detailed summary statistics for all my data are included in appendix 1.

3.1.2 Institutional measures

In my model, the degree of judicial and media dependence determines the probability of corruption being investigated. Each institution is supposed to have a higher average cost of threatening the incumbent the more dependent it is. I try to find proximate empirical measures of such dependency.

Judicial dependence

I use a measure of judicial independence from the Political Constraint Index (POLCON) Dataset Codebook⁸ to create a proxy for z_J in the model. POLCON defines the existence of an independent judiciary by the joint occurrence of a polity score on executive constraints (XCONST) of at least 3 (slight to moderate limitations on the Executive Authority) and, where data is available, an International Country Risk Guide (ICRG) score on Law and Order of at least 4 (a high point total means that there is a strong law and order tradition).

Slight to moderate limitations on the Executive Authority (XCONST=3) implies that there are some real, but limited, restraints on the executive. Evidence

⁸available at <http://www-management.wharton.upenn.edu/henisz/>

of this could be that the legislature initiates some categories of legislation, that the legislature blocks the implementation of executive acts and decrees, that there is an independent judiciary, etc.

The International Country Risk Guide (ICRG) assesses Law and Order separately, with each sub-component comprising zero to three points. The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of the popular observance of the law. Thus, a country can enjoy a high rating (3) in terms of its judicial system, but a low rating (1) if it suffers from a very high crime rate or if the law is routinely ignored without effective sanction (for example, widespread illegal strikes).

This measure is binary, 0 indicates an independent judiciary and 1 a dependent judiciary, and corresponds to the year 1999. The countries with an independent judiciary include, for example, all countries in the OECD except Mexico. In the larger sample, 42 countries out of 95 have a dependent judiciary, that is, $z_J = 1$.

Media dependence

In the real world, as opposed to the model, countries have more than one newspaper. These newspapers have different costs of threatening the incumbent and are therefore more or less likely to investigate corruption. One source of this difference is ownership structure.

State-owned newspapers are likely to have high costs of threatening the incumbent, for many reasons; one being the fact that the government has more to say about who gets to work there. Another is the fact that they typically get to publish more government advertising and, therefore, are more dependent on it.

Foreign-owned newspapers are instead likely to have low costs of threatening the incumbent. Typically, they are also less dependent on government advertising. Moreover, the government will be more careful in threatening these newspapers as this could damage the country's international reputation.

Newspapers with local private ownership are likely to have intermediate costs of threatening the incumbent.

In the model, the average cost of threatening the incumbent is directly related with the degree of dependence of the media. I will proxy this variable (z_M in the model) by the difference between the market share of state-owned and

foreign-owned newspapers in each country (STATE-FOROWN). The variables of this index are defined as follows:

STATE: the market share of state-owned newspapers out of the aggregate market share of the 5 largest daily newspapers (by circulation). This data is available in Simeon Djankov et al (2001).

FOROWN: the market share of foreign-owned newspapers out of the aggregate market share of the 5 largest daily newspapers (by circulation). This data was estimated by Besley and Prat (2002).

The correlation between these two variables measured in 1999 is negative and low (-0.2502). I rescale the proxy for media dependence so that it ranges between 0 (independent media) and 1 (dependent media).

An alternative proxy for the dependence of the media would be the Freedom of the Press Index produced by Freedom House⁹. In my view, the structure of media ownership is a better proxy for the dependence of the media. It is more likely to be exogenous to corruption because ownership is more difficult to change than the freedom of the press. The incumbent might choose a low level of freedom of the press when choosing a high level of corruption to reduce the probability of voters being informed.

Twenty countries out of 95 in my larger sample have a dependent media with an index $z_M = 1$, meaning that the five largest newspapers are state owned. These countries include, for example, Angola, Belarus, Botswana, Burundi, Cameroon, Chad and China. The index is never higher than 0.5 for OECD countries. The only country that has an independent media with an index $z_M = 0$, meaning that the five largest newspapers are foreign owned, is Hungary.

Elections

In the model, the non-competitiveness of elections gives a measure of the risk for the incumbent of being replaced by his opponent, given the policies adopted. The elections are less competitive when it is difficult for the citizens to participate in the political life of the country and run for president. If good politicians can participate in the election as opponents, punishing a corrupt incumbent becomes more attractive. I construct a proxy of this variable using data on the

⁹available at <http://www.freedomhouse.org/research/pressurvey.htm>

competitiveness and openness of executive recruitment and the competitiveness of political participation from the Polity IV Project¹⁰.

The Polity IV Project conceives democracy as having three essential, interdependent elements. The first is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. The second is the existence of institutionalized constraints on the exercise of power by the executive and the third is the guarantee of civil liberties to all citizens in their daily lives and acts of political participation. The democracy indicator is an additive eleven-point scale (0-10). An eleven-point Autocracy scale is constructed additively and derived from codings of the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment and constraints on the chief executive. The Polity score is computed by subtracting the Autocracy score from the Democracy score and ranges from +10 (strongly democratic) to -10 (strongly autocratic).

My proxy for the non-competitiveness of elections is constructed as the difference between AUTOC and DEMOC, after extracting the elements measuring the constraints on the chief executive (XCONST), which were used to measure judicial dependence above, from both indicators.

$$z_V = (AUTOC - XCONST) - (DEMOC - XCONST).$$

AUTOC-XCONST gives an eight-point scale (0-7) and DEMOC-XCONST gives a seven point-scale (0-6), so that the difference has a scale (7,-6). I have rescaled the variable z_V from 0 (competitive elections) to 1 (non-competitive elections). For example, Sweden has $z_V = 0$ and China and Uzbekistan have $z_V = 0.923$.

The correlation between the institutional measures is in all cases higher than 0.55 in the larger sample and higher than 0.45 in the smaller sample (as shown in appendix 1).

3.1.3 Controls

I control for many characteristics of countries that have been shown to affect corruption in the empirical literature. Developing countries are more affected by corruption than developed ones. To control for poverty, I consider the logarithm of the gross domestic product in 1999 at current prices in US dollars, provided

¹⁰ Available at <http://www.cidcm.umd.edu/inscr/polity/index.htm>.

by the Statistics Division of the Department of Economic and Social Affairs of the United Nations¹¹.

The voters can make better use of the available information when they are more educated. To control for the population's education level, I consider the "Education index" based on the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio for the year 2000. The source of this index is the Human Development Indicators 2002 by the United Nations¹².

Legal systems differ in the degree of protection they offer to private property owners harmed by corrupts acts of officials. They also differ in the way they are enforced. I control for the legal origin of the countries using legal dummies from La Porta et al (1999)¹³, who extensively analyzed their impact on various measures of government efficiency.

Another factor affecting the perceived costs of corrupt actions is a country's religious tradition. I include the population share with a Protestant, Catholic or Muslim religious tradition, using data from La Porta et al (1999).

Different regions of the world have other common features not captured by the controls already mentioned that affect the level of corruption. I control for these features by regional dummies corresponding to the division of regions in the World Bank Global Development Network Growth Database and OECD membership.

3.2 Results

As my variables are plagued by measurement error, I run OLS regressions with robust standard errors. I am aware of a potential endogeneity problem in my regressions as the institutional measures and measures of corruption I consider may be related to the same unobserved country characteristics. I have not been able to find any suitable instruments for my institutional measures, so I cannot estimate using instrumental variables. Thus, I will only take the results of my regressions as a preliminary indication of the validity of the predictions of the model.

Data on the level of corruption measured by the Transparency International "Corruption Perception Index" is available for 74 countries. The data on "Control of Corruption" and "Government Effectiveness" by the World Bank Institute and all explanatory variables is available for 95 countries.

¹¹ Available at <http://unstats.un.org/unsd/>

¹² Available at <http://hdr.undp.org/statistics/data>

¹³ Available at <http://iicg.som.yale.edu/data/datasets.shtml>

Dependent Variable: Transparency International CPI							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Judiciary Dependence (z_J)	0.0688 ** (0.028)	0.0644 *** (0.034)	0.0594 * (0.036)	0.1060 *** (0.037)	0.2085 *** (0.067)	0.1105 ** (0.049)	0.0560 (0.036)
Media Dependence (z_M)		0.0272 (0.068)	0.0179 (0.077)	0.0880 (0.078)	0.1304 (0.103)	0.0324 (0.075)	0.1435 (0.108)
Non-competitiveness of elections (z_V)			0.0238 (0.088)	0.1051 (0.111)	0.0399 (0.088)	0.0955 (0.131)	0.2879 (0.183)
$z_J * z_M * z_V$				-0.2187 ** (0.108)			
$z_J * z_M$					-0.2626 ** (0.113)		
$z_J * z_V$						-0.1461 (0.126)	
$z_M * z_V$							-0.3913 * (0.221)
Observations	74	74	74	74	74	74	74
R2	0.7711	0.7716	0.7720	0.7811	0.7833	0.7760	0.7813

Robust standard errors in parenthesis. Controls: income, education, regions, religions and legal origin.
*** means significant at the 1% level, ** at the 5% level and * at the 10% level.

Figure 1: Table 1

Here, I present tables highlighting the relationships in which I am most interested. In appendix 2, I present the results including the coefficients and standard errors for the controls. Many other variables affect corruption on top of the effect of institutional controls and their interactions. In most regressions corruption is lower in countries with a high income, a more educated population, a higher percentage of Protestants, German, French or British legal origin and location in Western Europe and North America or membership in the OECD. Corruption is higher in South Asia and Subsaharan Africa.

In Table 1, I consider the Transparency International "Corruption Perception Index" as my measure of corruption. The regressions in columns (1) to (3) introduce the institutional controls as explanatory variables one by one. The level of corruption is increasing in the dependence of the judiciary (z_J). The co-

efficients for the dependence of the media (z_M) and the non-competitiveness of elections (z_V) are positive, but not significantly different from zero. This could be explained by the high correlation among all three institutional measures. The results are consistent with the predictions of proposition 1.

As shown in appendix 1, the correlation among the institutional measures is in all cases higher than 0.55 in the larger sample and 0.45 in the smaller sample. The correlation among the interaction terms is even higher (larger than 0.77 in both samples). This means that a regression including all three institutional variables and three interaction terms (one for each pair of institutional variables) suffers from substantial collinearity. I will instead focus on the regression in column (4) which only has one interaction term for all three institutional variables. The interaction term is negative and significantly different from zero, as predicted by Proposition 2. To interpret the coefficients in this column, we can look at one country in particular, for example, Croatia.

In 1999, Croatia had a dependent judiciary ($z_J = 1$), the market share of foreign-owned newspapers out of the aggregate market share of the 5 largest daily newspapers was 30% and that of state-owned newspapers was 27%, providing an index of media dependence $z_M = 0.48$ and elections were not competitive ($z_V = 0.77$). The Transparency International CPI for Croatia is $r = 0.73$, leaving the country in rank 57 out of 74, where a lower rank means a more corrupt country.

The average values for the OECD countries are $z_J = 0.04$, $z_M = 0.39$ and $z_V = 0.024$. Imagine that Croatia could introduce a reform process that would take all institutional variables to OECD average levels. Say that it starts by making the judiciary more independent. I am aware that z_J is either 0 or 1 in my data, but I will still use the average level as the target for the sake of the example. The reduction in corruption is

$$\begin{aligned}
 \text{Reform1} \quad \Delta r &= 0.11 \Delta z_J - 0.22 (\Delta z_J * z_M * z_V) \\
 &= 0.11 * (-0.96) - 0.22 * [(-0.96) * 0.48 * 0.77] \\
 &= -0.0242.
 \end{aligned}$$

This moves the country from rank 57 to rank 54 together with Argentina ($r = 0.70$). In the second stage, the elections become more competitive and corruption once more decreases

$$\begin{aligned}
 \text{Reform2} \quad \Delta r &= 0.11 \Delta z_V - 0.22 (z_J * z_M * \Delta z_V) \\
 &= 0.11 * (-0.75) - 0.22 * [0.04 * 0.48 * (-0.75)] \\
 &= -0.0753.
 \end{aligned}$$

This moves the country to rank 41 together with Slovakia ($r = 0,63$). In the third stage, the media becomes more independent and corruption decreases to its new lower level

$$\begin{aligned}
\text{Re form3} \quad \Delta r &= 0.09 \Delta z_M - 0.22 (z_J * \Delta z_M * z_V) \\
&= 0.09 * (-0.09) - 0.22 * [0.04 * (-0.09) * 0.024] \\
&= -0.0079.
\end{aligned}$$

The complete reform leaves the country in rank 39 out of 74, together with South Korea ($r = 0.62$).

To understand the complementarity among institutional controls, one can see the difference between reforming the judiciary first or last. If we reform the judiciary after having reformed elections and the media, the effect of this last reform is

$$\begin{aligned}
\text{Re form4} \quad \Delta r &= 0.11 \Delta z_J - 0.22 (\Delta z_J * z_M * z_V) \\
&= 0.11 * (-0.96) - 0.22 * [(-0.96) * 0.39 * 0.024] \\
&= -0.0998.
\end{aligned}$$

Thus, making the judiciary more independent decreases corruption by 0.02 and moves Croatia on par with 54-ranked Argentina if the other institutions are weak, but it reduces corruption by 0.10 and moves Croatia on par with 41-ranked Slovakia if the other institutions are strong. In fact, Reform 4 gives the same result as Reforms 1 and 2 combined.

In columns (5) to (7), I introduce interaction terms for each pair of institutional controls at a time. Each of the regressions suffers from omitted variables, but they seem to indicate that the interactions are indeed negative.

In Tables 2 and 3, I look at the other measures of corruption, "Control of Corruption" and "Government Effectiveness". In each table, columns (1) to (4) correspond to the same sample of countries as in the regressions using the CPI as a measure of corruption (74 countries), while columns (5) to (8) correspond to the larger sample for which these measures are available (95 countries). Columns (1) to (4) and columns (5) to (8) in Tables 2 and 3 correspond to columns (4) to (7) in Table 1. For each sample size, the specification always includes the three institutional controls and one interaction term plus the general controls.

Dependent Variable: WBI Control of corruption										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Judiciary	0.1512 ***	0.2890 ***	0.1705 ***	0.0695	0.1044 **	0.2411 **	0.1376 **	0.0545		
Dependence (z_J)	(0.042)	(0.087)	(0.059)	(0.048)	(0.043)	(0.093)	(0.057)	(0.045)		
Media Dependence	0.1649	0.2141	0.0777	0.2272	0.1916 **	0.2675 **	0.1256	0.1814		
(z_M)	(0.101)	(0.141)	(0.098)	(0.145)	(0.091)	(0.122)	(0.083)	(0.134)		
Non-competitiveness	0.1248	0.0224	0.1207	0.3675	0.1408	0.0496	0.1876	0.1662		
of elections (z_V)	(0.160)	(0.126)	(0.184)	(0.257)	(0.114)	(0.081)	(0.161)	(0.201)		
$z_J * z_M * z_V$	-0.3538 **				-0.2190 *					
	(0.152)				(0.130)					
$z_J * z_M$		-0.3781 **				-0.3076 **				
		(0.152)				(0.139)				
$z_J * z_V$			-0.2675				-0.2335			
			(0.182)				(0.175)			
$z_M * z_V$				-0.5453 *					-0.1778	
				(0.289)					(0.251)	
Obs	74	74	74	74	95	95	95	95		
R2	0.7434	0.7433	0.7351	0.7389	0.7362	0.7425	0.7365	0.7294		
Robust standard errors in parenthesis. Controls: income, education, regions, religions and legal origin.										
*** means significant at the 1% level, ** at the 5% level and * at the 10% level.										

Figure 2: Table 2

The level of corruption is increasing in the dependency of the judiciary (z_J) for all measures of corruption. In the regressions with the large sample, it is also increasing in the dependency of the media (z_M). The coefficients for the non-competitiveness of elections (z_V) are positive, but not significantly different from zero. The interaction of the three institutional variables is negative and significantly different from zero when corruption is measured as the WBI's "control of corruption" (in both samples) and when measured as the WBI's "government effectiveness" and the sample is small. All in all, these results are consistent with the predictions in propositions 1 and 2.

Dependent Variable: WBI Government Effectiveness									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Judiciary	0.1148 ***	0.2333 ***	0.1478 ***	0.0629	0.0998 ***	0.1592 *	0.1501 ***	0.0694 *	
Dependence (z_j)	(0.041)	(0.079)	(0.047)	(0.047)	(0.038)	(0.082)	(0.043)	(0.041)	
Media Dependence	0.0881	0.1399	0.0359	0.0348	0.1232 *	0.1488 *	0.0879	0.0157	
(z_M)	(0.078)	(0.106)	(0.076)	(0.096)	(0.069)	(0.090)	(0.059)	(0.083)	
Non-competitiveness	0.0625	-0.0035	0.0908	0.0298	0.0480	-0.0105	0.1340	-0.1048	
of elections (z_V)	(0.155)	(0.123)	(0.177)	(0.233)	(0.109)	(0.070)	(0.147)	(0.160)	
$z_j * z_M * z_V$	-0.2385 *				-0.1373				
	(0.144)				(0.124)				
$z_j * z_M$		-0.2984 **				-0.1479			
		(0.126)				(0.115)			
$z_j * z_V$			-0.2414				-0.2340		
			(0.158)				(0.150)		
$z_M * z_V$				-0.0848				0.1327	
				(0.235)				(0.183)	
Obs	74	74	74	74	95	95	95	95	
R2	0.6559	0.6612	0.6571	0.6416	0.6827	0.6825	0.6923	0.6791	

Robust standard errors in parenthesis. Controls: income, education, regions, religions and legal origin.
*** means significant at the 1% level, ** at the 5% level and * at the 10% level.

Figure 3: Table 3

4 Conclusion

This paper explores the interaction of three institutions that provide checks and balances to corruption: the electoral system, the media and the judiciary. Based on evidence of the vulnerability of the media when not protected by the judiciary, I assume that such protection is the main link between the two institutions. I consider an extension in which an investigating media protects the judiciary as well.

In the theoretical model, the three institutions are shown to have an effect on the prevalence of corruption. When the judiciary and media are more dependent and the elections are less competitive, corruption flourishes. The three institutions are also shown to be complementary: strengthening one increases the marginal effectiveness of the others in the control of corruption.

The empirical analysis uses cross-country samples of 74 and 95 countries, respectively. The results indicate that a proxy for the dependence of the judiciary

has a positive and statistically significant effect on three alternative measures of the level of perceived corruption. Proxies for the dependence of the media and the non-competitiveness of elections have a positive effect, but this effect is not statistically significant. Most importantly, every interaction term I estimate has a negative sign, indicating that the institutional controls of corruption are indeed complementary.

It thus appears that institutional controls of corruption are critical and that countries trying to curb corruption should work hard to strengthen whole clusters of institutions at the same time. This complementarity of reforms may be the reason why fighting corruption is so hard and anti-corruption campaigns in many countries have had little or no effect.

5 Bibliography

Adserà A., C. Boix and M. Payne (2003), "Are You Being Served? Political Accountability and Quality of Government", *The Journal of Law, Economics & Organization*, Vol. 19, No. 2.

Besley T. and A. Prat (2002), "Handcuffs for the Grabbing Hand? Media Capture and Government Accountability", CEPR Discussion Paper No. 3132

Djankov S., C. McLiesh, T. Nenova and A. Shleifer (2001), "Who owns the media?", National Bureau of Economic Research Working Paper 8288.

Henisz W. and B. Zelner, Codebook of the Political Constraint Index (POLCON) Dataset.

Kaufmann D., A. Kray and M. Mastruzzi (2003), "Governance Matters III: Governance Indicators for 1996-2002", World Bank Policy Research Working Paper 3106.

La Porta, R., F. Lopez-De-Silanes, A. Shleifer and R. Vishny (1999), "The Quality of Government", *The Journal of Law, Economics and Organization* 15: 222-79.

Lederman, D., N. Loayza and R Reis Soares (2001), "Accountability and Corruption, Political Institutions Matter", No 2708, World Bank Policy Research Working Paper 2708.

Lindbeck, A. and Weibull, J. (1987), "Balanced-Budget Redistribution as the outcome of political competition", *Public Choice* 52: 273-97.

Marshall M. and K. Jaggers (2002), "Polity IV Project - Political Regime Characteristics and Transitions, 1800-2002".

McMillan J. and P. Zoido (2004), "How To Subvert Democracy: Montesinos in Peru" - CES IFO Working Paper No. 1173.

Persson T. and G. Tabellini (2000), "*Political Economics Explaining Economic Policy*" - The MIT Press.

Persson T., G. Tabellini and F. Trebbi (2003), "Electoral Rules and Corruption", *Journal of the European Economic Association*, MIT Press, vol. 1(4), pages 958-989.

Shapiro, C., and H. Varian (1998), "*Information Rules: A Strategic Guide to the Network Economy*". Boston: Harvard Business School Press.

Strömberg, D.(2004), "Mass Media Competition, Political Competition, and Public Policy", *Review of Economic Studies*, vol. 71, issue 1, pages 265-284.

Svensson, J.(2004), "Seven Q&As about Corruption", draft.

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

6 Appendix 1 : Description of the data

6.1 Smaller sample

Sample: 74 countries

Variable	Mean	Std. Dev.	Min	Max
TI CPI	0.5284	0.2363	0.0200	0.8500
GOVEFF	0.4059	0.1982	0.0039	0.7235
COCORR	0.5050	0.2616	0.0046	0.8502
Z_J	0.3243	0.4713	0.0000	1.0000
Z_M	0.5297	0.2415	0.0000	1.0000
Z_V	0.2588	0.3064	0.0000	0.9230
$Z_J * Z_M * Z_V$	0.1300	0.2515	0.0000	0.9230
$Z_J * Z_M$	0.2223	0.3520	0.0000	1.0000
$Z_J * Z_V$	0.1715	0.2976	0.0000	0.9230
$Z_M * Z_V$	0.1805	0.2567	0.0000	0.9230
Income	4.7718	0.8716	3.0689	6.9644
Education	0.8435	0.1503	0.3700	0.9900
Protestant	12.8514	21.3337	0.0000	97.8000
State	0.1966	0.3408	0.0000	1.0000
Forown	0.1374	0.2675	0.0000	1.0000

Table 4

Correlations:

Variable	TI CPI	GOVEFF	COCORR	Z_J	Z_M	Z_V	$Z_J * Z_M * Z_V$	$Z_J * Z_M$	$Z_J * Z_V$	$Z_M * Z_V$	Education	Income	Protest.	State	Forown
TI CPI	1.00														
GOVEFF	0.91	1.00													
COCORR	0.97	0.95	1.00												
Z_J	0.51	0.47	0.51	1.00											
Z_M	0.36	0.34	0.39	0.45	1.00										
Z_V	0.54	0.53	0.55	0.61	0.59	1.00									
$Z_J * Z_M * Z_V$	0.41	0.37	0.39	0.75	0.66	0.77	1.00								
$Z_J * Z_M$	0.47	0.43	0.47	0.92	0.64	0.68	0.91	1.00							
$Z_J * Z_V$	0.47	0.42	0.44	0.84	0.55	0.80	0.95	0.89	1.00						
$Z_M * Z_V$	0.47	0.47	0.48	0.60	0.74	0.94	0.88	0.77	0.82	1.00					
Income	-0.52	-0.62	-0.58	-0.26	-0.25	-0.48	-0.25	-0.27	-0.30	-0.39	1.00				
Education	-0.53	-0.48	-0.54	-0.40	-0.42	-0.56	-0.34	-0.39	-0.39	-0.50	0.39	1.00			
Protestant	-0.57	-0.41	-0.49	-0.24	-0.21	-0.27	-0.23	-0.24	-0.25	-0.25	0.13	0.23	1.00		
State	0.37	0.37	0.96	0.47	0.84	0.69	0.76	0.70	0.63	0.84	-0.40	-0.39	-0.13	1.00	
Forown	-0.19	-0.15	-0.19	-0.21	-0.73	-0.20	-0.23	-0.27	-0.20	-0.27	-0.05	0.26	0.21	-0.25	1.00

Table 5

6.2 Larger sample

Sample: 95 countries

Variable	Mean	Std. Dev.	Min	Max
GOVEFF	0.4502	0.2044	0.0039	0.8000
COCORR	0.5490	0.2554	0.0046	0.9078
Z _J	0.4421	0.4993	0.0000	1.0000
Z _M	0.6007	0.2687	0.0000	1.0000
Z _V	0.3304	0.3376	0.0000	1.0000
Z _J *Z _M *Z _V	0.2094	0.3064	0.0000	0.9230
Z _J *Z _M	0.3396	0.4156	0.0000	1.0000
Z _J *Z _V	0.2575	0.3497	0.0000	1.0000
Z _M *Z _V	0.2529	0.2984	0.0000	0.9230
Income	4.5759	0.9025	2.9074	6.9644
Education	0.7946	0.1927	0.1600	0.9900
Protestant	10.7863	19.3974	0.0000	97.8000
State	0.3100	0.4123	0.0000	1.0000
Forown	0.1087	0.2424	0.0000	1.0000

Table 6

Correlations

Variable	GOVEFF	COCORR	Z _J	Z _M	Z _V	Z _J *Z _M *Z _V	Z _J *Z _M	Z _J *Z _V	Z _M *Z _V	Educat.	Income	Protest.	State	Forown
GOVEFF	1.00													
COCORR	0.94	1.00												
Z _J	0.57	0.56	1.00											
Z _M	0.52	0.52	0.56	1.00										
Z _V	0.54	0.55	0.67	0.61	1.00									
Z _J *Z _M *Z _V	0.50	0.48	0.77	0.71	0.84	1.00								
Z _J *Z _M	0.58	0.56	0.92	0.74	0.70	0.89	1.00							
Z _J *Z _V	0.48	0.47	0.83	0.59	0.88	0.95	0.85	1.00						
Z _M *Z _V	0.55	0.55	0.66	0.77	0.94	0.93	0.79	0.87	1.00					
Income	-0.65	-0.60	-0.38	-0.40	-0.45	-0.34	-0.43	-0.35	-0.42	1.00				
Education	-0.54	-0.54	-0.46	-0.52	-0.40	-0.33	-0.51	-0.33	-0.40	0.52	1.00			
Protestant	-0.41	-0.48	-0.27	-0.25	-0.29	-0.26	-0.26	-0.28	-0.27	0.17	0.23	1.00		
State	0.55	0.53	0.56	0.90	0.64	0.76	0.78	0.62	0.81	-0.49	-0.51	-0.18	1.00	
Forown	-0.22	-0.24	-0.28	-0.68	-0.25	-0.28	-0.32	-0.26	-0.31	0.05	0.27	0.25	-0.30	1.00

Table 7

7 Appendix 2 : Empirical Results

Dependent Variable: Transparency International CPI											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)				
Judiciary	0.0688 **	0.0644 ***	0.0594 *	0.1060 ***	0.2085 ***	0.1105 **	0.0560				
Dependence (z_j)	(0.028)	(0.034)	(0.036)	(0.037)	(0.067)	(0.049)	(0.036)				
Media Dependence		0.0272	0.0179	0.0880	0.1304	0.0324	0.1435				
(z_M)		(0.068)	(0.077)	(0.078)	(0.103)	(0.075)	(0.108)				
Non-competitiveness			0.0238	0.1051	0.0399	0.0955	0.2879				
of elections (z_V)			(0.088)	(0.111)	(0.088)	(0.131)	(0.183)				
$z_j^*z_M^*z_V$				-0.2187 **							
				(0.108)							
$z_j^*z_M$					-0.2626 **						
					(0.113)						
$z_j^*z_V$						-0.1461					
						(0.126)					
$z_M^*z_V$										-0.3913 *	
										(0.221)	
income	-0.0023	-0.0015	0.0001	0.0081	0.0053	0.0012	0.0134				
	(0.021)	(0.022)	(0.023)	(0.021)	(0.021)	(0.022)	(0.022)				
education	-0.0800	-0.0672	-0.0425	-0.0352	-0.0854	-0.0303	-0.0658				
	(0.191)	(0.200)	(0.231)	(0.235)	(0.223)	(0.237)	(0.231)				
protestants	-0.0048 ***	-0.0048 ***	-0.0048 ***	-0.0048 ***	-0.0047 ***	-0.0049 ***	-0.0048 ***				
	(0.001)	(0.001)	(0.231)	(0.001)	(0.001)	(0.001)	(0.001)				
leg-germ	-0.1440 **	-0.1453 **	-0.1440 **	-0.1609 **	-0.1615 **	-0.1481 **	-0.1668 ***				
	(0.066)	(0.066)	(0.067)	(0.064)	(0.064)	(0.067)	(0.063)				
leg-fren	-0.1204 **	-0.1217 **	-0.1184 **	-0.1401 ***	-0.1400 ***	-0.1288 **	-0.1416 ***				
	(0.046)	(0.046)	(0.050)	(0.049)	(0.049)	(0.050)	(0.049)				
leg-brit	-0.2372 ***	-0.2375 ***	-0.2374 ***	-0.2625 ***	-0.2603 ***	-0.2491 ***	-0.2611 ***				
	(0.063)	(0.063)	(0.064)	(0.060)	(0.061)	(0.062)	(0.059)				
weeur-nam	-0.1506 ***	-0.1521 ***	-0.1527 ***	-0.1418 ***	-0.1468 ***	-0.1394 ***	-0.1482 ***				
	(0.049)	(0.049)	(0.050)	(0.048)	(0.048)	(0.051)	(0.047)				
southasia	0.2608 ***	0.2662 ***	0.2739 ***	0.2763 **	0.2456 **	0.2919 ***	0.2430 **				
	(0.095)	(0.098)	(0.101)	(0.106)	(0.103)	(0.106)	(0.108)				
subsahaf	0.2647 **	0.2640 ***	0.2694 ***	0.2617 ***	0.2534 ***	0.2640 ***	0.2687 ***				
	(0.071)	(0.071)	(0.069)	(0.072)	(0.069)	(0.073)	(0.069)				
cons	0.7433 ***	0.7163 ***	0.6858 ***	0.6112 **	0.6598 ***	0.6577 **	0.5949 ***				
	(0.173)	(0.198)	(0.239)	(0.251)	(0.237)	(0.248)	(0.248)				
Obs	74	74	74	74	74	74	74				
R2	0.7711	0.7716 ²⁹	0.7720	0.7811	0.7833	0.7760	0.7813				

Robust standard errors in parenthesis. ***= significant at the 1% level, ** at the 5% level and * at the 10% level

Table 8

Dependent Variable: WBI Control of corruption										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Judiciary	0.1512 ***	0.2890 ***	0.1705 ***	0.0695	0.1044 **	0.2411 **	0.1376 **	0.0545		
Dependence (z _J)	(0.042)	(0.087)	(0.059)	(0.048)	(0.043)	(0.093)	(0.057)	(0.045)		
Media Dependence (z _M)	0.1649	0.2141	0.0777	0.2272	0.1916 **	0.2675 **	0.1256	0.1814		
	(0.101)	(0.141)	(0.098)	(0.145)	(0.091)	(0.122)	(0.083)	(0.134)		
Non-competitiveness of elections (z _V)	0.1248	0.0224	0.1207	0.3675	0.1408	0.0496	0.1876	0.1662		
	(0.160)	(0.126)	(0.184)	(0.257)	(0.114)	(0.081)	(0.161)	(0.201)		
z _J *z _M *z _V	-0.3538 **				-0.2190 *					
	(0.152)				(0.130)					
z _J *z _M		-0.3781 **				-0.3076 **				
		(0.152)				(0.139)				
z _J *z _V			-0.2675				-0.2335			
			(0.182)				(0.175)			
z _M *z _V				-0.5453 *					-0.1778	
				(0.289)					(0.251)	
income	-0.0023	-0.0085	-0.0128	0.0026	-0.0006	-0.0056	-0.0052	-0.0013		
	(0.024)	(0.023)	(0.024)	(0.025)	(0.020)	(0.020)	(0.020)	(0.022)		
education	-0.2800	-0.3049	-0.3011	-0.2732	-0.1014	-0.1474	-0.1004	-0.1028		
	(0.218)	(0.207)	(0.227)	(0.208)	(0.123)	(0.116)	(0.127)	(0.119)		
protestants	-0.0040 ***	-0.0039 ***	-0.0041 ***	-0.0040 ***	-0.0038 ***	-0.0037 ***	-0.0039 ***	-0.0038 ***		
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		
leg-germ	-0.1895 ***	-0.1861 ***	-0.1705 **	-0.1925 ***	-0.1847 ***	-0.1873 ***	-0.1699 ***	-0.1806 ***		
	(0.062)	(0.063)	(0.066)	(0.063)	(0.059)	(0.059)	(0.058)	(0.062)		
leg-fren	-0.1725 ***	-0.1641 ***	-0.1592 ***	-0.1652 ***	-0.1624 ***	-0.1644 ***	-0.1510 ***	-0.1514 ***		
	(0.057)	(0.059)	(0.058)	(0.058)	(0.052)	(0.052)	(0.049)	(0.055)		
leg-brit	-0.2216 ***	-0.2173 ***	-0.2002 ***	-0.2176 ***	-0.1846 ***	-0.1942 ***	-0.1686 ***	-0.1721 ***		
	(0.068)	(0.069)	(0.070)	(0.068)	(0.052)	(0.053)	(0.049)	(0.055)		
weeur-nam	-0.1616 ***	-0.1725 ***	-0.1537 ***	-0.1748 ***	-0.1840 ***	-0.1865 ***	-0.1774 ***	-0.1976 ***		
	(0.052)	(0.051)	(0.056)	(0.051)	(0.047)	(0.045)	(0.050)	(0.047)		
subsahaf	0.1888 **	0.1918 ***	0.1826 **	0.2146 ***	0.1652 ***	0.1728 ***	0.1552 **	0.1784 ***		
	(0.072)	(0.070)	(0.078)	(0.068)	(0.055)	(0.054)	(0.060)	(0.057)		
cons	0.8152 ***	0.8557 ***	0.9122 ***	0.7643 ***	0.6285 ***	0.6715 ***	0.6643 ***	0.6428 ***		
	(0.248)	(0.235)	(0.247)	(0.267)	(0.133)	(0.132)	(0.132)	(0.153)		
Obs	74	74	74	74	95	95	95	95		
R2	0.7434	0.7433	0.7351	0.7389	0.7362	0.7425	0.7365	0.7294		

Robust standard errors in parenthesis. ***= significant at the 1% level, ** at the 5% level and * at the 10% level

Table 9

Dependent Variable: WBI Government Effectiveness										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Judiciary	0.1148 ***	0.2333 ***	0.1478 ***	0.0629	0.0998 ***	0.1592 *	0.1501 ***	0.0694 *		
Dependence (z _J)	(0.041)	(0.079)	(0.047)	(0.047)	(0.038)	(0.082)	(0.043)	(0.041)		
Media Dependence (z _M)	0.0881	0.1399	0.0359	0.0348	0.1232 *	0.1488 *	0.0879	0.0157		
	(0.078)	(0.106)	(0.076)	(0.096)	(0.069)	(0.090)	(0.059)	(0.083)		
Non-competitiveness of elections (z _V)	0.0625	-0.0035	0.0908	0.0298	0.0480	-0.0105	0.1340	-0.1048		
	(0.155)	(0.123)	(0.177)	(0.233)	(0.109)	(0.070)	(0.147)	(0.160)		
z _J *z _M *z _V	-0.2385 *				-0.1373					
	(0.144)				(0.124)					
z _J *z _M		-0.2984 **					-0.1479			
		(0.126)					(0.115)			
z _J *z _V			-0.2414					-0.2340		
			(0.158)					(0.150)		
z _M *z _V				-0.0848					0.1327	
				(0.235)					(0.183)	
income	-0.0430 *	-0.0479 **	-0.0470 **	-0.0492 **	-0.0394 **	-0.0441 **	-0.0395 **	-0.0440 **		
	(0.022)	(0.021)	(0.022)	(0.022)	(0.019)	(0.020)	(0.020)	(0.020)		
education	-0.3075	-0.3327 *	-0.3110	-0.3183 *	-0.2348 **	-0.2645 ***	-0.2153 **	-0.2412 ***		
	(0.193)	(0.187)	(0.193)	(0.191)	(0.093)	(0.094)	(0.094)	(0.090)		
oeed	-0.0922 *	-0.0908 *	-0.0881 *	-0.1093 **	-0.1031 **	-0.1021 **	-0.0938 **	-0.1289 ***		
	(0.050)	(0.051)	(0.052)	(0.052)	(0.044)	(0.046)	(0.044)	(0.045)		
protestants	-0.0022 ***	-0.0021 ***	-0.0022 ***	-0.0021 ***	-0.0019 ***	-0.0019 ***	-0.0020 ***	-0.0018 ***		
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		
leg-germ	-0.1110 *	-0.1126 *	-0.1022 *	-0.0906	-0.1100 *	-0.1084 *	-0.1055 *	-0.0846		
	(0.059)	(0.062)	(0.061)	(0.064)	(0.056)	(0.059)	(0.055)	(0.062)		
leg-fren	-0.1251 ***	-0.1240 **	-0.1212 **	-0.1030 **	-0.1136 ***	-0.1107 **	-0.1128 ***	-0.0873 **		
	(0.047)	(0.051)	(0.047)	(0.049)	(0.040)	(0.044)	(0.038)	(0.041)		
leg-brit	-0.1307 ***	-0.1320 **	-0.1234 **	-0.1054 **	-0.1323 ***	-0.1313 ***	-0.1299 ***	-0.1049 ***		
	(0.049)	(0.054)	(0.049)	(0.052)	(0.038)	(0.043)	(0.037)	(0.040)		
cons	0.9469 ***	0.9769 ***	0.9841 ***	1.0124 ***	0.8454 ***	0.8878 ***	0.8297 ***	0.9251 ***		
	(0.230)	(0.203)	(0.224)	(0.225)	(0.103)	(0.091)	(0.106)	(0.101)		
Obs	74	74	74	74	95	95	95	95		
R2	0.6559	0.6612	0.6571	0.6416	0.6827	0.6825	0.6923	0.6791		

Robust standard errors in parenthesis. ***= significant at the 1% level, ** at the 5% level and * at the 10% level

Table 10

8 Appendix 3 : Proof of Propositions 1 and 2.

The level of rents extracted by the incumbent is in section 2.5 found to be:

$$r = yt - \left\{ \frac{16 \alpha R}{[8Nz_Jz_V + 8\beta R N z_M + 3N^2 z_J z_M (z_V + \beta R) - 16\beta R]} \right\}^2.$$

The derivative of this level with respect to the three institutional variables of interest is the following:

$$\frac{\partial r}{\partial z_J} = + \frac{2(\alpha R)^2 N (z_V + \beta R \frac{N}{2} z_M)}{\{N z_J z_V - \beta R [1 - \frac{N}{2} z_M (1 + Nz_J)]\}^3} > 0,$$

which means that the level of corruption is decreasing in the degree of independence of the judiciary.

$$\frac{\partial r}{\partial z_M} = + \frac{(\alpha R)^2 \beta R N (1 + Nz_J)}{\{N z_J z_V - \beta R [1 - \frac{N}{2} z_M (1 + Nz_J)]\}^3} > 0,$$

which means that the level of corruption is decreasing in the degree of independence of the media.

$$\frac{\partial r}{\partial z_V} = + \frac{2(\alpha R)^2 N z_J}{\{N z_J z_V - \beta R [1 - \frac{N}{2} z_M (1 + Nz_J)]\}^3} > 0,$$

which means that the level of corruption is decreasing in the degree of responsiveness of voters.

$$\frac{\partial^2 r}{\partial z_M \partial z_J} = - \frac{(\alpha RN)^2 \beta R \{3z_V + 2N z_J z_V + \beta R [1 + N z_M (1 + Nz_J)]\}}{\{N z_J z_V - \beta R [1 - \frac{N}{2} z_M (1 + Nz_J)]\}^4} < 0,$$

$$\frac{\partial^2 r}{\partial z_M \partial z_V} = - \frac{3(\alpha RN)^2 \beta R z_J (1 + Nz_J)}{\{N z_J z_V - \beta R [1 - \frac{N}{2} z_M (1 + Nz_J)]\}^4} < 0,$$

which means that the media is complementary in the control of corruption both with the judiciary and the elections.

$$\frac{\partial^2 r}{\partial z_J \partial z_V} = - \frac{2(\alpha R)^2 N \{N z_J z_V + \beta R [1 + N z_M (Nz_J - \frac{1}{2})]\}}{\{N z_J z_V - \beta R [1 - \frac{N}{2} z_M (1 + Nz_J)]\}^4},$$

$$\frac{\partial^2 r}{\partial z_J \partial z_V} < 0 \quad \text{if} \quad N z_J z_V + \beta R + \beta RN^2 z_M z_J > \beta R \frac{N}{2} z_M,$$

so the judiciary and the elections are complementary in the control of corruption unless z_J is very small ($z_J < \frac{1}{2N}$) and, at the same time, z_M is quite big ($z_M > \frac{2}{N}$, so z_M needs to be at least four times bigger than z_J).

9 Appendix 4 : Probabilistic Outcomes

Consider an alternative investigation game in which outcomes are not certain but probabilistic. If the media decides to investigate, it will find out corruption and report it with probability λ . Similarly, if the judiciary decides to investigate, it will find out reliable evidence of corruption and be able to remove the incumbent of office with probability ε . An institution that decides to investigate and has no success obtains zero benefits, which is lower than the benefits of an institution that does not investigate ($N > 0$).

The judiciary's decision is independent of the media's decision. The judiciary obtains ϕ_J with probability ε and 0 with probability $(1 - \varepsilon)$ if it chooses to investigate and N otherwise, so it will investigate with the following probability

$$\Pr(\varepsilon \phi_J \geq N) = 1 - \frac{\frac{N}{\varepsilon}}{\frac{1}{z_J}} = 1 - \frac{N}{\varepsilon} z_J.$$

The judiciary will find out corruption and start a process against the incumbent with probability

$$P_J = \varepsilon \Pr(\varepsilon \phi_J \geq N) = \varepsilon - N z_J.$$

If the media's benefits from investigation are very high, if $\lambda \phi_M \geq N$, the media will choose to investigate at stage **I**. Otherwise, the media will wait until stage **II**. The media will only choose to investigate in this second stage if its benefits are not low ($\lambda \phi_M \geq \frac{N}{2}$) and the judiciary investigated at stage **I**.

The overall probability that the media investigates is

$$\begin{aligned} P_M &= \lambda \Pr(\lambda \phi_M \geq N) + \lambda \Pr\left(N > \lambda \phi_M \geq \frac{N}{2}\right) P_J \\ &= [\lambda - N z_M] + [\varepsilon - N z_J] \frac{N}{2} z_M, \\ P_M &= \lambda - N z_M \left(1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J\right). \end{aligned}$$

From section 2.3, the incumbent's probability of being thrown out by the voters is

$$P_V = \frac{1}{2} - \frac{1}{z_V} \left[y(1-t) + 2\alpha (yt-r)^{\frac{1}{2}} - \beta P_M r - \bar{\omega} \right].$$

The optimal level of corruption is now

$$r = yt - \left\{ \frac{\alpha R}{(1 - \varepsilon + N z_J) z_V - \beta R \left[\lambda - N z_M \left(1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J\right) \right]} \right\}^2.$$

Propositions 1 and 2 still hold in this alternative version of the model as shown in the following derivatives.

$$\frac{\partial r}{\partial z_J} = + \frac{2(\alpha R)^2 N (z_V + \beta R \frac{N}{2} z_M)}{\{(1 - \varepsilon + N z_J) z_V - \beta R [\lambda - N z_M (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)]\}^3} > 0,$$

which means that the level of corruption is decreasing in the degree of independence of the judiciary.

$$\frac{\partial r}{\partial z_M} = + \frac{2(\alpha R)^2 \beta R N (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)}{\{(1 - \varepsilon + N z_J) z_V - \beta R [\lambda - N z_M (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)]\}^3} > 0,$$

which means that the level of corruption is decreasing in the degree of independence of the media.

$$\frac{\partial r}{\partial z_V} = + \frac{2(\alpha R)^2 (1 - \varepsilon + N z_J)}{\{(1 - \varepsilon + N z_J) z_V - \beta R [\lambda - N z_M (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)]\}^3} > 0,$$

which means that the level of corruption is decreasing in the degree of responsiveness of voters.

$$\frac{\partial^2 r}{\partial z_M \partial z_J} = - \frac{(\alpha R N)^2 \beta R \left\{ \begin{array}{l} \beta R [\lambda + N z_M (2 - \varepsilon + N z_J)] + \\ + z_V (5 - 2\varepsilon) + 2N z_J z_V + \end{array} \right\}}{\{(1 - \varepsilon + N z_J) z_V - \beta R [\lambda - N z_M (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)]\}^4} < 0,$$

$$\frac{\partial^2 r}{\partial z_M \partial z_V} = - \frac{6(\alpha R)^2 \beta R N (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J) (1 - \varepsilon + N z_J)}{\{(1 - \varepsilon + N z_J) z_V - \beta R [\lambda - N z_M (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)]\}^4} < 0,$$

which means that the media is complementary in the control of corruption both with the judiciary and the elections.

$$\frac{\partial^2 r}{\partial z_J \partial z_V} = - \frac{2(\alpha R)^2 \left\{ \begin{array}{l} \beta R [\lambda + \frac{N}{2} z_M (1 - 2\varepsilon + 2N z_J)] + \\ + 2(1 - \varepsilon + N z_J) z_V \end{array} \right\}}{\{(1 - \varepsilon + N z_J) z_V - \beta R [\lambda - N z_M (1 - \frac{\varepsilon}{2} + \frac{N}{2} z_J)]\}^4},$$

so the judiciary and the elections are complementary in the control of corruption unless z_J is very small ($z_J < \frac{2\varepsilon-1}{2N}$) and, at the same time, z_M is quite big.

The incorporation of probabilistic outcomes does not change then the predictions of the model.

10 Appendix 5 : Mutual Protection

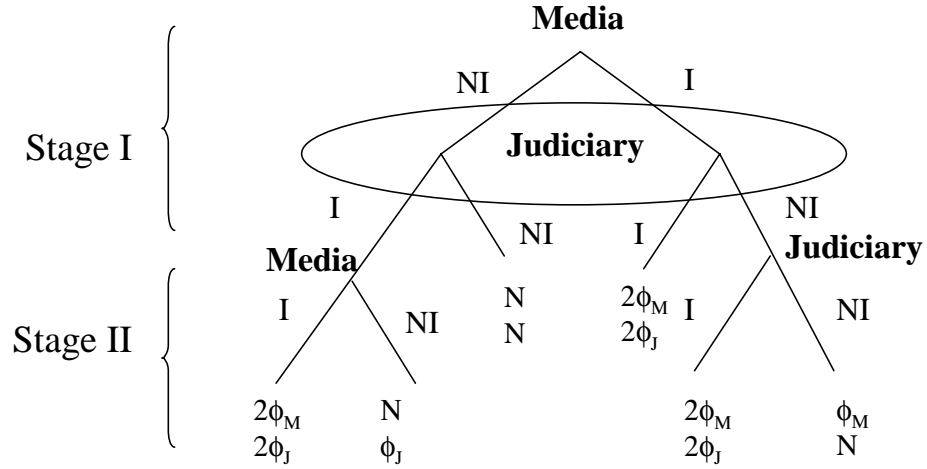
In this Appendix, I further assume that the judiciary receives higher net benefits if both institutions investigate. The judge's reputation grows more if the corruption scandal and the consequent process are reported by the media. Both institutions can share part of the costs in terms of time and money. And, most importantly, the fact that the media reports a corruption scandal provides protection to an investigating judiciary.

As in Section 2.4, let b be the benefit of an improved reputation, k the cost in terms of time and money and c_H the cost faced by institution $H = J, M$ when threatening the incumbent. I assume c_J to be uniformly distributed on the support $\left[a - \frac{1}{z_J}, a \right]$, where z_J is the degree of dependence of the judiciary. Similarly, c_M is uniformly distributed on the support $\left[a - \frac{1}{z_M}, a \right]$, where z_M is the degree of dependence of the media. A more dependent judiciary (media) is more likely to have a high cost for threatening the incumbent, so that its average cost is higher. Each institution is uninformed about the realization of the other institution's cost of threatening the incumbent, although its distribution is common knowledge.

The benefits for institution H depend on the decision taken by both institutions as follows:

- $2(b - k - c_H)$ if both institutions investigate
- $(b - k - c_H)$ if only institution H investigates
- A constant benefit N (assumed to be positive) if institution H does not investigate. N can be considered as a constant value of choosing the "safe" alternative of status quo.

I assume once more that $a = b - k$ and express the net benefits of investigation in terms of the variable $\phi_H = b - k - c_H$. If c_J is uniformly distributed on the support $\left[a - \frac{1}{z_J}, a \right]$, then ϕ_J is uniformly distributed on the support $\left[0, \frac{1}{z_J} \right]$. Similarly, ϕ_M is uniformly distributed on the support $\left[0, \frac{1}{z_M} \right]$.



Alternative Investigation Game in Extensive Form

At stage **I**, both players simultaneously decide whether to investigate. If they both make the same decision, the game ends. Otherwise, the player that did not investigate gets another chance. The advantage of investigating at stage **I** in this alternative game is that you may cause the other player to investigate at stage **II**, in case she would not do it on her own. The disadvantage is that you might investigate and regret it. A player who waits can make her best choice based on the other's decision. But both may lose if they simultaneously decide to wait and see.

One can find the equilibrium of this game by using backwards induction. Stage **II** occurs only if one of the players has investigated but the other has not. Assume first that the judiciary did investigate while the media did not. What will the media do? It gets $2\phi_M$ if it does investigate and N if not, so it will never investigate if $\phi_M < \frac{N}{2}$. Given the distribution of ϕ_M , the probability of the media investigating at stage **II** is

$$\Pr\left(\phi_M \geq \frac{N}{2}\right) = 1 - \frac{\frac{N}{2}}{\frac{1}{z_M}} = 1 - \frac{N}{2}z_M.$$

So, for the judiciary, the expected value of investigating at stage **I** is

$$\begin{aligned} E(V_J | \text{inv. at stage a}) &= \Pr\left(\phi_M \geq \frac{N}{2}\right) 2\phi_J + \Pr\left(\phi_M < \frac{N}{2}\right) \phi_J \\ &= \left(1 - \frac{N}{2}z_M\right) 2\phi_J + \frac{N}{2}z_M\phi_J = \left(2 - \frac{N}{2}z_M\right) \phi_J. \end{aligned}$$

By symmetry of benefits, the judiciary will investigate at stage **II** if $\phi_J \geq \frac{N}{2}$

and, for the media, the expected value of investigating at stage **a** is

$$E(V_M | \text{inv. at stage a}) = \left(2 - \frac{N}{2}z_J\right)\phi_M.$$

It must be the case that a player with a sufficiently low cost of threatening the incumbent (i.e., ϕ_H sufficiently large) would always want to investigate. The equilibrium strategy must look something like:

- i** If $\phi_H < \frac{N}{2}$, never investigate
- ii** If $\frac{N}{2} \leq \phi_H < \phi_H^*$, do not investigate at stage **a**, but investigate at stage **II** if the other player investigated at stage **I**
- iii** If $\phi_H \geq \phi_H^*$, investigate at stage **I**

What is ϕ_H^* ? It is the value of ϕ_H that makes a player indifferent between investigating at stage **I** or waiting in order to decide at stage **II**. First, consider the problem from the point of view of the judiciary.

$$E(V_J | \text{inv. at stage a and } \phi_J = \phi_J^*) = \Pr(\phi_M < \phi_M^*)N + \Pr(\phi_M \geq \phi_M^*)2\phi_J^* \\ \left(2 - \frac{N}{2}z_M\right)\phi_J^* = (z_M\phi_M^*)N + (1 - z_M\phi_M^*)2\phi_J^*.$$

Simplifying, this equation becomes

$$2N\phi_M^* + N\phi_J^* - 4\phi_M^*\phi_J^* = 0. \quad (4)$$

Similarly, the problem from the point of view of the media is

$$E(V_M | \text{inv. at stage a and } \phi_M = \phi_M^*) = \Pr(\phi_J < \phi_J^*)N + \Pr(\phi_J \geq \phi_J^*)2\phi_M^* \\ \left(2 - \frac{N}{2}z_J\right)\phi_M^* = (z_J\phi_J^*)N + (1 - z_J\phi_J^*)2\phi_M^*.$$

Simplifying once more, this equation becomes

$$2N\phi_J^* + N\phi_M^* - 4\phi_M^*\phi_J^* = 0. \quad (5)$$

Equations (4) and (5) imply that $\phi_M^* = \phi_J^* = \phi^*$. We can then obtain this threshold level

$$\phi^* (3N - 4\phi^*) = 0 \implies \phi^* = \frac{3N}{4}.$$

The overall probability that the judiciary investigates is then

$$\begin{aligned}
P_J &= \Pr\left(\phi_J \geq \frac{3N}{4}\right) + \Pr\left(\frac{N}{2} \leq \phi_J < \frac{3N}{4}\right) \Pr\left(\phi_M \geq \frac{3N}{4}\right) \\
&= \left(1 - \frac{3}{4}Nz_J\right) + \left(\frac{3}{4}Nz_J - \frac{1}{2}Nz_J\right) \left(1 - \frac{3}{4}Nz_M\right) \\
P_J &= 1 - \frac{1}{2}Nz_J - \frac{3}{16}N^2z_Jz_M.
\end{aligned} \tag{6}$$

In the same vein, the overall probability that the media investigates is

$$\begin{aligned}
P_M &= \Pr\left(\phi_M \geq \frac{3N}{4}\right) + \Pr\left(\frac{N}{2} \leq \phi_M < \frac{3N}{4}\right) \Pr\left(\phi_J \geq \frac{3N}{4}\right) \\
&= \left(1 - \frac{3}{4}Nz_M\right) + \left(\frac{3}{4}Nz_M - \frac{1}{2}Nz_M\right) \left(1 - \frac{3}{4}Nz_J\right) \\
P_M &= 1 - \frac{1}{2}Nz_M - \frac{3}{16}N^2z_Jz_M.
\end{aligned} \tag{7}$$

Both probabilities of investigation are decreasing in the dependence of the judiciary and the media, but respond more to a change in the own dependence.

The optimal level of corruption is now

$$r = yt - \left\{ \frac{16 \alpha R}{[8Nz_Jz_V + 8\beta R N z_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]} \right\}^2.$$

Propositions 1 and 2 still hold in this alternative version of the model as shown in the following derivatives.

$$\frac{\partial r}{\partial z_J} = + \frac{2(16\alpha R)^2 [8Nz_V + 3N^2z_M(z_V + \beta R)]}{[8Nz_Jz_V + 8\beta R N z_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]^3} > 0,$$

which means that the level of corruption is decreasing in the degree of independence of the judiciary.

$$\frac{\partial r}{\partial z_M} = + \frac{2(16\alpha R)^2 [8\beta R N + 3N^2z_J(z_V + \beta R)]}{[8Nz_Jz_V + 8\beta R N z_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]^3} > 0,$$

which means that the level of corruption is decreasing in the degree of independence of the media.

$$\frac{\partial r}{\partial z_V} = + \frac{2(16\alpha R)^2 [8Nz_J + 3N^2z_Jz_M]}{[8Nz_Jz_V + 8\beta RNz_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]^3} > 0,$$

which means that the level of corruption is decreasing in the degree of responsiveness of voters.

$$\frac{\partial^2 r}{\partial z_J \partial z_M} = - \frac{6(16\alpha RN)^2 \left\{ 16 \left\{ \begin{array}{l} (\beta R)^2 (1 + Nz_M) + Nz_J (z_V)^2 + \\ + \beta Rz_V [5 + N(z_M + z_J)] + \\ + 3N^2z_Jz_M (z_V + \beta R) (3z_V + 2\beta R) \end{array} \right\} + \right\}}{[8Nz_Jz_V + 8\beta RNz_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]^4} < 0,$$

$$\frac{\partial^2 r}{\partial z_J \partial z_V} = - \frac{4(16\alpha R)^2 N \left\{ \begin{array}{l} 4\beta R(2 - Nz_M)(3Nz_M + 8) + \\ + 9N^3z_J(z_M)^2(z_V + \beta R) + \\ + 8Nz_J[2z_V(4 + 3Nz_M) + 3\beta RNz_M] \end{array} \right\}}{[8Nz_Jz_V + 8\beta RNz_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]^4} < 0,$$

$$\frac{\partial^2 r}{\partial z_M \partial z_V} = - \left\{ \frac{12(16\alpha RN)^2 z_J \left[\begin{array}{l} 40\beta R + Nz_Jz_M(8 + 3Nz_M) + \\ + \beta RN(8z_M + 12z_J + 3Nz_Jz_M) \end{array} \right]}{[8Nz_Jz_V + 8\beta RNz_M + 3N^2z_Jz_M(z_V + \beta R) - 16\beta R]^4} \right\} < 0.$$

All cross-derivatives are negative, indicating that the three institutions are complementary in the control of corruption.