Are the Law, Democracy and Socioeconomic factors related to the level of Corruption in Brazilian States?*

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Resumo

Este trabalho objetiva insvestigar a relação entre lei, democracia e fatores socioeconômicos com o nível de corrupção encontrado em estados brasileiros. O nível de corrupção é mensurado pelo número de irregularidades encontradas em relatórios de auditoria federal. Os resultados empíricos demonstram que a elevação do número de transfências federais provê para o agente público maiores possibilidades de exercer seu poder discricionário e extrair rendas. Além disso, o aumento do número médio de anos de estudo para a população adulta no estado age como um deterrente da corrupção, pois a população tornase mais apta a monitorar os administradores públicos. Ademais, em estados com processo democrático em evolução ou melhor estruturado, implica no menor nível de corrupção.

Resumo

This paper aims at investigating the relation between the law, democracy and socioeconomic factors with the level of corruption encountered in brazilian states. The corruption level is measured as the number of irregularities found in federal audities reports. We found that as the amount of federal funds transfered for a state rises, it provides for the public agent more room for exercise discricionary power and for rent to be extracted. Also, if the average years of study for the adult population is increasing in the state, it acts as a deterrant of corruption, because the population becomes more able of monitoring the public administrators. Furthermore, in states where the democratic process is evolving or better structured, it provides a lower level of corruption.

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1 Introduction

"Rouba, mas faz"¹

In Brazil, the population is constantly surprised - or not so much anymore - by newspapers headlines showing denounces of corruption in several agencies and hierarchies of the government. The most recents ones are quoted below:

"Federal police arrests the Rio Grande do Norte's governor son due to frauds in biddings"².

"The govern of the Rio Grande do Sul's state is accused of involvement in the corruption of state companies, the corruption money was used to finance political campaign."³

Not so long ago, other shocking corruption scheme published by the press was the *Mensalão*. It involved the deviation of money for private benefit or campaign financing by the brazilian's Parlament. In 1992 the brazilian's president was accused of money deviation and surfered a process of impeachment. As can be seen, corruption has been a characteristic of public money management in Brazil, becoming a serious and enduring problem.

Corruption is a pervasive ilicit act, and it attaches strongly to the wheels of public system. It is not only perpetrated by politians, but it is present in many degrees of the government hierarchy and should be disencouraged to anyone to whom the possibity of gain appears. Because of this, research in this area have been trying to better understand it and to propose policies and reforms for its erradication.

Prior studies have focused on several issues trying to understand the nature and impacts of corruption. Treisman(2000) analysis the relation of corruption with historical and cultural traditions, levels of economic development, political institutions, and government policies. Pellegrini and Gerlagh(2004) observes empirically the corruption's effect on growth through direct and indirect channels.

Lambsdorff(1999) covers the question in a broder way analysing its impacts on investment, GDP, institutional quality, government expenditure, poverty and international flows of capital, goods and aid. Serra(2004) develops a sensitivity analyse, finding that corruption is lower in richer countries, and the ones with longer democratic institutions and where the population's mainly religion is Protestantism, and on the other hand, it is higher in countries with political instability.

Goel and Nelson(1998) observes the effect of government size on corruption originated from two sources: the individual's incentives to act corruptily(demand driven) and for the incentives existent at the larger

¹It is a famous brazilian saying in relation to corrupt politians. A rough translation would be: steals, but yet does something.

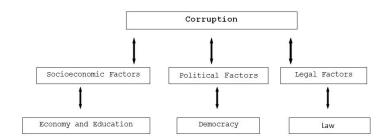
 $^{^2}$ Author's responsable for the Headlight's translation. Newspaper: Folha de São Paulo, 13/06/2008

³ Author's responsable for the translation. Newspaper: Folha de São Paulo, 11/06/2008, article: Yeda ataca vice-governador e critica repercussão de escândalo no RS.

government spending(suppy driven). Freille, Haque and Kneller studied the relationship between aggregate press freedom and corruption.

All of this studies, however, adress the matter at a country level. This paper aims to adress it in a lower level: the country's states. The data base used is drawn from the audit reports of the federal internal audit agency (Corregedoria Geral da União - CGU). This data is not based on subjective assessements of corruption, it covers the type and number of irregularities found in every state in relation to federal money transfers two years prior to the audit. The authors consider it a consistent measure of corruption, because each irregularity reported constitutes a breach on a specific legal norm.

With the objective of providing support to policies and reform, this study tries to understand the relation between the judicial and political institutions and socioeconomic factors with the occurrence of corruption. Following Brown and Shackman(2007), we propose the following factors: law and order, democracy, economic level and education to be studied, as its represented by the organogram below



What is meant by each category is explained in section 2. The description of the variables and how they were built is detailed in section 3, related to the Data. Section 4 describes the model. Finally, section 5 report and explain the results, and section 6 concludes.

2 Corruption: definition and causes

"Corruption is a moral category that signifies putrefication and rot." (Rose-Ackerman), meaning that corruption is an immoral act as it violates the principles of behavior. More specifically, corruption allows unvirtuous behavior to take place and stablishes itself.

The type of corruption focused here is the one perpetrated by government agents from any agency or hierarchy, and it is defined as the misuse of public power for private benefit. Misuse of public power represents any act that contravenes an existent explicit law, norm or regulation. And private benefit is understood as an action where a rational agent makes a choice taking in account only his gains liquid from his evaluated losses, which means that he doesn't consider its impacts on others.

By restricting the corrupt act to those where occurs personal gain, the acts considered as ilicit are the

ones in which the incorrect follow of the norms, leaves room for rent to be extrated. For example, an official document missing a stamp or a signature could reveal that it was naivily forgotten, or that, actually, was purpously forgotten in other for a bribe to be demanded or for government money to be deviated.

It suggests that there are three conditions necessary for corruption to arise(Aidt, 2003):

- 1. Discretionary power the public agent must possess authority to act in a discretionary manner;
- 2. Economic rents there is possibility of rent extraction;
- 3. Weak institutions the structure of the legal, political and administrative institutions is such that creates incentives for public agents to extract rents.

Given this conditions, this paper aims to explore the condition of weak institutions related to the legal and political aspects and the state's socioeconomic factors.

2.1 Corruption and the Law

The legal institutions are a set of public agencies that assure the application and obedience to the law in the society through the definition of the degree of penalty and punishments associated to each break of the law. Its quality acts as a deterrent to crimes, and, also, a deterrent to corrution. Expectations about the law in preventing and punishing crimes (Becker, 1965) affects the perception of public agents of the probability of being caught and penalized.

Having an independent legal system is an essential factor in reducing corruption as recent literature asserts. The existence of strong negative correlation between law and corruption(Herfeld and Weiss(2003)) and a lower perception of the law in the society is associated to a higher level of corruption(Cartier-Breeson,2000). And, as Brown and Shackman(2007) shows, there is a direct causality from law and order to corruption, with the law and order factor reducing corruption in the short- and long-run.

The brazilian legal system, according to the Constitution, is independent, as are its components, and is divided in four main agencies: the Courts of law; the Prosecutor's Office; the Public Advocacy and the National Order of Lawyers (OAB). The crimes are investigated and prosecuted by the State Prosecutor's Office, when it refers to state's or municipality's jurisdiction, and by the Federal Prosecutor's Office, when it is federal jurisdiction. Within this crimes are included the misuse of public agente position for private benefit.

In this context, where there is a small number of prosecutors, it would be less probable of an investigation to be started in a specific government agency without prior denouncement has been placed, which leads to a low probability of an irregularity to be discovered and of a court process to be open. So, it was considered that the number of prosecutor's in a state was a relevant proxy to measure the degree of the law and order.

Although an unusual variable, the homicide rate was the other selected variable, because it may reflect the social perception of the perfomance and existence of the law. In a society where the rate of violent crimes is very high, it would be considered that the law is lax, and so, how could it prevent corruption or other kinds of crimes?

2.2 Corruption and Democracy

A democratic government regime is the one where the power to take important political decisions is in the hands of the citizens, directly or indirectly, by the elected representatives. Moreover, it guarantees that the government acts accordingly to the rule of law and assures that every citizen receives the same legal protection. Democracy also relates to the degree of political freedom, as it provides liberty to the citizens. More democracy, then, enhance the existence of opposing political parties and the decision to vote.

Some recent studies corraborate this. Treisman(2000), for example, reports that a long exposure to democracy reduces corruption, though a current degree of democracy is not significant to reduce corruption. Brown and Shackman(2007) reports that the democratic variable reduces corruption in the short- and long-run; while Chowdhury(2004) founds that a democracy index has a significant impact on corruption and that the voter's participation is the more robust within its components.

Then, it is expected that for higher levels of democracy, there should be less corruption. The democratic process, through elections, enforces the permanence of politians that protect society's rights and avoid misuse of power, and withdraws from power the corrupt politicians.

In Brazil, the democratic process is difficult to be fully grasped. First, vote is a compulsory act, not an individual choice to exercise its democratic power, so, the number of citizens voting in the elections might not represent the people's decision to exercise the democratic act. Second, it might be one of the countries with the most higher number of active political parties. The actual number is 27^4 , making it difficult for the citizens to select the right candidate. Fortunately, the rules applied in the brazilian electoral process in every state is rather the same, avoiding the possibility of the state's democratic level to be due to its legislation.

A country can be defined to be less democratic if the minority parties have little influence on politics, which is defined as a measure of democracy by Gastil(Barro,1999). Based on this and on vote being an democratic act, it is thought that the Vanhanen democratization index⁵ would represent a good measure of democracy.

⁴http://www.tse.gov.br/internet/partidos/index.htm

⁵Explained in the Data section.

2.3 Corruption and Socioeconomic factors

The social characteristics of a society determines its level of development, not only in economic terms but also the population access to education, health and quality of life. However, as some studies point out, the degree of some characteristics might facilitate for corruption to occur. For exemple, Serra(2004) and Treisman(2000) both found, through empirical data, that richer countries tend to have less corruption then poorest ones. Albuquerque e Ramos(2006) asserts that richer and well-educated population are better capable of monitoring the public administrators and are associated to fewer corruption. In another direction, You and Khagram(2006) argues that income inequality increases the level of corruption.

Based on this foundings, the socioeconomic factors focused on are the economic level and the level of education. To represent the economic level it was chosen the state's PIB, which is a variable that reflects the level of investment and productivity in the economy, both of which may be affected by corruption. The education level considered important for this study aim was the average number of schooling years for people over 25 years old. It is a measure of the education of the adult population in the state, which is the segment that makes the society's decisions.

3 Model

This section is subdivided in two parts: the model estimated according to the dependent variable and the description of the data along with its source.

3.1 Estimation Model

The dependent variable, irregularities, only assumes positive integer values and is not limited by an upper bound, suggesting that it assembles to count data. By this means, the regression analyses is performed by a model for count data. The test of Cameron and Trivedi⁶ and the test of Wooldridge⁷ both indicates that there is the presence of overdispersion in the data, so the model adopted will be the Negative Binomial Model.

The Poisson regression model is the simplest model for count data. Its distribution is given by

$$y_i|x_i,c_i \quad Poisson[c_im(x_i,\beta)] \ c_i > 0$$
 (1)

⁶Cameron and Trivedi propose a regression based test of the Poisson restriction. The test is based on an auxiliary regression (OLS) of e_i^2 - y_i on \hat{y}_i^2 and testing the significance of the regression coefficient. If the t-statistic is found insignificant, it indicates that the poisson model can be correctly applied.

⁷Wooldridge's alternative approach is to regress e_i^2 - 1 on $haty_i$, where the errors are standardized, but the method of analyse is basicly the same.

It is assumed that c_i follows a gama distribution with unit mean and $Var(c_i) = \eta^2$. So, the expected conditional value of $y_i|x_i$ is

$$E[y_i|x_i] = m(x_i, \beta) \tag{2}$$

with variance

$$Var(c_i) = m(x_i, \beta) + \eta^2 m(x_i, \beta)$$
(3)

where we adopted the exponential function

$$m(\mathbf{x}_i, \beta) = exp(x_i, \beta)$$
 (4)

This way, the model to be estimated is:

$$irreg_i = exp(\beta_0 + \beta_1 recur_i + X_i\beta)i = 1, ..., N$$
 (5)

where *irreg* is the number of irregularities, X_i the variable vector to be tested e β his respective coefficient vector.

The estimation method used was the Maximum Likelihood(ML). The Quase-Maximum Likelihood(QML) was also applied, but both presented the very similar, so ML estimator was preferred because of its properties. It is consistent, efficient and asymptotically normally distributed.

3.2 Data Description

The variable of corruption is the number of irregularities found in federal audities reports related to the application of federal government money transfers in the states. This data is from a data base compiled by Francisco Ramos' research team, and is based on the audit reports stemming from a surveillance police called random audit program and carried out by CGU. This program randomly selects Brazilian municipalities and states for audits to take place in order to analyse the occurrence of federal money transfers misuse. Its reports are available on the internet⁸.

The audit is conducted over the money transfers occured in the last two years by an independent comission of auditors from the CGU, which reduces the chances of it to be corrupted. The irregularities found range from a simples infraction, as the absence of a legal documentation, to a large deviation of public funds. The similar aspect between them is they contravenes a law or public regulation. Examples of the type of irregularities found are given in Appendix A.

⁸ http://www.cgu.gov.br

It was considered that some irregularities might only be due to a lax administration not to the occurence of corruption. However, within the data set it is also discriminated the explanation provided by the public administrator for the encountered irregularities. And less than 5% of these explanations were found to be binding by the auditors.

Until now, the data base has information about 23 of the brazilian's 27 states⁹, including the Federal district. The four states not yet audited were Amapá, Piauí, Rio Grande do Sul and Sergipe. As the audits consider only the transferred money funds from two years prior to the audit, the irregulatities considered are committed between the years of 2002 and 2005.

Another variable originated from the random audit program was the total funds related to the irregularities. Its inclusion in the regression is due to this probable relation to corruption. It is expected that for a larger money transfer the ilicit acts should be higher than for inexpressive ones, because there is more rent to be extracted.

The democratic measure applied was the Vanhanen's democratization index. It is based in two dimensions: public contestation and the right to participate, which is named as competition and participation, respectively (Chowdhury, 2004). Competition refers to the electoral success of the smaller parties 10 and is calculated by their porcentage of the total votes realized during election. Participation, on the other hand, refers to the percentage of the total state's population that actually voted in the elections. The data used to compile the index was obtained from the Superior Electoral Court in relation to the 2006 Governor elections.

The legal measure considered was the number of prosecutors per 100.000 inhabitants. It can be found in the 2006 Prosecutor's Office report¹¹, and is calculated for all 26 states, but not for the Federal District. In order not to lose an observation, the Federal District value was determined as the medium number of prosecutors for the Center-West region, where the Federal district is located.

The other variables included in the model were gross domestic product (PIB), Homicide rate (2002¹²) and Average number of schooling years for people over 25 years old (2005). They are from, respectively, the IBGE's States Data Base for the first, and the government's research institute Ipea¹³ for the last ones.

The statistics summary of the variables can be observed in the table below.

⁹It is based only until the 4th draw of the states reports.

¹⁰The parties were classified in major and minor according to this political weight. Major parties are: PMDB, PTB, PDT, PT, PSB and PSDB. And the minor parties are: DEM, PCdoB, PTC, PMN, PRP, PV, PTdoB, PSTU, PCB, PRTB, PHS, PSDC, PCO, PTN, PRB, PSOL, PR, PSL, PSC, PPS, PP. In the case a coalition political, the presence of one of the major parties classifies it as a major party.

¹¹It can be found at http://www.mp.gov.br

 $^{^{12}\}mathrm{This}$ represents the year in which the research was conducted.

 $^{^{13}\}mathrm{http://www.ipeadata.gov.br}$

Tabela 1: Variable Statistic Summary

Variable	Mean	Min	Max	St. Deviation
Irregulaties	112.55	22	337	82.34
Total funds (10^8)	1.78	0.044	6.57	1.887
Prosecutor	4.762	3.11	7.44	1.14
Homicid rate	27.32	9.925	56.74	14.61
Democratic Index	32.29	26.65	50.20	5.02
lnPIB	17.42	14.97	20.40	1.283
Average School	5.976	4.227	7.727	0.947

4 Results

Firstly, a remark should be made, most of the relevant variables had a certain degree of correlation between them. Many other variables also considered for the analysis were droped for this reason. Some of them were the gini index, the idh index, literacy rate, per capita income.

Due to this, it was considered better to analyse the independent variables per related groups. The group of independent variables are: the political and legal factors group and the socioeconomic factor group. The first regression performed considered only the total funds deviated, as a way of checking its significance with corruption.

The tests for overdispersion were also performed for the disagregated regressions. Its result showed the presence of overdispersion for all of them, so the same regression model was applied to the other regressions: the Negative Binoial regression. The table below describes the four models performed and their respective results.

As the value of the LR test for every equation is significant and Pseudo- R^2 arround 0.80, the four of them are considered well-specified and adjusted. It can also be seen that most of the variables are highly insignificant. The insignificance might be due to one of this main factors: lack of relation between the variables; autocorralation between the variables or sample size. However, as this factors are related, it is difficult to distinguish one from the other.

In regression (1), the only variable was total funds and it has a positive and significative relation to corruption. It means that, *ceteris paribus*, for larger amounts of federal transfers to states, it is expected a higher number of irregularities. So, at a unit increase in the standard deviation of the total funds, approximately 178 million reais, would increase irregularities in 40%.

The second regression analyse the political and legal factors and, again, the total funds. The nule hyphotesis concerning the legal factor, represented by number of prosecutors and the homicide rate, was rejected as both variables were found insignificant. Although, it is interesting to point out the direction of

Tabela 2: Poisson Regression over Irreg

Independent Variable	(1)	(2)	(3)	(4)
Total funds (10^8)	0.223170	0.275590	0.181774	0.206151
	(2.77)***	(2.784318)***	(2.689044)***	(2.193817)**
Prosecutor		0.022927		-0.179659
		(0.179833)		(-1.086748)
Homicid rate		0.005620		0.008748
		(0.534184)		(0.887554)
Democratic Index		-0.060035		-0.013581
		(-2.248455)**		(-0.428507)
lnPIB			-0.059981	-0.175116
			(-0.649198)	(-1.306205)
Average School			-0.263778	-0.180669
			(-2.352746)**	(-1.033983)
Intercept	4.247224	5.822884	6.918895	9.425450
	(22.98)***	(6.478729)***	(5.206125)***	(3.875284)***
Pseudo (R^2)	0.812703	0.811826	0.819448	0.816179
Log likelihood	-124.0171	-117.1970	-119.5508	-114.4860
LR test	1076.249	1011.232	1085.181	1016.654
${\bf Probability}({\bf LRtest})$	0.000	0.000	0.000	0.000
Observations	23	22	23	22

Obs. The value below the coefficients of the variables is the z-Statistic, where * is significant at 10%, ** at 5% and *** at 1%.

relation between them and the level of corruption. In relation to the prosecutors the direction of causality should be accounted for, the sign might represent that a higher level os corruption in a state demands more prosecutors. The explanation to the homicide rate steams from the fact that states' with high rates of violent crimes are due to ineffective law or to a lenient treatment to corruption, because crimes against others are prioritized. Again, total funds variable was found significant and consistent.

A interesting fact was the sign and significance of the democratic index. The level of democracy in a society is, as found in prior studies, relevant to reduce the level of corruption. This provides empirical consideration that the electoral process might be able to remove corrupt or innefficent public agents from office. Actually, if democracy is enhanced in a state, it reduces corruption in 30% for a 5 point increase in the index, keeping the other variables constant.

The regression (3) was related to the socioeconomic factors, the PIB and the average schooling. As expected, the total funds was again significant. The surprising fact was that the PIB was found insignificant

and his sign positive, while it was expected that the richer the state, the lower level of corruption is, as is predicted by Albuquerque e Ramos(2006). Infering only in the signal, given the type of corruption measure used, it is possible that a richer state is associated with more transfer of funds¹⁴ and with more government projects, which increases the chances of corruption to occur.

Considering the relevance of the average schooling and its signs, it means that the increase in the years of education of the adult population acts as a deterrant to corruption in approximately 25%, for other variables held constant. Leading to the acceptance of the nule hyphotese that education reduces corruption, as was found also in Albuquerque e Ramos(2006). They suggest that the higher the education the lower is the assymety of information between the population and the public agents.

The last regression, which considered all the variables, had only the total funds as significant. Though, the other variables were highly insignificant when grouped together, their signs were the ones expected by the nule hyphotesis: more prosecutors, enhanced democracy, richer and more educated state would reduce corruption, while the level of homicide and total funds would increase it.

5 Conclusion

This paper aimed to analyse if weak institutions, as proposed by Aidt(2003), was a relevant condition in the brazilian state's level of corruption. Using the information cointained in CGU's audit reports as a measure of corruption, the focus was on the relation between corruption and state's legal, political and socioeconomic factors. Our empirical results founds, however, do not corroborate all of the assumptions made.

The model predicts accurately the essence of irregularities variation. As the amount of federal funds transfered for a state rises, it provides for the public agent more room for exercise discricionary power and for rent to be extracted. Morever, if the average years of study for the adult population are increasing in the state, it acts as a deterrant of corruption as the population becames more able of monitoring the public administrators. Furthermore, in states where the democratic process is evolving or better structured, it provides a higher level of democracy in relation to others. So, a higher competition between the parties, with the minor ones having a more expressive results in elections, and a increasing population participation in the elections, with the people exercising its freedom of choice, reflects on a lower level of corruption and on the removal of corrupt or innefficient public agents from government agencies.

This findings indicate the main channels in which policies and reforms should be focused to reduce the public agents possibility and incentive to act corruptly. As seen, this policies is not restricted to short-run actions. For the level of education and democracy to be enhanced and effective against corruption, it is necessary a continue improvement in this areas. This work leaves as suggestion the analyse of the influence of the state's historical process and culture in its degree of democracy. It might be a cause of the difference

¹⁴A possible explanation for the PIB insignificance is the correlation between it and funds.

in degree found.

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7 Appendix A

Here, there is a small sample on four groups of irregularity as an example of the data used. It is based on Zamboni e Litschig(2007).

Procurement

Irregularities in this category relate mostly to limited competition for contracts and attempts to obstruct oversight by both auditors and stakeholders in the procurement process. The following are examples of the types of irregularities included in this category: missing/incomplete procurement documentation, irregular composition/capture of the procurement commission, inadequate/incomplete publication of tender information and participating ineligible.

Program/project execution

This category includes irregularities related to the execution of new programs and capital projects. Irregularities include the following: diversion of project resources, substandard project execution, lacking oversight of project implementation, irregular project documentation.

Financial reporting

This category includes irregularities related to the quality and timeliness of financial reporting by local governments. Public officials involved in committing irregularities are for the most part financial managers. Irregularities include: irregular/non-existent financial report, irregular/non-existent receipts.

Civil society oversight

Irregularities in this category are related to civil society oversight. Examples are: non-existent civil society council, inefficient/non-existent oversight, irregular council composition.