UNIVERSIDADE FEDERAL DO RIO DE JANEIRO

INSTITUTO COPPEAD DE ADMINISTRAÇÃO

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A STUDY OF CORRUPTION AND AN OBJECTIVE METHOD TO MEASURE IT

Rio de Janeiro

2018

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Master's dissertation project presented to the Instituto Coppead de Administração, Universidade Federal do Rio de Janeiro, as part of the mandatory requirements in order to obtain the degree of Master in Business Administration (M.Sc.).

Supervisor: Otavio Henrique dos Santos Figueiredo

Rio de Janeiro

2018

CIP - Catalogação na Publicação

M921s

Motta Veiga, Mateus Carneiro
A study of Corruption and an objective method to measure it / Mateus Carneiro Motta Veiga. -- Rio de Janeiro, 2018.
82 f.

Orientador: Otavio Henrique dos Santos Figueiredo.
Dissertação (mestrado) - Universidade Federal do Rio de Janeiro, Instituto COPPEAD de Administração, Programa de Pós-Graduação em Administração, 2018.

1. Corrupção. 2. Administração - Teses. I. Figueiredo, Otavio Henrique dos Santos, orient. II. Título.

Elaborado pelo Sistema de Geração Automática da UFRJ com os dados fornecidos pelo(a) autor(a).

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ACKNOWLEDGEMENT

Gostaria de agradecer aos meus pais, por todo o suporte, presença e amizade ao longo da minha vida,

À Bia, por todo o companheirismo e carinho do dia a dia, seja no Brasil, no frio do Canadá, ou em qualquer outro lugar,

Aos meus amigos, pelos inúmeras histórias e momentos felizes que me proporcionam,

E também ao Paris, Kiki, Mingau, Rosália e à Pequena.

Gostaria também de agradecer ao Otávio, por toda a orientação, ajuda e amizade demonstrada ao longo desta dissertação, e à Margarida, pelos insights e sugestões de como melhorá-la.

E, por fim, ao instituto COPPEAD, por todo o crescimento pessoal e profissional.

A todos, meu sincero muito obrigado,

Mateus.

ABSTRACT

MOTTA VEIGA, Mateus Carneiro. **A study of corruption and an objective method to measure it.** 2018.

Dissertation (Masters in Business Administration) – Instituto COPPEAD de Administração, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2018.

The problem of corruption is one of the most complicated to be curbed and understood. One of the reasons for that includes the difficulty in measuring it within countries, as there is a lack of concrete data informing the size of the problem due to its intrinsically obscure nature. Another difficulty is defining what corruption is, mostly due to the comprehensiveness and subjectivity of the topic. One of the largest studies of the problem is conducted by Transparency International, which produces an annual report known as the Corruption Perceptions Index (CPI) that ranks countries according to perceptions about corruption. The idea of the present work is to study the relationship between each country's CPI and independent variables related to demographic, political, structural and economic aspects. In addition, an alternative ranking to estimate the degree of corruption within countries is elaborated based on objective variables, in order to purge problems that may arise from the subjectivity present in the index based on perception.

Keywords: Corruption, Corruption Perceptions Index, Ranking, Weighted Least Squares

RESUMO

MOTTA VEIGA, Mateus Carneiro. **Um estudo sobre a corrupção e um método objetivo para mensurá-la.** 2018.

Dissertação (Mestrado em Administração) – Instituto COPPEAD de Administração, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2018.

O problema da corrupção é um dos mais complicados para ser combatido e entendido. Algumas razões para isso englobam a dificuldade em medir seu tamanho nos países, pois existe uma carência de dados concretos informando o tamanho do problema devido ao seu caráter intrinsecamente obscuro. Uma outra dificuldade é em definir o que é corrupção, justamente pela abrangência e subjetividade do assunto. Um dos maiores grupos de estudo sobre o problema é feito pelo órgão da Transparência Internacional, que produz um relatório anual chamado de Índice de Percepção de Corrupção (IPC), ordenando os países de acordo com a percepção sobre a corrupção. A ideia do presente trabalho é estudar a relação do resultado encontrado entre o CPI de cada país com variáveis independentes de caráter demográfico, político, estrutural e econômico. Além disso, um ranking que estima o grau de corrupção nos países é construído baseando em variáveis objetivas, a fim de expurgar eventuais problemas oriundos da subjetividade presente no índice baseado em percepção.

Palavras-chave: Corrupção, Índice de percepção de Corrupção, Ranking, Mínimos Quadrados Ponderados

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CIA: Central Intelligence Agency

CPI: Corruption Perception Index

GDP: Gross Domestic Product

OECD: Organization for Economic Co-operation and Development

OPEC: Organization of the Petroleum Exporting Countries

PISA: Programme for International Student Assessment

TI: Transparency International

WGI: Worldwide Governance Indicators

Summary

1. Introduction

What can be considered corruption? Paying a higher price to skip the line? Paying for one's ticket for a show where the tickets are limited? Tipping someone to enter a crowded nightclub? Tipping a waiter to have the best seat? Using connections to have some sort of advantage in order to get something? When one pays a blackmailer, is it acceptable? Also, what is a bribe and what is a gift? And does a corrupt act mean that a payment must be done? If one who has a job claims to be sick but goes on vacation, is it corruption as well?

Due to the subjectivity in defining corruption, there can be an infinite range and numerous ways of characterizing it. So, it is worthy to use the concept that is the most commonly adopted by researches and literature in the topic, which is the definition that *corruption is the abuse of public power for private benefit* (World Bank, 1997). With this concept, some examples may be given: Government officials collect graft for providing licenses and permits, giving passages through customs or for prohibiting the entry of competitors (Shleifer & Vishny, 1993); an official may also create a law intended to bring benefits for himself or to someone he desires, who will return the 'favor' with underground money, among many other situations.

Much of literature about corruption and its peculiarities, as well as some attempts to measure its level within countries, flourished during the 1990s, mainly because of the large number of cases involving illegal practices across the world, increased number of scandals, rise of nongovernmental organizations working to better understand the field, larger globalization, press freedom, among other causes. It is valid to cite that according to The Financial Times end-of-year editorial on December 31, 1995, that year was considered the "year of corruption" (Reuters, 2016), so all of this may explain why so many articles were written covering the topic, and some initiatives to fight this problem have been carried out.

Another issue relates to the hardness of measuring it, not only because it may have many definitions, but mainly due to the characteristic of the subject being something obscure and hidden. Also, as it is intrinsically illegal, there is not available data to precise the numbers or total costs from the deviated or lost money originated from corruption, directly and indirectly. Despite that, some attempts to estimate it are

eventually made, as The International Monetary Fund (IMF) released a report in 2014 estimating the annual cost of bribes paid in both developing countries and advanced economies, amounting to $1.5 to $2 trillion globally, roughly 2% of global GDP (Gross Domestic Product).

2. Literature Review

As there are many studies, possible interpretations and peculiarities on the topic about corruption, it is valid to specify and better define how some issues that may arise during the research are going to be dealt. For instance, one vivid discussion is whether perception-based indexes are trustable indicators of the actual experience of getting involved in corrupt acts. There are some arguments on both sides, and it is worth discussing the pros and cons of perception and reality-based indicators.

Another discussion concerns the consequences of corruption, as according to some authors, it also has a positive side. For instance, it is often said that corruption may work as a much-needed grease for the squeaking wheels of a rigid administration (Bardhan, 1997), among other positive aspects that are going to be presented here. On the other hand, other authors go in line with the common sense of corruption being something harmful that works more as a sand-in-the-machine (Kaufman and Wei, 1999) rather than a greasing-wheels mechanism. Examples and evidences are also brought to support both sides of the issue, in order to clarify the arguments.

Lastly, it is going to be discussed how and why corruption emerges within societies. As there are many studies and different views regarding the sources of corruption, the most relevant variables will be presented, and some of them are going to be for the analysis on a later step. A table containing the variables, authors who mention the topic as well as the suggested relationship between these variables and how they influence corruption is going to be drawn at the end, in order to summarize the main idea.

2.1. The perception-based indicators and its representativeness with reality

There are some kinds of indicators that try to measure the corruption level over countries. Among them, there is the Corruption Perceptions Index (CPI), which is the output of a world-wide known and credible institution –Transparency International (TI) – that has been making studies on the topic for more than twenty years. It is important to emphasize that CPI is based on how corrupt a country's public sector is **perceived**

to be, thus the output is not construct using absolute terms or variables. The justification for this subjective approach, according to TI is:

> Corruption generally comprises illegal activities, which are deliberately hidden and only come to light through scandals, investigations or prosecutions. There is no meaningful way to assess absolute levels of corruption in countries or territories on the basis of hard empirical data. Possible attempts to do so, such as by comparing bribes reported, the number of prosecutions brought or studying court cases directly linked to corruption, cannot be taken as definitive indicators of corruption levels. Instead, they show how effective prosecutors, the courts or the media are in investigating and exposing corruption. Capturing perceptions of corruption of those in a position to offer assessments of public sector corruption is the most reliable method of comparing relative corruption levels across countries. (Transparency International, 2015)

Many times, one of the major differences between different indicators is the number of countries and years that are covered. Daniel Kaufmann et al. (2003) built the Control of Corruption Index (CC), drawn from a large set of data source. Svensson (2005) measured the linear relationship[1] between CC and The International Country Risk Guide (ICRG), another source of country risk that considers corruption, and the correlation was 0.75. They also tested the correlation between CC and CPI; finding a correlation of 0.97. Treisman (2014) also found further evidences that different indexes measurements of **perceived** corruption have high correlation among one another. Besides, the countries ranked in those indexes seem to present a high degree of stability over the years, providing some support that the analysis over **perceived corruption** has its value and cannot be left aside when studying the subject. Mauro (1995) findings suggest that subjective evaluations of corruption appear to influence investment decisions, growth and political behavior of citizens. On the other hand, one specific excerpt says:

> It may be argued that it is investors' *perceptions* of political uncertainty that determine the investment rate, and this is what subjective indices capture directly. A disadvantage is that it is unclear whether BI's[2] attempts to ensure that the difference between a grade of 4 and 5 is the same as that between 7 and an 8 are successful, which leads to difficulties in the interpretation of the coefficient. (MAURO, 1995, p. 689)

[1] The linear relationship measure the strength of association between two variables, and the strength of the linear association can be quantified by the correlation coefficient of Pearson. The value of a correlation coefficient ranges between -1 and 1. The greater the absolute value of a correlation coefficient, the stronger the linear relationship, and a positive correlation means that if one variable gets bigger, the other variable tends to get bigger and vice versa.

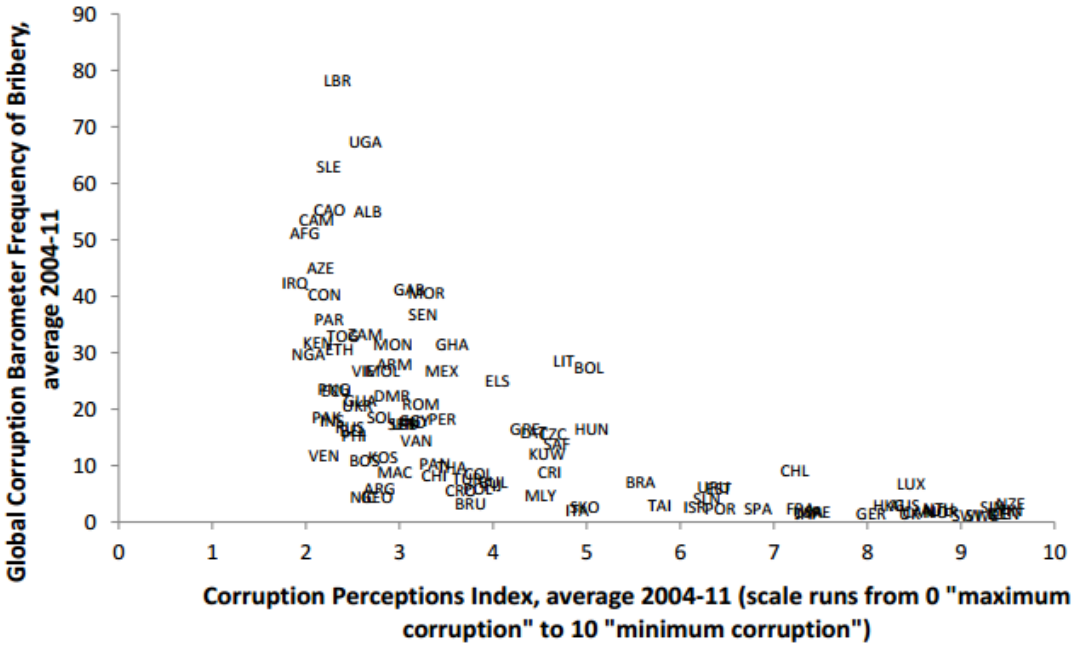
[2] Business International.

Benjamin A. Olken (2009) studied the case of a road-building project in a rural Indonesia village, comparing the estimated costs of the real spending with the reported costs in that village. After some analysis, Olken's (2009, p. 963) results indicate that although the villagers appear to be aware that corruption may exist in certain situations, they cannot precise it. So, "perception data should be used for empirical research on the determinants of corruption with considerable caution", suggesting that it is necessary a high degree of transparency, access to information and effectively monitoring to decrease this gap between perception and reality.

In order to test correlation between perception-based indexes and the actual experience of getting involved in corrupt acts, Rose and Mishler (2010, p.153) brought the results of a survey in Russia, 2007, when they asked people "To what extent do you see some institutions as affected by corruption?" and "In dealing with any of these institutions in the past two years, was it necessary for you or anyone in your household to give a bribe?". The results between perceptions were **unrelated** to actual experience of it. As example, while 89 percent thought that most police officers were corrupt, only 5 percent said that during the previous two years they or a household member had found it necessary to pay hush money to one. Huge discrepant results were also on the following sectors: education, permit office, social security, doctor and hospitals, military service and tax inspectors.

Of course, one can say that people seldom feel comfortable to declare they have already bribed someone, as it is an illegal act, but there can also be an overestimated perception of corruption, as people hearing others histories about it, may foster their own corruption's perception level; they can also put the blame of some personal problem into the corruption, government or another target that is not necessarily the reason of the problem, among other personal bias that can affect the measurement. With this in mind, Treisman (2014) tested the correlation (Figure 1) between CPI and the Global Corruption Barometer Frequency of Bribery, which probes the frequency that respondents report having paid bribes. The results showed that rather than a downward sloping line, the graph traces the shape of an "L", bringing more evidences that differences between corruption and perception of corruption actually exist.

Figure 1 – Corruption perceptions and corruption experience, 2004-2011



Source: Treisman (2014)[3]

2.2. The positive aspects of corruption

When one is asked if corruption can be good, probably gets surprised and wonders on how something related to deviance of money and grafts, among other malfeasances, can be considered good, as most likely the person defines corruption as an illegal act that harms the economy and society **at all**. Despite that common sense intrinsic on people's mind, some authors question to which extent corruption is something truly bad, and how far people have a predisposition to be negatively biased about corruption into their thoughts. Leff (1964, p.2) would say: "Insofar as this criticism is based on moralizing-explicit or latent-self-interest, or ideology, it can be a formidable obstacle to rational analysis". Bardhan (1997, p. 1322) brings the issue regarding corruption's effects on efficiency, stating: "As non-economists usually point out, corruption is the much-needed **grease for the squeaking wheels** of a rigid administration".

[3] Data provided to Treisman by Transparency International. The Global Corruption Barometer Frequency of Bribery is the percentage of respondentes saying they or household member had paid a bribe during preceding 12 months.

> The “efficient grease” hypothesis would suggest a negative correlation between bribes and the effective wasted time: firms that pay more bribes to buy savings in terms of the time in getting the officials to certify compliance with the (nominal) regulations and/or in securing licenses. That is why many of the "grease payments" are also called "speed money”. (KAUFMAN AND WEI, 1999, p.8)

In order to understand the ‘grease the wheels’ hypothesis over corruption, Dreher and Gassebner (2013) tested if regulations deter firm entry into the market and if corruption reduces this impact. Their conclusion was that regulations robustly deter firm entry into market, because when minimal capital requirements and more procedures are required to start a business, this ends up decreasing entrepreneurship incentives on average. They also found that corruption ‘greases the wheel’ of entrepreneurship, as it reduces the negative impact of regulation on new firms coming into the market, making things ‘easier’. As such, the apparent problem can sometimes be beneficial rather than harmful.

Supporting the positive aspect of corruption, Leff (1964) says that not necessarily the government decides the policies in the right direction, and a diversion made possible by the corruption could be a better decision being taken in a non-official or illegal way. One example brought by the author concerns to the high inflation period in Latin America, where government of some countries stablished the price controls[4]. In countries like Brazil, the bureaucracy ineffectiveness sabotaged the enforcement of price controls, and prices received by producers were allowed to rise. Therefore, as prices were rising, there was incentive to a higher food production, something that is **beneficial** to combat raising prices, as the higher supply partially limits the course of the inflation. In other countries like Chile, where the deviance of the law did not take place, the supply did not increase, and prices remained frozen, worsening the problem. In other words, the Chilean government was actually doing the wrong thing, although they were not aware of that.

Another consideration raised by Leff (1964) relates to investment decision: usually entrepreneurs face a lot of uncertainty and difficulties when undertake,

[4] After further studies over the topic, economists know that the price control (frozen prices) is a ‘time bomb’ for inflation, as it just delays the inflation rate coming back, and when it does, comes with a much higher intensity. So, it is almost a consensus that the price control settled in Latin America should have been avoided.

including issues over the current laws and rules that exist, as well as the additional risk of future political interferences affecting the business. When an entrepreneur knows that he has the chance of getting whatever he needs ensured by his graft, he decreases his uncertainty, what leads to a higher investment rate, therefore promoting economic growth. Leff (1964) also mentions that as there are some bidding competitions among firms to acquire some project license or authorization, those enterprises which are the most efficient will afford to offer the highest bribe. That being said, the most efficient firms will assign projects and prevail in the market, what would be desirable to the society, as the services and products would be offered in the long run by the most capable and efficient firms.

Lui (1985) says that sometimes bribery can be inefficient because bureaucrats may cause delays for attracting more graft. In order to test it, he proposed a model where he analyzes this proposition in the context of a queue, where customers with different values of time are ranked by their bribe payments to the queue's server. He studied the Nash equilibrium[5] strategies of these customers, finding that the allocation process is speeded-up when bribery is allowed. With that in mind, those whose time is most valuable would offer bribe to jump in front of the line, having their decisions made more quickly. Concluding from Lui's analysis, investment allocation would be faster within societies when this sort of illegal payment exists.

According to Vito Tanzi (1998, apud Graziano, 1980), "corruption can be a useful political glue by allowing politician to get funds that can be used to hold a country together. The latter outcome is seen as a necessary condition for growth". Tanzi (1998) also says that bribes can supplement low wages, and corruption could allow the government to maintain a lower tax burden, which can favor growth.

[5] The Nash equilibrium is a solution concept involving two or more players in which each person chooses the best strategy that suits to him, knowing the equilibrium strategy of the other player.

2.3. The negative aspects of corruption

Although there are many possible –and sometimes coherent or plausible– explanations that attempt to defend corruption, there is also a massive –and broader– literature providing empirical evidences that at the very end, corruption is harmful not only to a country's economy, but also to its society in general. So, it is fundamental to understand the harms that it can provoke, and more important yet, to understand its causes, in order to prevent the problem and its further consequences.

In contrast to the idea that corruption entangled in bureaucracy would fasten investments, Jain (2001) exposes the situation in which once bureaucrats are aware that their income may enhance through corruption, they enact regulations in order to increase the dependence and interaction between managers and bureaucrats, or else they may refuse to provide services without charging for it. This would consolidate even more corruption within a country, and the number of required transactions in the presence of bribery may increase sufficiently to offset potential benefits brought by speeding up transactions. So, this escalation to grand corruption would lead to disincentives for investment not only because of its illegality, but also because it would increase the costs, as bribery can be analogous to a tax, due to the raise of transaction's costs.

Seeking to find empirical evidences of the effects of corruption over countries' growth, and issues regarding the debate on the literature if corruption is beneficial or not, Mauro (1995) makes his analysis using the indices drawn from Business International, newly assembled by that time, and that had not been tested so far. The author concluded that there is a **negative** association between corruption and investment, which reflects on any country's growth. The magnitudes of these effects are considerable: a one-standard-deviation increase in the corruption index from Business International rises 5 percent of GDP in investment and the annual GDP per capita growth rate rises about half a percentage point. Another obvious, but sometimes forgotten problem of corruption is the distortion it causes on the desirable market behavior: price and quality cease to be the most important features, giving space to the willingness of accepting getting involved in illegal transactions as the most important. Another disadvantage highlighted by Mauro (1995) concerns the investment rate, which decreases when corruption is higher, as it lowers the private marginal

product of capital, acting like a tax on the returns on the investments. Furthermore, as it is something illegal that needs to be kept in secret, its potential damages (such as prosecutions, fines and even arrests) increases even more the uncertainty on future returns, decreasing incentives to invest.

Ades and Di Tella (1997a) found evidences supporting the idea of a negative and significant correlation between corruption and investment, meaning that the "grease-the-wheels-of-bureaucracy" aspect of corruption would work more as a "**sand-in-the-machine**". Kaufman and Wei (1999) seeking to test the idea if graft can be useful as it speeds up transactions, examined the relationship between bribe payment and incidence of red tape[6] that firms face. After the analysis, they found that firms that pay more graft experience more harassment (as there is a higher time wasted with bureaucracy, regulatory burden, and cost of capital), giving no support for the "efficient grease" hypothesis.

Regarding what happens with foreign direct investment (FDI), Habib and Zurawicki (2002) tested some hypothesis of its impact, and the results corroborate that corruption is also a serious obstacle for investment coming from abroad. Furthermore, difference in corruption levels matters to some firms that are willing to invest in another country, as they are not willing to deal with issues as planning and operational pitfalls. Thus, one country may not receive flows of capital partially because of it.

Using the human capital approach, Murphy et al. (1991) said that if human capital is allocated improperly due to more lucrative opportunities in rent-seeking[7] activities rather than productive work, this "loss" of allocation on the talented and educated individual will negatively reflect in the country productivity and,therefore, in its growth. Also, according to Mitchell A. Seligson (2006, p.400), "corruption victims are also less likely to exhibit high levels of interpersonal trust", a loss that cannot be measured in economic terms, but can be considered as a **social loss**.

[6] Red tape can be considered as "the collection or sequence of forms and procedures required to gain bureaucratic approval for something, especially when oppressively complex and time-consuming."

[7] Rent-seeking is the use of the resources of a company, an organization or an individual to obtain economic gain from others without reciprocating any benefits to society through wealth creation.

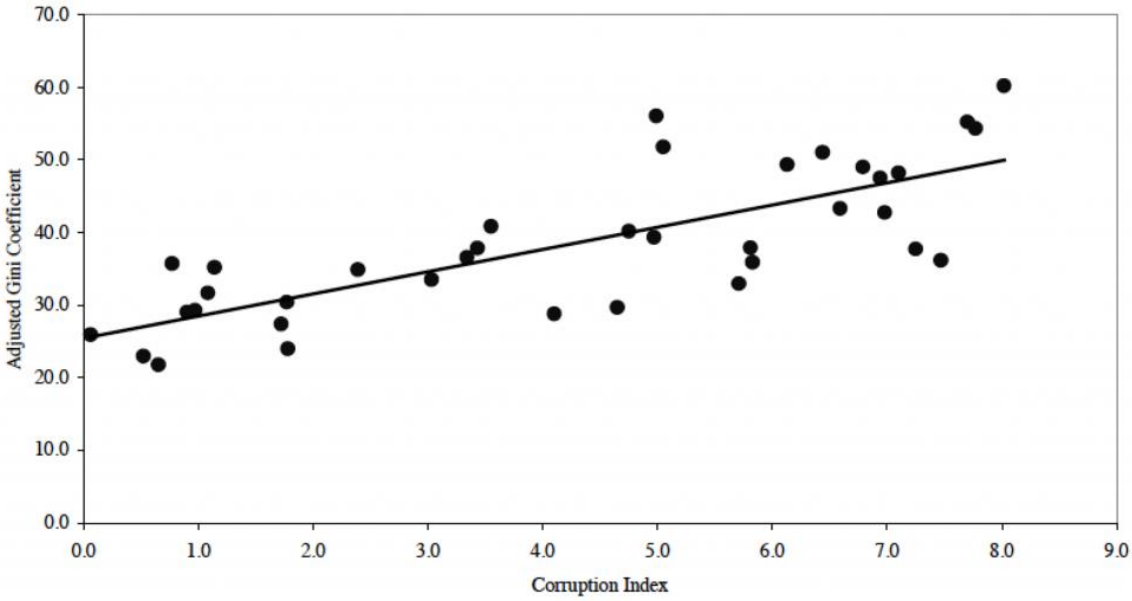
Mauro (1996) says that the effectiveness of aid flows, something that is especially relevant in developing countries, may be negatively affected if the donor countries raise doubts over its good governance practices, as it would cause the scale back of some donor's assistance. According to him, another downside of corruption is the loss of tax revenue due to tax evasion or misuse of tax exemptions. By that, corruption may affect the level of public expenditure, compromising the country's budget. If the public procurement is also corrupt, it can decrease the quality of public infrastructure and services, as for example, cheap materials may be used in the construction of public works.

Gupta et al (2002) state that corruption interferes with important core functions of government, as allocation of resources, stabilization of economy and redistribution of income (Figure 2), thus harming society. According to them when corruption exists, income inequality and poverty will increase[8] through lower economic growth, biased and regressive tax systems that are made to favor the riches and well-connected people within society, unequal access to education and ineffective targeting of social program as there is not an interest to solve structural problems within society. Furthermore, there is a tendency to perpetuate this inequality, wealth and asset concentration in countries with high corruption, due to the strong lobby from powerful and influential groups over politicians and law-makers.

Besides, Gupta et al. (2000a, p.24) when studying the provision of health care and education services, concluded that a high level of corruption has negative consequences over social indicators, such as a country's child and infant mortality rates, percent of low-birthweight babies in total births, not limiting to health, but also presenting a dropout rates in primary schools. According to them, in countries with high corruption, "child mortality rates are about one-third higher than in countries with low corruption; infant mortality rates and percent of low-birthweight babies are almost twice as high, and dropout rates are five times as high."

[8] Regarding the possibility of endogeneity and direction of the causation problem (as high inequality could incentive corruption and corruption could generate inequality; for instance), Gupta et al (1998) used some instrumental variables. When Treisman (2000) studied the consequences of corruption in growth, he also controlled for the direction of causation, concludes that there is "strong reason to believe that, whatever the effect of corruption on growth, higher economic development does itself reduce corruption".

Figure 2 – Corruption and Income Inequality



Source: Gupta et al (2002)

2.4. Sources of Corruption

> In recent years, and especially in the decade of the 1990s, a phenomenon broadly referred to as corruption has attracted a great deal of attention. In countries developed and developing, large or small, market-oriented or otherwise, because of accusations of corruption, governments have fallen, prominent politicians (including presidents of countries and prime ministers) have lost their official positions, and, in some cases, whole political classes have been replaced. (TANZI, 1998, p. 4)

The question of why officials misuse public office for private gain involves many variables and depends –besides ethical behavior– also on the expected payoff, i.e. cost of a corrupt act against the expected benefit. Economists, political scientists, specialized authors in the topic and researchers raise some possible causes for the problem, as it is a phenomenon that affects practically all countries in the world, although its degree varies considerably among them. As the direct and indirect costs to combat corruption are also much higher when already rooted within countries, it is an important and valuable cause to better understand its possible sources.

Corruption can be perceived in many ways, Aidt (2003) distinguishes it into four different approaches, as following: Efficient corruption, where transactions are facilitated, following the 'grease the wheels' arguments; corruption with a benevolent principal, where the principal delegates decision making power to a non-benevolent agent; corruption with a non-benevolent principal, where he introduces inefficient policies in order for extract rents from the private sector; and self-reinforcing corruption, when history helps to explain it, as corruption being seen as a reward, with an individual feeling more comfortable to enact in illegal acts depending on how many other individuals act in an illegal way within society.

Starting from the existing literature and researches, Treisman (2000) raises some possible hypothesis to explain the causes of corruption over nations. Among them: the effectiveness of the legal system in countries with common law systems (as in Britain and its former colonies), the religious tradition, political system, press freedom, economic development, public salaries and political stability. In addition, he also includes the country's degree of state intervention, exposure to competition from imports, endowments of valuable natural resources, ethical degree of division[9] and whether it is a federal state or not. After his analysis, Treisman (2000) found six most robustly significant variables, which together account for more than 89% of the variation of TI index and more than 62% of the variation in the BI (Business Intelligence) rating.

Mauro (1996) in his synthetic review of some possible causes and consequences of the problem tested some cross-country evidences, splitting the causes into being originated by government policy or not. The explanatory variables for the case of corruption originating from these policies are: trade restrictions (as the protection of national industries from international competition may be an opportunity for local entrepreneurs to bribe or import licenses that are valuable), subsidies, price controls, multiple exchange rate practices and wages in the civil service. Among the sources of rents that do not come from government policy we have natural-resource endowments and sociological factor.

[9] Ethical degree of division can be measured by the "ethnolinguistically fractionalization", which is the probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group.

One of the most vivid discussions regarding the motives for bribes and other illegal transaction relates to how much does the degree of public wages influence the corruption level of any country. It is valid to mention that there are some signals of ambiguity on the topic, as specific studies present no, or divergent conclusions. Treisman (2000), for instance, found no clear evidence that higher government wages reduce government corruption. Di Tella and Schargrodsky (2003, p. 286) on the other hand, studied corruption cases in public hospitals in the city of Buenos Aires, finding out that wages can influence it, since audition exists, as they mention: “Exclusive emphasis on wage raises may be misplaced, as such policies would work only if there were audit policies in place. On the other hand, exclusive emphasis on auditing may be difficult to sustain over time.” That being said, their empirical evidence supports that **the degree** of audit intensity is crucial for the effectiveness of anticorruption wage policies, and these aspects should be viewed as complementary to curb the problem.

A good example between the relationship of corruption and public wages is brought by Lindbeck (1998) in Sweden, currently one of the countries with the lowest degree of corruption, but once considered as one of the most corrupt countries in Europe[10]. One of the main changes in Sweden over these centuries was the increased remuneration of civil servants (high-level administrators earned from 12-15 times the salary of an average industrial work) combined with deregulation.

Another big discussion relates to competition; following Rose-Ackerman (1998, apud Montinola and Jackman, 2002) more competitive political structures (between politicians and bureaucrats, for instance) inhibit corruption, as constituents can replace politicians, or clients can readily reapply for bureaucratic privileges from different officials; so, this turnover of power that exists in democracies would minimize the size of bribes that rent-seekers are willing to pay. Ades and Di Tella (1999) also say that more competition reduces corruption, because profits are driven down by competitive pressure, therefore meaning no excess of money is available to pay bribe. They found in their results a higher corruption rate when firms are sheltered from foreign competition, or when antitrust regulations are anticompetitive. On the other hand, Hirschman (1970) gave an example where the opposite could happen: supposing

[10] This period of high corruption in Sweden dates especially to the mercantilist period in the second half of eighteenth and early nineteenth centuries.

corruption in schools, some parents may choose to denounce the problem or quit their child from this specific school. If there are many other schools (so, there is competition) to enroll their child in a new one, they would rather just change their school instead of reporting or denouncing the fact.

One variable that is widely discussed in the literature is democracy. Bardhan (1997, p.1330) would say that “democratic institutions are a good way to build mechanisms of accountability and transparency at different levels, which make it difficult for the networks of corruption to be sustained for long”, for they propitiate a better enforcement of laws. Although some authors found further evidences for the mentioned results, it is also important to mention that it is not a consensus that democracy solves the corruption’s problem: According to Rose-Ackerman (1997, p.40) “democracy is not necessarily a cure for corruption. Some democracies harbor corrupt politicians even though citizens are aware of their malfeasance. Moreover, bribes are often used to fund political parties and election campaigns.” Tanzi (1998) raises the issue that in democracy may exist an enormous pressure of political parties to receive the payroll for its employees, which can be considered as a disadvantage of the regime, as there is this need to finance the activities, including the electoral campaigns of parties. Tanzi (1998, p. 15) cites what happened in Italy with an important member of the socialist party, who admitted in a speech that the Italian political parties had on their payrolls a small army of employees, stating that their salaries had to be paid, and “the needed money had to come from somewhere”. In Brazil, some similar problems arise from it, as politics can use public money to pay for their extra-official expenses, as travels, wines and barbecues, among others (OGlobo, 2016).

Regarding tax burden, Johnson, Kaufmann and Zoido-Lobatón (1998) found some evidences that the higher the tax level is, the bigger will be the size of the unofficial economy. On the other hand, according to Tanzi (1998), countries perceived to be the least corrupt (e.g. Sweden, Denmark, Canada) have some of the highest tax burdens. He includes some remarks here, stating that taxes based on clear laws that do not require direct contact between taxpayers and tax inspectors are less likely to lead to some sort of corruption. Furthermore, other factors conjunctly may influence the taxation factor, as the wages of the tax administrators or the penalty level when one’s act of corruption is discovered, for instance. Besides that, one can think that

with a higher tax level, there are fewer incentives to work (as much of the earned money will go to the government's budget and paying some graft can avoid spending more on the legal way). This has something to do with the Laffer[11] curve, as higher taxes would lead to, or increase the incentive to find a way out to avoid paying tax, which can be the underground channel of corruption.

Jain's (2001, p.78) study about corruption states that its existence requires three elements to co-exist. The first one is **discretionary power**, which is the attributed authority that someone has to design regulations[12], rules and to administer them. "The three agents would be the political elite, the administrator and the legislators, have incentives to further their own interest (…) The greater the discretionary powers, (…) , the stronger the incentives to succumb to temptation". The second one would be the **value of economic rents**[13], as Jain (2001, p. 79) says: "The higher the rents, the greater the incentive for property owners to attempt to evade regulations and the higher the value of the side payments they could offer the agents who hold the discretionary powers". Lastly, the third requirement for corruption to flourish relates to the presence of **deterrents** to corruption. Those engaged in corrupt acts have a *utility of the income* from corruption function that also considers the values, structure of society and drawbacks of associating into corrupting acts. Among the variables and proxies, she mentions: Income from corruption, legitimate income of fair wages, quality of bureaucracy, political rights and civil liberties, GDP per capita based on PPP (Purchasing Power Parities), secondary-school enrolment, strength of political institutions, moral and political values of society, penalty for corruption, among others. If the net utility of corruption is worth the inconveniences it may cause, there is the chance to engage in the illegal act.

In line with the discretionary power presented by Jain (2001), Bliss and Di Tella's (1997, p.1002) examples illustrate well what discretionary power may propitiate: They

[11] Laffer curve is a famous concept in economics, and represents the relationship between tax level and government's revenue. The intrinsic idea is that increasing tax rates will increase the total collected tax until a certain point; after that, the revenue collect from the taxation will start to decrease, as taxpayers will lose their incentive to work, because much of their effort is going to the government.

[12] As opposed to market economies, corruption would be higher in regulated and controlled economies.

[13] Economic rent can be defined as an excess payment made to or for a factor of production over the amount required by the property owner to proceed.

describe a situation of a tax inspector that might connive in someone underreporting his tax obligations in exchange for a kickback, as well as a health inspector overlooking the presence of cockroaches in a restaurant kitchen in return for a bribe. In this latter situation, the inspector's power comes from a law that allows him to close a cockroach-infested restaurant if he believes it should be closed[14].

Gupta et al (1998) conclude that there is a direct impact of corruption in inequality and poverty, but also corruption can affect inequality and poverty through its impact in other variables. Some variables in their study are education inequality, secondary schooling, social spending, education and health spending, social security and welfare spending, Gini coefficient for land and natural resources abundance. Braun and Di Tella (2004) also contribute to the literature as they found out that inflation can also be a factor that influences the corruption level within a country.

There are some discussions in literature if the federal structure within a country increases or decreases the corruption level. Even with arguments to both sides, the net effect and results found in Treisman's (2000) research is that there is a positive correlation between corruption and countries that adopt a Federal system. Wilson (1970) says that in federalism, there is the need to exchange favors to overcome decentralized authority, as different branches of the country depend on the other to make the wheel turn. Wolfinger (1973) based on John A. Gardiner's study of the corruption in the city of Wincanton, found evidence for the proposition that decentralized political systems are more corruptible, as the potential corrupter needs to influence only a segment, and there are fewer centralized forces and agencies to enforce honesty. Another interesting point is brought by Bardhan (1997, p. 1324), who says that "in countries with centralized corruption, it has less adverse consequences for efficiency than decentralized bribe-taking, because in the former case the bribe will internalize some of the distortionary effects of corruption". Shleifer and Vishny's (1993) example of using an independent and joint monopolist agency, reached the conclusion that when acting independently, the two agencies actually hurt each other, and the result would be better if they worked in collusion. This can be analogous to federalist

[14] In Brazil, 2017, its meat exports collapse due to the inspection scandal over the meat that was distributed in the country and sent abroad (NU Times, 2017). The country is one of the biggest exporters of meat in the world (BBC, 2017).

countries, where officials, ministers, agencies and levels of governments, each one of them can charge their own bribes, what could lead to some kind of 'tragedy of commons'[15], where the individual own revenues are maximized but are not at the optimal level of efficiency. Bardhan (1997) presents the example of two countries that are equally corrupt, but the economic performance of one is better than the other, suggesting that this could be due to the centralized political machine of one being more efficient than the decentralized one.

Mauro (1995) studied the relationship between corruption and composition of government expenditures. He cites that opportunities for levying bribes are higher in oligopolistic markets, where rents are available, in large infrastructure projects or in goods whose exact value is hard to monitor, like high-technology defense equipment. Hines (1995) exemplifies by mentioning that international trade in military aircraft[16] is particularly susceptible to corruption, as it is something sizeable with imperfect competition, thus raising the producers' bargain's power. Also, according to Jain (2001), some channels are chosen to make it easier to collect hush money, therefore creating a tendency towards high-value and large-scale construction projects rather than investing in education. Following that, the money would be invested more in infrastructure projects and defense, as there are higher opportunities for corruption, than on education or on health, where they are much more limited. Furthermore, this has an enormous social cost, as not only the corruption level increases, but the education and health does not grow as it should. Nevertheless, it is important to mention that not necessarily there is no corruption practice in education or health; in fact, in many developing countries, government payrolls are inflated by ghost workers. In Brazil, some corruption case related to that are eventually reported, as the deviance of the public money that was uncovered in Belo Horizonte, with some workers earning money without ever working for the city hall (OGlobo, 2017).

Another variable that can be one of the most effective ways of controlling corruption is the degree of press freedom. The idea is presented by Brunetti and Weder (2003), and their results corroborate the proposed idea. According to them, potential

[15] See "The Tragedy of the Commons", from Hardin, G (1968).

[16] In 2016, the Brazilian aircraft manufacturer Embraer has agreed to pay a fine of US$206 million to close a corruption case involving bribes in business deals done in India, Saudi Arabia, the Dominican Republic and Mozambique (Folha, 2016).

ways of violating press freedom would be by laws and regulations, political and economic influence over media content, or through repressive actions. As pointed out by DailyMail (2017), this can be the major reason that North Korea, one of the countries with the lowest degree of freedom of information, is one also of the most corrupt countries in the world, as with Somalia and South Sudan. Regarding to that, Bertot et al (2012, p.86) say:

> The social media applications of the internet, on the other hand, have the potential to enhance existing approaches to transparency and foster new cultures of openness both by giving governments new tools promote transparency and reduce corruption and by empowering members of the public to collectively take part in monitoring the activities of their governments.

An interesting analysis about the **persistence** of corruption within countries is brought by Andvig (1991)[17], who basically explains that when the economy has a relatively high level of corruption, it will lead to the high-corruption equilibrium, while if its average level is low, then economy gravitates toward the low-corruption equilibrium. In a determined point of indifference, a small change may have a large impact, as it will move the flow to the corruption or no corruption tendency. This suggests how difficult is to change the *status quo* when the problem is rooted within society, endorsing the importance of a better understanding of its causes.

A fundamental variable that affects corruption concerns law enforcement and punishment controls. As Gary Becker (1968) mentions, something that affects corruption includes not only the penalty level on who is caught, but also the expenditures on courts and police, among others, which will at the very end determine the probability that those who commit crimes be caught, punished and the form they will be punished (imprisonment, probation, fine, etc.). As Tanzi (1998) suggests, this can be influenced by the role of institutional controls, and its enforcement on honest and effective supervisors, good auditing offices and clear rules on ethical behavior, among other preventive procedures and mechanisms; these characteristics naturally vary from country to country and from company to company. Another important point raised by Tanzi (1998) says that although higher penalties may reduce the number of

[17] See Andvig's (1991) Schelling diagram.

acts of corruption, it may also lead to demands for higher bribes on the corrupt acts that still take place.

Still regarding enforcement and control, Svensson (2005, p. 33) states: “wage incentive can reduce bribery, but only under certain conditions. This strategy requires a well-functioning enforcement apparats”, which would be the third-party enforcement suggested by Becker and Stigler (1974), mentioning the punishment of those who take grafts or other acts of misfeasance or nonfeasance, and rewarding enforcement. Outside audits (Di Tella and Schargrodsky, 2003) with monitor policies would also help the struggle against corruption. A study of Klitgaard et al (2000) corroborates that, describing what happened in Hong Kong when an independent commission against corruption that also enforced the citizens’ participation was created; the result was remarkable, with the systematic corruption in the police force being broken and moreover, corruption in that city was reduced. Fisman and Miguel (2007) tested how diplomats who had immunity protection from parking enforcements behaved regarding the number of fines they got and the corruption level. The results revealed a high correlation between the number of parking violations and existing measures of home country corruption, suggesting that the cultural root is a determinant factor of people’s behavior. The other conclusion was that law enforcement is important to mitigate illegal behavior, as when the government of New York City started to strip the diplomats’ plates from vehicles that accumulated more than three unpaid parking violations; this led to the immediate decline of approximately impressive 98 percent in parking violations.

Table 1 summarizes some of the variables mentioned over the literature, as well as the suggested relationship with corruption. It is valid to mention that the suggested relationship is not a consensus, but mainly what most of the results and theories present. A negative relationship means that the higher the variable’s value, the corruption level will be smaller, and vice versa. In the next session, further explanations will be provided for the chosen variables for the study.

Table 1 – Topic, Variables, Studies and Expected Relationship with corruption

Topic	Variable	Study	Expected Relationship
Religious Tradition	**Protestantism**	Treisman (2000); Landes (1998); La Porta et al (1999)	–
Education	**PISA**	Scheifer and Vishner (1993); Tanzi (1998); Jain (2001); Svensson (2005); Mauro (1995, 1996)	–
Country's Wealth	**GDP per capita**	Treisman (2000), Barhan (1997), Svensson (2005)	–
Country Origin	**British Influence Dummy**	Treisman (2000); Mauro (1995); Svensson (2005); La Porta et al (1999)	+/-
Federal Structure	**Federalism Dummy**	Wilson (1970); Wolfinger (1974); Bardhan (1997); Schleifer and Vishny (1993); Treisman (2000); Tanzi (1995); Prud'homme (1995); Gerring and Thacker (2004); Fan et al (2008)	+/-
Democracy	**Democracy Index**	Bardhan (1997); Treisman (2000); Montinolla and Jackman (2002); Tanzi (1998)	–
Women presence in Government	**Percentage of Women in Parliaments**	Tishkov (2003); Dollar, Fisman and Gatti (1999)	–
Regulation and Bureaucracy	**Ease of Doing Business Index**	Jain (2001); Rose-Ackerman (1997); Djankov et al (2002)	–
Competition	**KOD Index of Globalization**	Montinolla & Jackman (2002); Ades and Di Tella (1999); Hirschman (1970); Svensson (2005)	+/-
Law Enforcement	**Rule of Law dimension of WGI**	Bardhan (1997); Treisman (2000); Montinolla and Jackman (2002); Tanzi (1998)	–
Press Freedom	**Freedom House Scores**	Brunetti and Weber (2003)	–
Inflation	**Inflation rate**	Braun and Di Tella (2004)	+
Income Distribution	**Gini Index**	Sanjeev Gupta, Hamid Davoodi, Rosa alonso-Terme (1998)	+

Table 1– Topic, Variables, Studies and Expected Relationship with corruption (Cont.)

Topic	Variable	Study	Expected Relationship
Taxation Complexity	**The Financial Complexity Index**	Tanzi (1998); Johnson et al (1998)	+/-
Natural Resources	**Natural Resources**	Gupta et al (1998); Montinolla and Jackman (2002); Bhattacharyya and Hodler (2010)	+
OPEC Membership	**OPEC Dummy**	Montinola and Jackman (2002)	+

3. Methodology

After presenting the topics and variables (Table 1) that were selected to test the relationship with corruption, in the sections 3.1 and 3.2 it is going to be provided some of the arguments that give support to the expected relationship between them, and the CPI, as well as a brief explanation on what the chosen variable measures.

Besides that, it is valid to inform that the weighted least squares (WLS) model was chosen for the model. The reason for that is to avoid the heteroskedasticity error, through the division of each coefficient by the variables' variance calculated through time. More information on the construction of the model, as the data comprehensiveness, data limitations and countries coverage are going to be provided on the following sections.

3.1.. Dependent Variable: Corruption Perceptions Index (CPI)

The decision to choose the Corruption Perceptions Index (CPI) as the dependent variable consists not only on all the credibility that the organization which develops it – Transparency International (TI) – has, but also on its comprehensiveness. TI has been making corruption related studies since 1993 and has been annually ranking countries "by their perceived levels of corruption, as determined by expert assessments and opinion surveys" since 1996,. The index collects information regarding the studied object from a variety of other reputable institutions, which are the sources for the measurement on the perceived level of corruption of more than 186 nations around the globe. The results of the collected surveys and assessments is transformed into a number that represents the corruption level of that specific country, which will be compared with other countries, and used to create a ranking system of corruption at the end.

In 2012, an update on the methodology[18] used to calculate the CPI established a new scale of 0-100, providing the capability to compare CPI scores from one year to

[18] Prior to 2012, the CPI was based on perception of corruption in each country relative to other countries, because it captured the rank position of each country in each data source, thus one country score was highly dependent on the changes in scores of the other countries. From 2012 on, raw scores

the next. Hence, scores before 2012 are not comparable over time. Moreover, from 2012, CPI started to use the most recent years' worth of data from each source for each country, whilst previous editions of the index drew on more than one data source. Considering that, the data series chosen for the analysis is the period comprising the data from 2012 to 2016.

3.2.. Topics covered and explanatory variables:

3.2.1. Religious tradition

The religion factor is a branch of how historical tradition and colonization might affect corruption. As Treisman (2000) suggests, Protestant cultures are less understanding toward lapses from grace comparing to other religions; also, there is a much more pronounced separation of church and state in Protestantism. He also raises the fact that in Protestant Cultures exist higher associations with individualistic and non-familistic relation, what leads to an amoral view of nepotism, something that can facilitate the occurrence of corruption.

Landes (1998) also enforces the apparent advantage of Protestants, as it presents higher access to education and spread of learning, compared to Catholic and Muslim countries. La porta et al (1999, p.21) conclude that predominantly protestant countries have better governments than either predominantly Catholic or predominantly Muslims countries, for the latter religion is more interventionist in terms of telling people what to do, mostly because it grew to support State power.

To assess to which extent the religious tradition affects corruption, the data from The World Factbook provided by CIA (Central Intelligence Agency) brings the percentage of the population adherent to each religion[19] in each of the listed countries. Missing information from specific countries were completed by the composition of

from each of the data source started being used, providing greater transparency and better capture of changes over time.

[19] Protestant Christianity, Lutheranism, Calvinism (Presbyterians), Anglican Christianity (Episcopalians), as well as other variants on Protestant Christianity, including Pentecostal movements and independent churches, are grouped on the provided database and will be considered as branches of Protestantism for the analysis

Religious and Ethnic Groups Project (CREG), a project initiated by the Cline Center for Democracy as part of its Societal Infrastructures and Development (SID) project.

3.2.2. Country's wealth and Education

The strong relationship observed between GDP per capita and corruption in many empirical and econometrical researches can be explained by some reasons: Treisman (2000)[20] suggests that countries with a higher economic development have a more educated and literate population, which renders abuses harder to conceal. Svensson (2005) enforces it, citing some theories on the literature about the determinant of corruption, as they emphasize the role of economic and structural policies. One related view –the human capital theory– argues that education and human capital are necessary to make institutions operate efficiently. Some institutions as courts may operate efficiently in more developed environments; also, if there is some abuse from the government, they are more likely to go unnoticed and unchallenged when the electorate is not literate. Bardhan (1997) says that even with some discussions regarding the relationship between corruption and growth, the historical evidences suggest it is negative in general. Some exceptions may occur, but the presence of outliers does not invalidate overall results, as many other factors may affect countries' performance as well.

As both GDP and education seem to be highly correlated, but do not influence corruption in the same way, these variables are going to be tested separately. To test the former, the GDP per capita provided by World Bank national accounts data, and OECD (Organization for Economic Co-operation and Development) National Accounts data file will be used, both in U.S. dollars. The GPD per capita is the gross domestic product divided by midyear population, and it is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

[20] An important point raised by the author regards to the problem of the direction of causation; thus, he used an instrumental variable (in this case, the latitudinal distance from the Equator) to ensure the robustness of the results.

To measure how deep education affects corruption, the Programme for International Student Assessment (PISA) average reading scale is going to be used. PISA is conducted by OECD classified as an international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students.

3.2.3. Country origin

It is discussed in the literature if the colonial history of one country could influence its corruption's level. La Porta et al (1999) say that 'common law countries' (originated from England) have better governments than French civil law or socialist law countries, which as opposed, regulate more, and regulation may be an opportunity to corruption, due to the presence of discretionary power, as already mentioned. Then, a common law tradition can be taken as a proxy for the intent to limit rather than strengthen the state, as common law system restrains the government and protects more the individuals. That being said, government efficiency is the lowest in socialist law countries, in part because the extreme power of the State corrupts the bureaucracies. Jong-Sung and Khagram (2005, p.138) endorses it, arguing that "whereas British common law system was developed as a defense of property owners against attempts by the sovereign to expropriate property, civil law was developed as a sovereign instrument for state building and economic control."

Treisman's (2000) results corroborate that despite not being clear that countries that had never been colonized are less corrupt, a British heritage by itself reduces corruption. The most likely explanation is that it may reflect greater protection against official abuse provided by common law legal systems. Besides that, there is a superior administration of justice in these countries, as in Britain and some of its former colonies, scholars noted an intensive focus on the procedural aspects of law. Mauro's (1995) results found evidence that the colonial history may affect its ability to form a stable government, as well as the efficiency and honesty of its bureaucracy. Svensson (2005) indicates that countries that have the highest levels of corruption are developing, in transiting periods, or have recently been governed or are governed by socialist governments.

In order to test this argument, and to which degree countries that present common law system have a lower level of corruption, a dummy variable is going to be used in countries formerly ruled or administered by the United Kingdom, or part of the British Empire. The database provided by Daniel Treisman (2000) is used as reference to the dummy variables over the countries, when the situation applies.

3.2.4. Federal Structure

Gerring and Thacker (2004) studied different political institutional arrangements, focusing on territorial sovereignty (unitary or federal[21]) and the composition of the executive (presidential or parliamentary[22]), finding out that unitary and parliamentary forms of government help reduce corruption. Their results support the idea that both characteristics "centralize political power, thus reducing the number of political veto points (or points of access), while federalism and presidentialism decentralize power.", giving some evidences that in a more fragmented political system, many focus of power and decision-making capacities propitiate the occurrence of corruption.

Some arguments against decentralization say that when officials and citizens live and work close to one another in local communities, they have a higher interaction and may even come from the same families, as the higher easiness of closer relationship may result in decisions that favor individuals or groups (Tanzi, 1995). Contributing to that, Prud'homme (1995) says that local politicians and bureaucrats are likely to be more prone to pressing demands from local interest groups, as money and votes count more on a proportional base than a centralized structure. Also, monitoring and auditing are usually better developed at the national level, as the pressure of the media would also be greater for national basis than local corruption, what gives support to a lower degree of corruption in countries that do not adopt the federalist system.

[21] According to Gerring and Thacker (2004), "territorial government ('federalism') refers to a permanent and highly institutionalized sharing of responsibilities between a national authority and semi-autonomous regional units".

[22] Gerring and Thacker (2004) define parliamentarism as "a system of government in which the executive (the prime minister and cabinet: collectively, 'the government) is chosen by, and responsible to, an elective body (the legislature), thus creating a single locus of sovereignty at the national level."

Fan, Lin and Treisman (2008) used in their study data coming from concrete experiences with bribery, in order to get more reliable results. Their results suggest that greater decentralization of government personnel facilitates corruption; moreover, the number of subnational employees per capita and higher staff levels in local government correlate with more frequent corruption. A larger number of administrative or government tiers had a higher incidence of hush money, with the graft over these ties being associated to contract, public utilities and customs, business licenses and tax collections. However, it is valid to mention that giving governments a higher stake in local income may reduce their motivation to extract bribe.

Seeking to understand if or to what extent federalism propitiates corruption, a dummy variable is going to be used in countries that adopted this mode of government. It is going to be considered as federalist those countries in which the federal government shares power with semi-independent regional governments. As for the country origin variable, the database provided by Daniel Treisman (2000) is used as reference to identify the countries that adopt Federalism.

3.2.5. Democracy

Tanzi (1998) would say that the lack of transparency in rules, laws and processes creates the ideal opportunity for corruption. As usually democracy enforces these items, Treisman (2000) tested if the presence of a democratic regime reduces the level of corruption within countries, and found out that more important than being a democracy is to have it in a continuous way. He also found out that greater civil engagement may lead to closer monitoring, and a higher press freedom (something that is usually present in democracy) raises the awareness level and easiness to information. Montinola and Jackman (2002) results of their regression corroborate with the idea that the more democratized the country, the lower the corruption level.

In order to check if democracy influences the corruption level within countries, the Democracy Index will be used; this is an index compiled by the UK-based Economist Intelligence Unit that covers almost the entire population in the world and is

based on indicators grouped in five categories: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture[23].

3.2.6. Presence of women in government

Many behavioral studies suggest that women are less likely to sacrifice the common good for personal gain, and men are more individually oriented than women. According to Tishkov (1993, p. 2839), “the presence of women in the higher echelons of the hierarchical structures exercises an extremely positive influence on the behavior of their male colleagues by restraining, disciplining and elevating the latter’s’ behavior”. Adding to that, Dollar, Fisman and Gatti (2001) found a strong, negative and statistically significant correlation between the proportion of women in a country’s legislature and the level of corruption. This can be valuable not only to combat the corruption level within a country, but also to enforce gender equality issues.

The proportion of seats held by women in national parliaments can be used to test the extent to which the percentage of women may affect corruption. It is defined as women in parliaments the percentage of parliamentary seats in a single or lower chamber held by women. The data is provided by Inter-Parliamentary Union (IPU).

3.2.7. Regulation and Bureaucracy

In many countries the role of the state is often carried out through the use of rules or regulations (Tanzi, 1998). When one depends on permits, licenses and authorizations of various sorts, this can become a barrier to entry and opportunity for bribery, as they give public officials the **discretionary power**[24], which is the attributed authority that someone has to distribute contracts, design regulations and administer them, all which can favor corruption. That being said, the existence of regulations and

[23] Based on their scores on a range of indicators within these categories, each country is then itself classified as one of four types of regime: “full democracy”; “flawed democracy”; “hybrid regime”; and “authoritarian regime”.

[24] See Shleifer and Vishny (1993) and Jain (2001).

authorizations give some monopoly power to the officials who have the power to authorize or inspect the activity.

Regarding bureaucracy efficiency, Jain (2001) summarizes that it can influence corruption in two ways: First, a firm that has a contract is not necessarily the most efficient one, as corruption may favor firms that have no scruples and those with connections over the most efficient ones (Rose-Ackerman, 1999). Second, established producers could prevent new producers from entering the market by exploiting their relationship with bureaucrats, increasing the uncertainty of the transaction costs. Djankov et al (2002) found out that heavier regulation of entry is generally associated with greater corruption and a larger unofficial economy, as it reflects a lower competition level on the country.

As bureaucracy efficiency has much to do with regulation, to test the extension to which regulation influences corruption, the data provided by the Ease of Doing Business will be used. This is an index created by the World Bank that measures how countries deal with regulation issues on a daily basis. A nation's ranking in the index is based on many areas of business regulation: Procedures, time and/or costs in starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency and labor market regulation.

3.2.8. Competition

One can say that the economic and political institutions influence the degree of corruption, as they restrict political and market competition. Svensson (2005, p.34) would enforce that, as according to him, "A variety of evidence suggests that increased competition, due to deregulation and simplification of rules and laws, is negatively correlated with corruption". Moreover, competition can increase the chance of a firm acting as a watchdog, which could at least intimidate those companies that are acting in an illegal way, as they would feel threatened to be denounced by the others.

According to Ades and Di Tella (1999), countries that are more open to foreign trade tend to be less corrupt as potential corrupts now face an increased competition

for their final interest, thus reducing the rents enjoyed by domestic firms, which reduces the rewards from corruption[25]. In other words, when higher competition in the market exists, there is a reduction in the monopoly power of domestic produces, and as they have lower profits, less money is available to pay bribes.

In order to measure the degree of competition between the local companies and foreign products, The KOF Index of Globalization is going to be used. This index[26] was introduced in 2002 and covers the economic, social and political dimensions of globalization. To assess the exposure of local companies to foreign competition, the economic globalization segment of this index is going to be used; It relates to the flows of goods, capital and services, hidden import barriers, mean tariff rate, taxes on international trade and other restrictions.

3.2.9. Law Enforcement

Shleifer and Vishny (1993) present some possible reasons why corruption can arise and why it may be costly to economic development. They describe one concept explaining how corruption can be different in two specific situations: with or without theft. In the case “with theft”, the main idea is that there is a product (e.g. custom officials may charge for some products less than the official duty, and if possible, they will give absolutely nothing for the government) that was stolen by an official, and as its marginal cost will be zero, so the total price might be below the government price, fostering corruption. In the case “without theft”, as the product is not stolen (e.g. a license or concession for something), the charged price will be the government official price plus something (the bribe). This concludes that in the case with theft, people may have access to the product paying less, meaning that there is no incentive to expose the fraud, consolidating the corruption over the country and spreading it, as it aligns the interests of buyers and sellers. In the case without theft, the one who had not paid

[25] Ades and Di Tella (1999) found out in their regressions that almost a third of the corruption gap between Austria and Italy can be explained due to the latter exposure to imports.

[26] Dreher, Axel (2006): Does Globalization Affect Growth? Evidence from a new Index of Globalization, Applied Economics 38, 10: 1091-1110.
Updated in: Dreher, Axel, Noel Gaston and Pim Martens (2008), Measuring Globalisation – Gauging its Consequences (New York: Springer).

the bribe is out of the market and the buyer's cost will be higher, so there are enough incentives to expose the corrupt act. With some additional hypothesis and restrictions, the conclusion is that the first step to reduce corruption is to create an effective accounting system that prevents theft from government.

The presented case without theft can be analogous to what happened in Brazil, regarding the conglomerates "Sete Brazil" and "Clube das Empreiteiras", as these companies worked as a cartel that used to align their bids and take turn on the contracts with the government. Another example very common in Brazil happens when people get a car-fine, as in many cases they have the chance to graft who is applying the fine to avoid it.[27]

According to Andvig and Moene (1990), when corruption is detected, the expected punishment declines when more officials are corrupt, as "a permanent increase in the supply of corrupt acts may come about by a lowering of the moral costs of taking bribes." In Brazil, a specific plea-bargaining procedure[28] is helping the struggle against corruption in the country.

Seeking to find how much law enforcement and institutional controls curb corruption, it is going to be used the Rule of Law indicator provided by the Worldwide Governance Indicators (WGI), a research dataset summarizing the views on the quality of governance provided by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. These data are gathered from many survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. This indicator reflects perceptions of the extent to which agents have confidence in and abide the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

[27] Of course, it also depends on the predisposition of who is applying the fine. Throughout the year of 2014, 9% of the Brazilians admitted have bribed someone, and among them, 4% were paid to police officers (Exame, 2015).

[28] This procedure is called in Brazil as "Delação Premiada".

3.2.10. Press Freedom

Brunetti and Weder (2003) found evidence of a significant and negative relationship between press freedom and corruption in a large cross-section of countries. They also specify potential ways of violating it, among them: laws and regulations that affect media content, political and economic influence over media content and repressive actions. They also bring explanations on how press freedom can be one of the most effective ways of controlling corruption, with their results corroborating the proposed idea. Also, according to them, a free press tackles the problem in two ways:

When a government official has the discretionary power to refuse or delay a service[29], and charges something for that, if the costs of fighting extortion are high, the ones who depend on a license or approval will surrender to it and accept to pay the required bribe. If there is a free and active press, with an active media reporting the extortion, this would reduce the costs of fighting extortion, as there would be a channel to complain or denounce the illegality. The other channel by which a free press lowers corruption is when an official has some discretionary power in the application of rules, and he 'cooperates' in some way with a private agent in exchange for a bribe, benefiting both at the end[30]. This would be the case of a tariff liability reduction of a private company, for instance. In this case, the existence of a free press would not only report the case, but also actively investigate it.

To test the interaction between corruption and press freedom, it is going to be used the annual data provided by Freedom House, which includes an annual report - Freedom of the Press- over media independence around the world; it assesses the degree of print, broadcast, and digital media freedom on a comprehensive data set of countries and territories over the world. Furthermore, it provides numerical scores and country narratives evaluating the legal environment for the media, political pressures that influence reporting, and economic factors that affect access to news and information.

[29] This is what Brunetti and Weder (2001, p. 1804) defines as 'extortive corruption'.

[30] According to Brunetti and Weder (2001, p. 1805), this is called 'collusive corruption'.

3.2.11. Inflation

Little is known regarding the effects of information on the propensity of agents to misrepresent prices. So, seeking to fill this gap, Braun and Di Tella (2004) created a model to test how would be the relationship between the principal[31] and an agent that he will hire to purchase the goods he wants. The main idea is that when the price variability is high, the agent may be tempted to over-invoice the costs, keeping the difference between the reported and the actual price to himself. To solve the problem, the principal would spend part of his money in auditing the agent's behavior, but the assumption assumes that higher inflation variability increases the cost of auditing due to information costs, resulting in an increase of the corruption level. Braun and Di Tella's (2004) empirical analysis encompassed 75 countries over 14 years, and the results corroborated what the proposed model suggests, specifying that more important than the inflation level, it is the inflation variability. They also tested the influence of inflation over investment and growth, supporting what Mauro (1995) had found. Another suggestion would be that in an environment where prices change all the time, as the **relative** prices are imprecise, buyers do not know exactly the real price of the good, and the seller would take advantage[32] of this.

In this matter, to understand if inflation affects corruption somehow, it is going to be used the inflation rate provided by the World Bank that compiles[33] the rate for a wide range of countries through many years. The database contains the consumer price index, which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, yearly in this case.

[31] The principal in this model can be an entrepreneur. Hiring an agent would save the principal's time, allowing him to focus on other issues. If we adapt to the perspective of a country, the principal could be an government executive and the agent a lower-level official, for instance.

[32] Although this does not necessarily mean that the seller is acting in a corrupt way, at least the ethical issue can be discussed.

[33] Sourced from the International Monetary Fund, International Financial Statistics and data files.

3.2.12. Income Inequality

Some studies[34] found evidence that when inequalities increase, corruption goes in the same direction. According to Glaeser, Scheinkman and Shleifer (2003), rich people have more resources, power and opportunities to subvert legal, political and regulatory institutions to work in their favor. This can be done through political influences, bribes or deployment of legal and political resources to get things done. Jong-Sung and Khagram (2005) say that whoever has the power, as interest groups, firms or individuals, can influence law-implementing process to buy favorable interpretations of the law. Once inequality is consolidated within a society, it can be hard to change this configuration, as the rich have more motivation and capability to behave, and poor lack material resources to organize and revert this configuration.

Seeking to measure the degree to which inequality affects corruption, the Gini Coefficient[35] is going to be used; this is the most common measure of inequality, and it measures the inequality regarding levels of income, intending to represent the wealth distribution within a country. The data source is collected primarily from the information provided by OECD, with the missing data of some countries being complemented with the provided data from EUROSTAT, OECD, World Bank (and the Human Development Report Office), Department of Statistics Singapore and CIA (Central Intelligence Agency).

3.2.13. Taxation Complexity

When discretionary decisions are made by some public officials, it can create conditions for corruption to develop, because many different groups of interest would benefit from tax incentives, leading to bribery or some sort of corrupt mechanism to attend their interests[36]. If the rules and tax system within one country are simple and objective, it can be harder to create some sort of benefit to who wants to engage in

[34] Gupta et al. (2002) after some tests found evidences that higher corruption is associated with higher income inequality at the 1 percent level of significance. Also, according to their results, the impact is considerable: “A worsening tin the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) increase the Gini coefficient by 5.4”. Also, using instrumental variables, they found out that corruption also increases income inequality and is one of the main causes for poverty.

[35] The greater the Gini index, the higher is inequality. Therefore, a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

[36] See Tanzi (1998).

illegal acts. On the other hand, if the tax system is complex, some groups of interest may see this unclearness of rules as an incentive to bribe whoever has the political power or influence to change the tax operating system.

To check if there is any relationship between corruption and degree of tax complexity, it is going to be used the information provided by The Financial Complexity Index, made by the TMF Group. It examines and assesses the complexities of maintaining accounting and tax compliance across 94 jurisdictions worldwide; many items are evaluated regarding complexity of the overall tax systems, as how to be in accordance with legislation in diverse levels (national, regional and municipal), how mandatory is to use technology to increase transparency and record tax payments, how many layers of value-added tax (VAT) exist, and how consistent is the application of the tax, among other complexity parameters to be evaluated.

3.2.14. Natural Resources and OPEC membership

Regarding the natural resources abundance variable, Gupta et al (2002, p. 10) explain that in situations with a high concentration endowment over these resources, it is expected that a higher income inequality exists, thus becoming a cause for corruption. Besides that, the high capital intensity and low complementarity between capital and labor in the natural resource sector may also propitiate wealth concentration.

Montinola and Jackman (2002, p.170) found out that being part of the Organization of the Petroleum Exporting Countries (OPEC) has a noteworthy effect on the corruption level, as the authors suggest that OPEC members have a high degree of the government's direct engagement in national economic issues, which could increase the opportunities for rent-seeking and corruption. According to them, "it suggests that state control of *all* aspects of the *dominant* sector of an economy does, in fact it increase the opportunities for rent-seeking and corruption". Bhattacharyya and Hodler (2010) results corroborate that, stating that the natural resources are associated with higher levels of corruption, as resources windfalls foster their

governments to engage in rent-seeking, since the quality of the democratic institutions is below a certain threshold level.

To test if the abundance of natural resources influence corruption at some point, it is going to be used the total natural resources rents as percentage of the country's GDP estimates, based on sources and methods described in "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium" (World Bank, 2011). The total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. A dummy variable will be used in the countries that are part of the OPEC organization.

3.3. Research Database

Regarding the sources that were used to build the database of all the variables presented in session 3.2, it is important to mention that as they come from distinct institutions with different comprehensiveness, resources and methodology, there were some missing data for specific countries and/or years. Seeking to englobe the utmost of countries and variables for the database, carefully keeping the maximum of reliability for the posterior analysis, some criteria to fill this missing data needed to be specified. The criteria follow the rule that if one or two independent variables (among the total of 16) are missing, and the same variable exists in all other years of the country database, the simple average will be calculated in order to fill in the missing year.

As already mentioned in session 3.1, the original period chosen for the analysis ranged from 2012 to 2016; however, due to lack of data on many variables on the year of 2016, this year was expelled for the analysis. Another issue concerns the shortage of data for the Gini Index on an annual basis; in order to solve that, when one country did not have the index on a specific year, but had in adjacent years, the average was calculated to fill this gap; when only one year was informed, the same year was repeated throughout the missing years. This was mainly because even if some variables do not have all the data in all the years, the time that it takes for the variable to present significative changes may be long, meaning that this gap does not affect

negatively the model, thus keeping the reliance on its relationship with corruption. In regard to the PISA scores among countries, as the assessment is not provided in a yearly basis, the average between the periods was used (2012 and 2015). To justify that, the same reason for Gini Index is used: as relevant changes in education are hardly significant in short period of times, it seems fairly reasonable that the analysis will keep its properties. The same line was used to replicate the Tax Complexity variable, due to the lack of data to the corresponding years, but as it is not a variable where data changes easily in a short period of time (as inflation, for instance). Another change that was made concerns the variable GPD per capita, where the natural logarithmic transformation was applied to the raw variable. Lastly, the scores attributed to the variable Press Freedom were modified[37] in order to make the results of the analysis easier to interpret.[38]

It is valid to mention that although some variables that are mentioned by the literature would be valuable to the model, as the wage level of the public sector or ethnolinguistic fractionalization, due to the lack of available or sufficiently recent information of the composition of those variables, they were chosen not to be included in the analysis, in order to prevail the reliance on the analysis. The dummy variable representing the countries that OPEC members was also expelled, as none of the countries that are part of the organization presented sufficient data concerning the other variables. Nevertheless, even with some variables being dropped or not being used on the analysis, there is still enough and more than sufficient data over the years and countries to use panel data on the analysis. According to Hsiao (2003), Panel data sets for economic research presents major advantages over other methods, as cross-sectional or time-series data sets. Among these advantages, Hsiao (2003, p.3) highlights: “Panel data usually give the researcher a large number of data points, increasing the degrees of freedom and reducing the collinearity among explanatory variables - hence improving the efficiency of econometric estimates”.

[37] The transformation was: 100 – X, where X is the original score.

[38] Also, to make it easier to interpret the results, the variable related to the complexity of taxation will have its name changed to “Tax Simplicity” from now on, as higher results of the original score are associated with a simpler tax system.

After following all the specified criteria and having all the missing data filled, there were a total of 57 countries (among the maximum of 165, representing the number of countries that englobes the CPI from 2012 to 2015) that presented full database over the 15 dependent variables ranging for all the years. Table 2 presents the countries split by their region in the world.

Table 2 – Percentage of countries covered in the analysis by region of the world

Region	Countries	Total	%
Europe & Central Asia	34	49	69%
East Asia & Pacific	10	20	50%
North America	2	2	100%
Latin America & Caribbean	9	30	30%
Middle East & North Africa	2	20	10%
South Asia	0	8	0%
Sub-Saharan Africa	0	43	0%
Total	57	172	33%

Something important for the analysis is the division of variables in groups, in order to better understand which general aspects influence corruption, and to what extent. To make that possible, groups are going to be defined and specified according to common characteristics of the variables; then, each variable is going to be assigned to one of these clusters. After all variables are arranged to their corresponding cluster, one group of variables will be the first one to be tested in the regression. Then, other groups are going to be tested, in order to better understand how those kinds of variables affect corruption.

The groups were separated into four criteria: aspects related to demography, country's structure, economic aspects and political structure. **Demography** relates to those variables that illustrate more the structure of the individuals within each society

and reflects some sort of personal beliefs and intrinsic characteristics of the population; aspects related to religion, cultural and educational. Another group relates to the **political** characteristics of the country, containing characteristics related to its degree of democracy, proportion of seats composed by women in national congress and if the country adopts a federalist system or not. Another cluster of variables relates to the **structure** of society and the way institutions work depending on the landscape and conditions that propitiate firms to develop within countries. Aspects related to how risky would be to invest and undertake due to external interference, regulation issues, how beneficial is the way bureaucracy works on specific countries and at which degree the law enforcement define how the structure of the institutions that exist within countries is. Furthermore, the presence and easiness of foreign competition is also included in this group, which considers the degree of barriers, tariffs and other restrictive actions that could potentially decrease competition. Lastly, the group of variables that have in common **economics** aspects describe how they can interfere and shape the way market operates. It also includes the influence of variables over aspects that affect individual agents' life, as inflation, GDP per capita, taxation simplicity, Gini index, among others.

Figure 3 – Topics of the grouped Variables

- Demographic: Religion, British heritage, Education.
- Political: Democracy, Federal structure, Women in political seats.
- Structural: Rule of Law, Competition, Press Freedom, Bureaucracy.
- Economic: GDP per capita, Gini index, Inflation, Taxation Simplicity and Natural Resources.

4. Results

In this session, it is going to be presented the results of the regressions between the explanatory variables that were previously described, and the dependent variable, CPI. Along with the results, the analysis and explanations for each case will be provided, in order to understand their relationship with corruption, as well as how different groups per se relate with CPI; table 3 presents the results.

It is important to mention that all variables, but Rule of Law and Log of GDP were also tested together, therefore providing an analysis considering a wider scope, comprising all the different groups, providing a holistic view of their interaction. The reason for not including those specific variables is the high level of correlation between them and the others in the model, which could potentially bring an inaccurate result for the analysis. It is also valid to mention that as a higher score on CPI means a lower level of corruption, then, if the explanatory variable has a high and positive coefficient, the better it is to fight corruption.

Table 4 brings further information concerning the variables that were used in the regression. Exceptions are the dummy variables that were not included the table, as it would not make sense to the analysis because of the duality of its value, and tax complexity data, which scores the countries based in a ranking order, attributing the same fixed value between each one.

Table 3 – WLS Regression on CPI; different groups and all-variables regression

Model 4: WLS, using 228 observations
Included 57 cross-sectional units
Dependent variable: CPI
Weights based on per-unit error variances

Variable	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
Const	−48.1489***	−15.15	−17.0918***	−9.044	37.5356***	15.05	−94.1672***	−28.27	−74.6702***	−13.72
Protestantism	0.3668***	27.58							0.1528***	7.930
Education	0.2134***	29.54							0.1181***	15.27
British	9.2425***	15.05							3.1716***	4.101
Democracy			9.6824***	30.32					3.1345***	5.071
Federalism			1.9761*	1.932					1.8564**	2.252
Women			0.1735***	3.718					0.1037**	2.526
Bureaucracy Effic.					0.1393***	4.741			0.3981***	7.502
Competition					−0.1129***	−6.445			0.1614***	3.672
Rule of Law					19.2757***	48.70			-	-
Press Freedom					0.0689***	3.862			0.1135**	2.337
Inflation							−0.1324	−1.325	0.0439	0.366
Gini							−0.0321	−0.868	−0.0277	−0.792
Natural Resources							−0.3603***	−4.246	−0.0979	−0.788
Tax Simplicity							0.1644***	17.46	0.0416***	2.645
Log GDP per capita							14.9670***	57.36	-	-
R-Squared	0.9579		0.9061		0.9865		0.9631		0.9650	
F-Statistics	1696.639		720.6194		4081.169		1159.862		454.5195	
Factor	3		3		4		5		13	
Degrees of Freedom	224		224		223		222		214	

* p-value < .10 ** p-value < .05 *** p-value < .01

Table 4 – Summary of the data comprising the variables during the period of the analysis

Years	2012-2015						
	Average	**Minimum**	**Maximum**	**Median**	**1st Quartile**	**3rd Quartile**	**Outliers (Average per year)**
Protestantism	12.0%	0%	82.1%	2.5%	0%	16.4%	6
Education	469	352	545	485	431	503	2
Democracy	7.3	2.9	9.9	7.6	6.6	8.2	5
Women	24%	6%	45%	23%	16%	31%	0
Bureaucracy	72.1	53.2	91.2	71.8	66.0	78.9	0
Competition	73.7	30.0	96.5	76.5	67.0	83.5	4
Rule of Law	0.8	-0.9	2.1	0.9	-0.1	1.6	0
Press Freedom	64.7	13.0	91.0	72.0	51.0	80.0	4
GDP per capita	$27,764	$1,755	$117,508	$18,099	$9,823	$43,556	3
Inflation	2.5%	-2.1%	38.0%	17.2%	0.4%	3.2%	6
Gini	34.33	0.33	53.54	33.60	28.50	40.80	2
Natural Resources	2.5%	0%	20.1%	0.9%	0.2%	2.8%	9

4.1. Corruption and Demographic aspects

The results presented in table 3 shed light on the importance of variables related to demography, as the results have a high level of significance on all variables. In line with what is suggested by the literature, the higher the educational level, the lower the level of corruption. Some possible explanation may justify that, as when there is any abuse from the government, if the electorate is literate, it is less likely to go unnoticed and unchallenged, for with a higher understanding on society rights and government attributions, eventual illicit acts are less tolerable. Also, the ethical enforcement that is each time more taught in schools may contribute to people start pursuing a fairer and more reliable government when dealing with the problem.

The significance and positive signal presented by the variable that represents the percentage of people who adhere to Protestantism or related causes also goes in line with what is suggested by the literature. Cultures that have a higher percentage of protestants enforce more the individual aspect than familiar relationships, which could be a branch for nepotism relations, eventually leading to extra protection and consolidation of powers, something that can spur the occurrence of corruption. Also, as protestant cultures have higher correlation than other religions in terms of education (Landes, 1998), what could enforce the results.

Another inference that can be drawn from the analysis relates to British Heritage. The result goes in line with some studies (La Porta et al, 1999; Treisman, 2000) that state that in countries colonized and influenced by the British, where the common law system exists, the rule of law is more enforced than in countries that adopt different models, like civil law systems, for instance.

Regarding the results found in the demographic analysis, it is important to mention that this group of related variables is probably the one that is the most difficult to change over time when compared to the other three types (political, structural and economical), or at least it takes a valuable time to change. The reason for that is the difficulty to change aspects related to the culture of the country and to some characteristics that have been rooted for decades or centuries. The results

presented shed light on the importance of past events related to the colonization, which can certainly shape some of countries' characteristics in the current days.

4.2. Corruption and Political aspects

Table 3 tests to which extent political aspects influence corruption. Regarding the inclusion of the democracy variable, it can be said by the significance and signal of the coefficient that the higher its level within countries, the lower will be the corruption degree. This can be explained by the characteristics that are normally intrinsic on democratic regimes, which many times are opposed to autocratic regimes. Possible explanations for the relationship happens when some politicians engage in illegal or even suspicious acts, people may choose to replace them, while in autocratic regimes the easiness of hearing the society's voice is lower, something that may contribute to more corruption. Besides, another pillar of democracy is the enforcement of law, which treats each individual in the same way, and could at least theoretically avoid white-collar crimes from taking place. Another aspect is the presence of free and fair elections, which includes a higher degree of access to information, something beneficial in the struggle against illicit acts. This is also important to give space to alternatives to those who are conducting the country, as many times the perpetuations of those who hold the power contribute to foster illegal activities.

Besides, according to the results, a higher number of women in parliament's seats in a single or lower chamber decreases the level of corruption within a country. This goes in line with previous studies made by Dollar, Fisman, and Gatti (1999) and Swamy, Knack, Lee and Azfar (2001), corroborating the idea that women present higher standards of ethical behavior. It is required more study in the field to better understand the reasons for that, but as women are usually the ones who feel more the harassment in the society (e.g.: sexual assaults of favors to getting hired or promoted, pay differentials, lack of opportunities in management positions, prejudice over pregnant women, strong stereotyping in specific jobs), they may care more about ethical aspects than men.

The dummy variable related to federalism indicates that when nations adopt this mode of political division of power within the country, the CPI's score increases, meaning a lower corruption level. The intrinsic idea is very straightforward: when there is an internal dispute between local officials, who compete for labor, capital and investments that will generate wealth on a later step, it disciplines good practices for creating the necessary conditions to receive these good benefits. Hence, the greater mobility of citizens, firms and capital flow, aligned to the avoidance of acting in suspicious or illegal acts, may propitiate the destination of all these benefits to that specific jurisdiction, curbing corruption. Despite this result, it is worth noting that the result related to federalism is only significant at a level higher than 5%. This may support what has already been mentioned previously: There is a strong debate and lack of conclusive evidences that the structure of division of power within countries may in fact affect corruption; which may bring the variable to the common ground where there are not enough concrete evidences to support any side.

The results presented in this session show the importance of the political variables related group. Although there are many other variables related to politics characteristics that have not been covered in this analysis, it is important to mention that they exist and can be used for further research. This includes but is not limited to test other government regime (presidentialism, parliamentarism, dictatorship among others), different political ideologies (capitalism, socialism, communism and variations) or if even being part of some cross-national cooperation agreement (EURO, NAFTA, MERCOSUL and others) or any other political aspect may contribute to shape the way society is organized, which can affect somehow the corruption level within countries.

4.3. Corruption and Structural aspects

The group containing the variables related to the structural features of countries presented a high significance level and coefficient signals in line to what is suggested by the literature, except for competition. Still regarding competition, it is interesting that when all variables are tested together, dropping Rule of Law and

GPD per capita, then its coefficient becomes positive. It may be because of the high level of correlation between the variables in this group (Appendix A). This high correlation sheds light on the idea that these variables seem to move together and depend somehow on the others to develop. Some examples are going to be provided:

When press freedom and rule of law variables exist in a high level together, they seem to reinforce each other: first, the necessity of having a free press that pinpoints or raises questions about many suspicious aspects that may exist in innumerous situations where corruption can exist exposes and creates pressure from the media on potential law deviances. But it is fundamental that further investigations over suspicious malfeasances take place; and in fact, if something illegal exists, the correct punishment must be applied. In this case, one variable works as complement for the other in fighting corruption.

Another example may apply to bureaucracy and competition: When one company presents many bureaucratic aspects to commercialize its products, as high expectancy of days to open a new business, difficulty to deal with permits and property registration, slow problem resolution time, among others, it is not expected that foreign companies would have an easy task to export to this country, sell its products, or even stablish themselves within that country. A country with these characteristics does not seem to foster competition due to its high level of bureaucracy.

Those examples try to clarify that some variables possess intrinsic characteristics that move together with others. In this situation, one can say that the wheel just keeps spinning when structural aspects in the society are moving on the same pace. That being said, the results emphasize the importance of a favorable condition in terms of bureaucracy efficiency, press freedom and respect to the laws on the fight against corruption. Good policies in each of these variables may improve the institutions within societies, and one may propel each other to the development of the structure-related variables in countries.

Lastly, it can be concluded that structural aspects may work very well in inhibiting corruption. The law enforcement apparatus seems to be fundamental to

avoid its spread, as illegal acts are going to be punished, working as example to curb further malfeasance. A free press enforces that the rule of law is being in fact applied and represents a way for the society to express its voice. Other structural aspects as efficient bureaucracy may enforce or get enforced by favorable competition conditions, which can not only increase the number of companies within countries, but also decrease the power concentration of some specific enterprises that could engage in corruptive acts. Also, with more companies and competition, the chances of one acting as whistle blower are higher. Regarding bureaucracy, when it is extremely costly in terms of procedures and veto point, this gives space for bribery to take place, in order to fasten the procedures for someone who is interested in having things done. Hence, all these structural aspects working well and efficiently together seem to be fundamental not only to decrease the corruption level, but also to contribute to indirect aspects that are fundamental to any country growth and development.

4.4. Corruption and Economic aspects

The results concerning how economic aspects influence corruption are exposed in Table 3. In line with what is proposed by the existing literature, all the coefficients presented the expected signal, although Inflation and Gini are not significant even at the 10% level.

Tax simplicity presented a positive result, meaning that the more complex it gets, higher are the chances that illicit practices may arise. With a complicated tax system, an obscure channel may facilitate not only tax evasion, but also the opportunity for politicians or rent-seekers to bribe someone who may need some sort of favor. A straighter and less complex tax system does not allow, or at least makes more difficult the occurrence of illegal transactions, as tax rules are easily understandable and there are few or harder ways to conceal irregularities.

The significance of the natural resources variable explains part of the influence on corruption. The literature suggests that there is a higher chance of concentration endowment over these type or resources, which can contribute to

higher income inequality, and in turn propitiate corruption, as already explained. It is valid to remind the variable related to the OPEC membership was expelled from the analysis, what was expected to corroborate the result related to natural resources variable.

The logarithmic GPD per capita results suggests the higher it is, smaller will the corruption over countries be, as a wealthier population increases the opportunity cost when acting in illegal transactions. The result presented ignores if the income is distributed fairly or not, as the Gini coefficient did not show significance at the 10% level. Another variable that did not show significance was inflation; one possible reason for this result may arise from the fact that the inflation rate needs to be in a very high level in order to make the ideal opportunity for corruption, as when inflation is at low levels, people are aware of the true relative prices within the economy.

The group of variables presented in Table 3 also brought other important possible explanations on how corruption can vary according to economic related variables, though some variables presented no significance. Some interesting variables that were not used to test the relationship with corruption because of the lack of trustable data were the measurement of market concentration[39] within countries, or the gap of the wages of civil servants compared to private workers, among others.

4.5. Corruption, Demography, Political, Structural and Economic aspects

To understand how all variables relate to corruption when taken together, the problem of correlation between variables from different groups needed to be addressed, in order to bring more reliable results. Because of that, as already mentioned, two variables that contained a high level of correlation with the others (see Appendix A for the correlation table) were dropped: Rule of Law and Log of GDP per capita. The results with the remaining variables are presented in the last column of Table 3, and kept the consistency with the ones that were found and analyzed in the previous sessions. The high level of R-squared, signal of coefficients

[39] The Herfindahl-Hirschman index (HHI), a commonly accepted measure of market concentration would be used in this case.

and significance of the variables corroborate what is proposed by the literature, providing a valuable weapon to curb the studied problem.

Table 5 presents the comparison between the results that were found in the model and expected relationship between the variables and CPI that were presented in table 1. Again, it is valid to remind that a negative relationship means that the higher the variable's value, the corruption level will be smaller, and vice versa. Regarding the summarized results in table 5, it was considered the relationship between CPI and all the variables together at a maximum level of significance of 10%, meaning no evidence was found to test Inflation, Income Distribution and Natural Resources. Besides, as already mentioned, the Rule of Law and GDP per capita variables were not included in the analysis that contains all the variables together due to the problem of high correlation between them and the other variables in the model; that being said, the results that were considered in table 5 were the ones found on its own groups.

Table 5 –Expected x Actual Relationship between remaining variables and Corruption

Topic	Variable	Expected Relationship	Actual Relationship
Religious Tradition	**Protestantism**	–	–
Education	**PISA**	–	–
Country's Wealth	**GDP per capita**	–	–
Country Origin	**British Influence Dummy**	+/-	–
Federal Structure	**Federalism Dummy**	+/-	–
Democracy	**Democracy Index**	–	–
Women presence in Government	**Percentage of Women in Parliaments**	–	–
Regulation and Bureaucracy	**Ease of Doing Business Index**	–	–
Competition	**KOD Index of Globalization**	+/–	–
Law Enforcement	**Rule of Law dimension of WGI**	–	–
Press Freedom	**Freedom House Scores**	–	–
Inflation	**Inflation rate**	+	N.S.
Income Distribution	**Gini Index**	+	N.S.
Taxation Complexity	**The Financial Complexity Index**	+/–	+
Natural Resources	**Natural Resources**	+	N.S.
OPEC Membership	**OPEC Dummy**	+	N.A.

N.S= Not significant at the 10% level

N.A= Not available data to test the relationship

5. Measuring corruption through an objective methodology

As already mentioned, the creation of a new methodology that tries to measure corruption using only objective variables is an alternative to the existing method of trying to sort countries based on perception, which is prone to contain bias. Because some of the explanatory variables that were tested in the model contained subjective aspects (expert's analysis, personal opinion over the questions and other ways that would bring a non-objective way to assess corruption), it would not make sense to keep these variables, because they would pollute the model with their subjectivity factor. Thus, some variables were dropped, in order to keep only those whose quantitative input was free of personal bias, as shown in Table 6.

Table 6 – Regression concerning only the Objective variables and Corruption

Model 9: WLS, using 228 observations
Included 57 cross-sectional units
Dependent variable: CPI
Weights based on per-unit error variances

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−50.5744	5.4443	−9.289	<0.0001	***
Protestantism	0.2885	0.0131	22.05	<0.0001	***
Education	0.1051	0.0092	11.34	<0.0001	***
British	4.4210	0.8221	5.378	<0.0001	***
Federalism	5.3015	0.7946	6.672	<0.0001	***
Women	0.1507	0.0468	3.217	0.0015	***
Bureaucracy	0.3707	0.0503	7.371	<0.0001	***
Competition	0.4385	0.0402	10.92	<0.0001	***
Inflation	0.2026	0.1250	1.620	0.1066	
Gini	−0.2297	0.0387	−5.921	<0.0001	***
Natural_Resources	−0.5951	0.0938	−6.342	<0.0001	***

Statistics based on the weighted data:

Sum squared resid	206.8888	S.E. of regression	0.9764
R-squared	0.9651	Adjusted R-squared	0.9635
F(10, 217)	599.6939	P-value(F)	4.6e-152
Log-likelihood	−312.4413	Akaike criterion	646.8826
Schwarz criterion	684.6054	Hannan-Quinn	662.1026

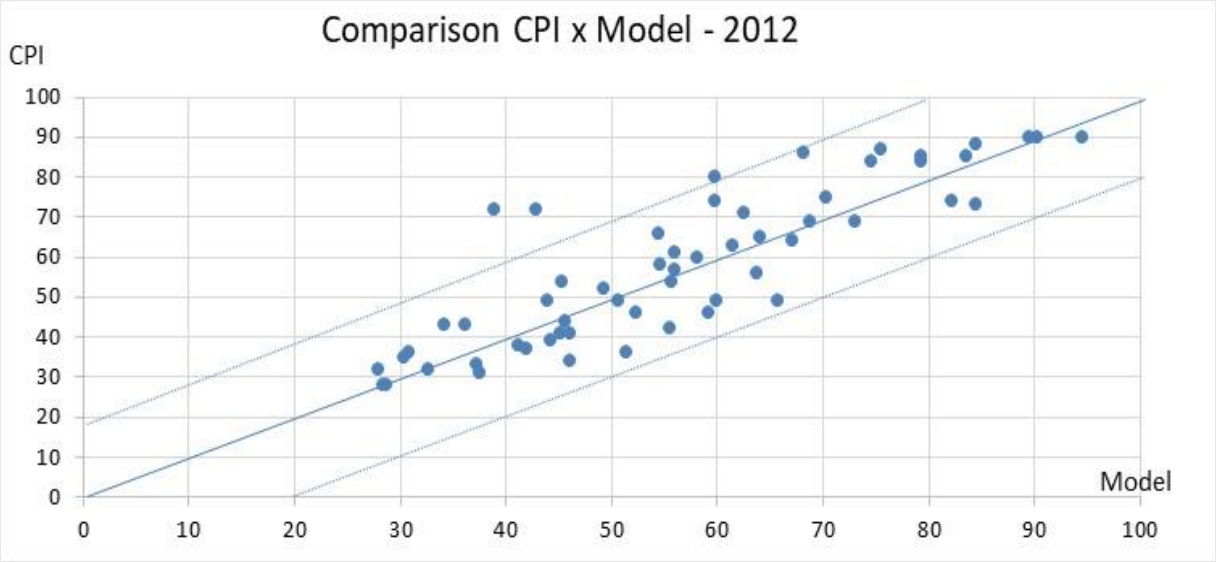
Statistics based on the original data:

Mean dependent var	58.0965	S.D. dependent var	19.1479
Sum squared resid	20236.97	S.E. of regression	9.6570

* p-value < .10 ** p-value < .05 *** p-value < .01

After the model was tested, the coefficients of the significant variables presented in Table 6 were used to weight the inputs related to each variable, and the output to each country was its related score. The results were organized and classified, as can be seen in Appendix B (Tables 8 to 11). Besides that, it was built (Figure 4) the graphical comparison plotting the corresponding score under both methodologies.

Figure 4 – Comparison between the ranking under the Objective Method and CPI



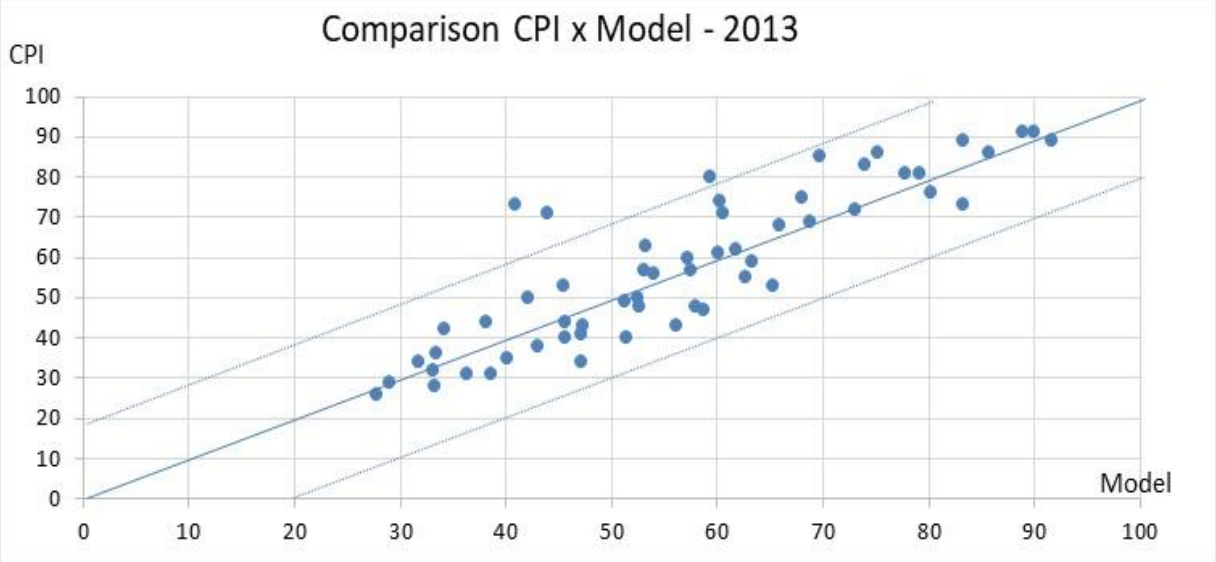
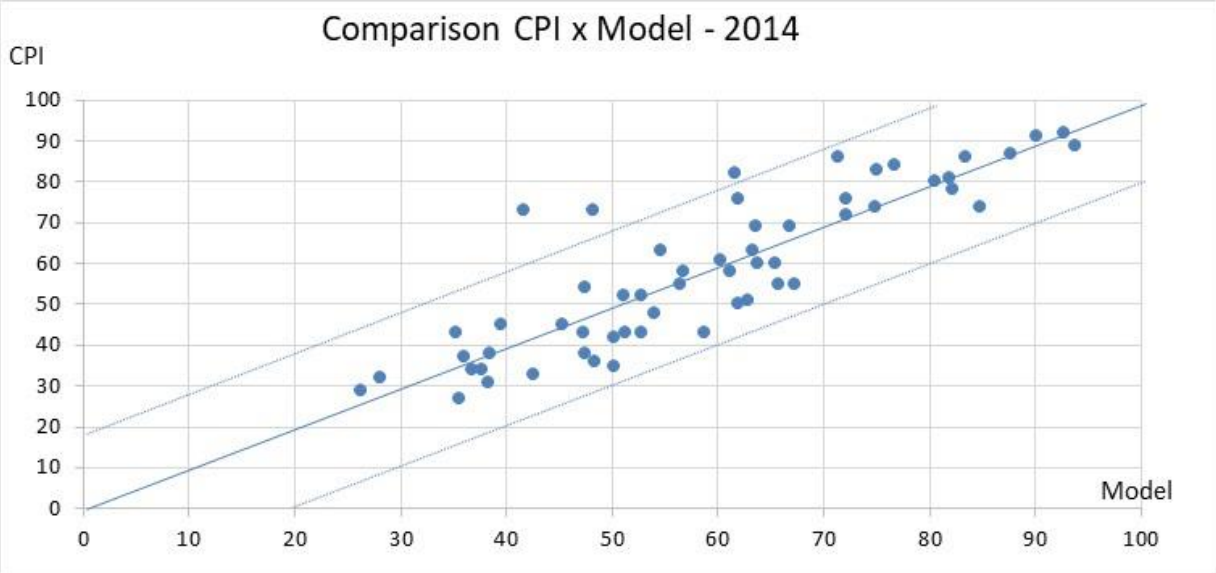
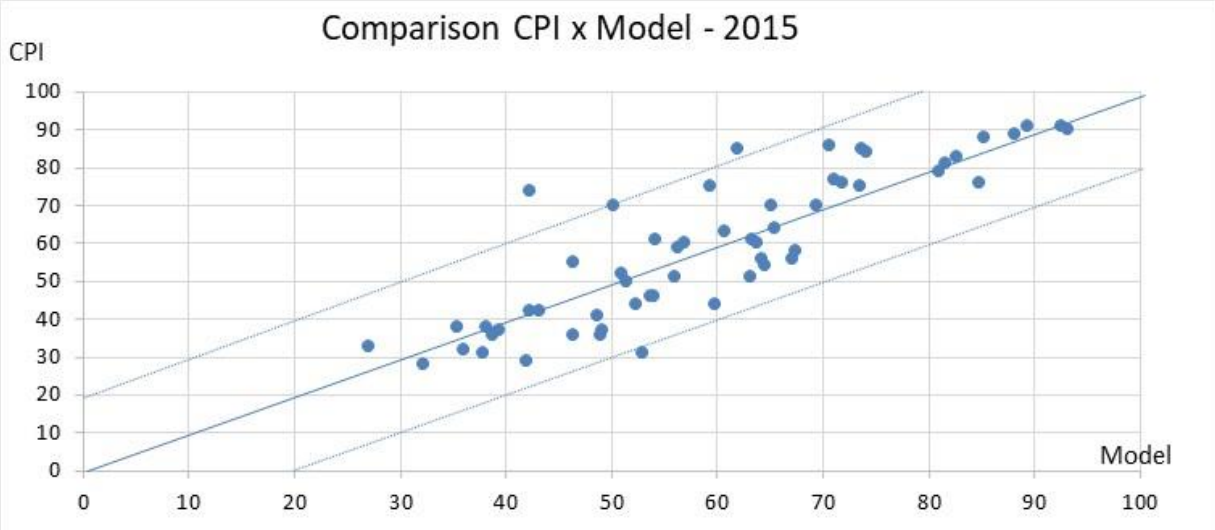


Figure 4 – Scores Comparison (Continuation)





Considering the limit of one standard deviation (represented by the dashed lines in the graphs of Figure 4) from the original data, the presented results showed that most[40] of the countries kept the proximity to their original score of the CPI, when limited to one standard deviation from the original data. Furthermore, as expected, the countries' score presented consistency over time.

[40] Only three observations (Luxembourg, Uruguay and Chile) among the total of 57 that were tested had their results exceeding the limit of one standard deviation from the original data.

As already mentioned, the subjectivity bias may distort the perception-based indexes of corruption, thus it may be risky to rely on this kind of indicator while assessing the corruption level within countries. Due to the importance of the theme, the new way of measuring corruption based only on objective inputs is an alternative for the current methodology. This alternative tries to mitigate the problems caused by misinterpretation between perception and reality. Other variables and studies may be added to the model, in order to make it more complete and precise; furthermore, the time frame in which the variables under this method are tested also needs to be rebalanced over time.

6. Conclusion

As defined, *corruption is the abuse of public power for private benefit*, and it may come in a wide array of illicit situations, many times comprising money or some sort of economic aspect, as “bribery, extortion, fraud, nepotism, graft, speed money, pilferage, theft, embezzlement, falsification of records, kickbacks, influence peddling, and campaign contributions” (Klitgaard, 1998, p.1).

Innumerous problems may also arise from corruption. One may think that the unique loss that exists is the amount of money per se that is deviated from its original destination. However, this is just the starting point of a branch of problems that are also consequence from that money that was deviated. For instance, when human capital (e.g. students, researchers and professors) of any institution within the education system does not receive proper investments or capital due to corruption, this may become a big problem for the future generations, as education results are only visible in the medium or long term. Another example occurs when patients on public hospital that may have their lives depending on those resources are left aside because the money did not arrive at its original destination; in other words, corruption may also take lives away, even indirectly. Entrepreneurs would also refrain from investing in the country because they feel discouraged due to the corruptive system, and investments would bring employment for the country, increasing wealth and propelling the economy.

This work tried to bring an updated research and diversified group of possible sources of variables that could influence corruption, which can be a useful and valuable tool to understand, and maybe restrain the root of the problem. Furthermore, the idea of creating a new methodology free of subjectivity is an alternate approach on how to assess corruption level. Further researches may use the objective ranking methodology to develop new ways to evaluate corruption, as well as better understanding its features. The division of variables into groups, seeking to understand not only how each variable behaves but also how each group of variables with similar characteristics relates to corruption provides an interesting aspect. This can be a powerful way to understand the channels that illegal money may flow, providing a tool to policymakers to evaluate the best action to take in the struggle against underground practices. In the case where corruption already exists

and is rooted within a country, the importance of the appliance of the law in a proper and prompt way may help to curb the problem and illegal schemes that harm society in countless ways. Other aspects related to gender equality for instance, may also be discussed, as the results suggested that as women present a lower tendency to practice corrupt acts, it may provide even more support to enforce equal rights among men and women, among many other topics of discussion that may arise from the results that were found, due to the high significance of the variables.

Because of the innumerous problems that may stem from corrupt acts, understand it better and creating an alternative methodology for the cause was the main motivator for the present research. The lack of reliability on policymakers that are potentially involved in corruption may bring not only economic losses, but also a social loss that cannot be quantified and may compromise the future of any country. Small steps to contribute for the literature is a valuable tool to avoid other problems that may potentially arise from it, helping to make societies a better place to live.

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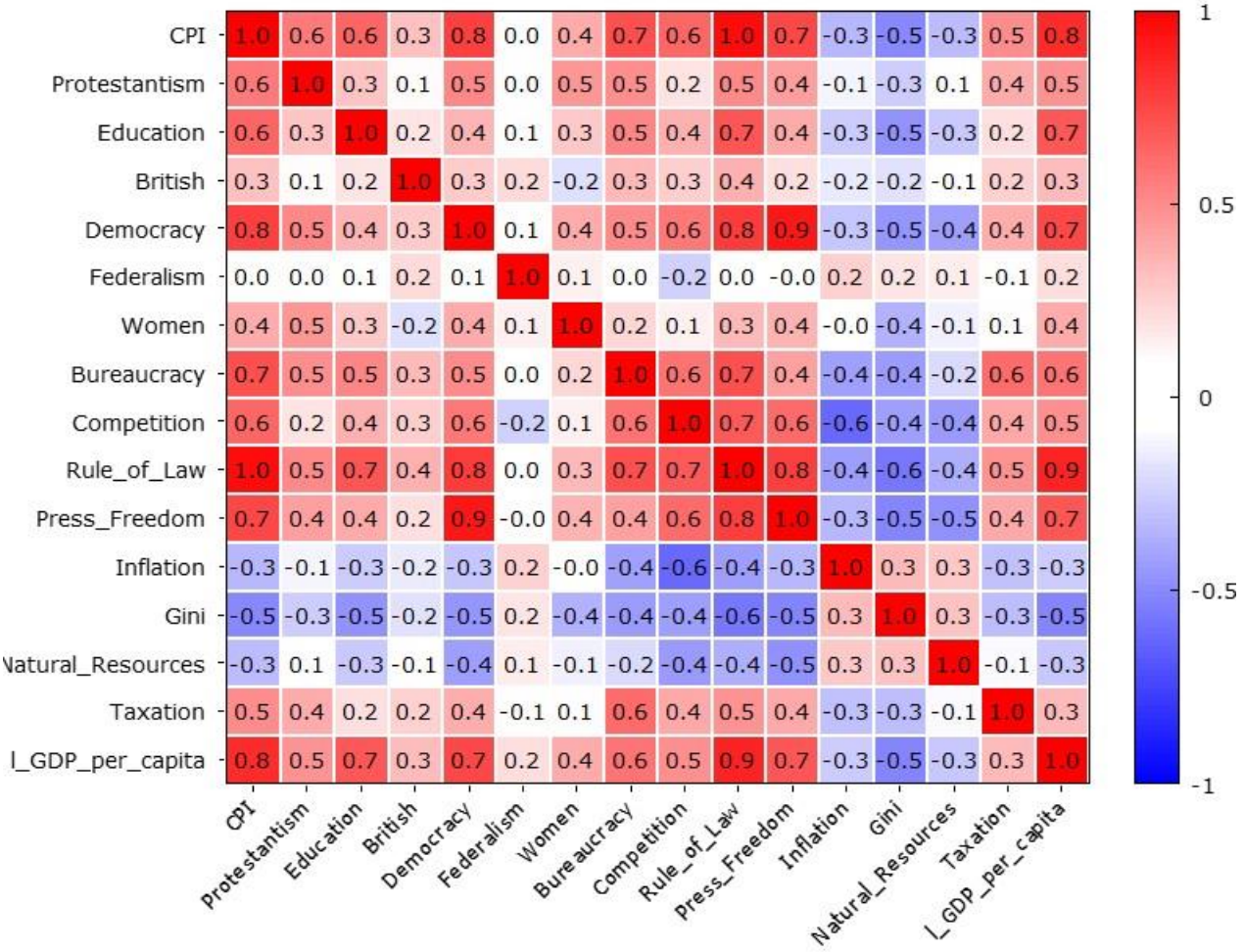
8. Appendix

8.1. Appendix A: Correlation Matrix

Table 7 – Correlation Matrix



8.2. Appendix B: Scores and Ranking comparison

Table 8 – Scores and Rankings for the year of 2012

	2012			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Finland	95	90	1	1
Denmark	90	90	2	1
New Zealand	89	90	3	1
Sweden	85	88	4	4
United States	84	73	5	15
Norway	84	85	5	7
United Kingdom	82	74	7	13
Canada	79	84	8	9
Australia	79	85	8	7
Singapore	75	87	10	5
Netherlands	75	84	10	9
Ireland	73	69	12	19
Belgium	70	75	13	12
Austria	69	69	14	19
Switzerland	68	86	15	6
Estonia	67	64	16	23
Latvia	66	49	17	33
Spain	64	65	18	22
Korea (South)	64	56	18	29
France	63	71	20	18
Portugal	61	63	21	24
Czech Republic	60	49	22	33
Japan	60	74	22	13
Luxembourg	60	80	22	11
Slovakia	59	46	25	37
Israel	58	60	26	26
Slovenia	56	61	27	25
Malta	56	57	27	28
Lithuania	56	54	27	30
Italy	55	42	30	42
Poland	55	58	30	27
Cyprus	54	66	32	21
Croatia	52	46	33	37
Greece	51	36	34	48
Malaysia	51	49	34	33
Georgia	49	52	36	32

Table 8 – Scores and Rankings for the year of 2012 (Continuation)

	2012			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Bulgaria	46	41	37	42
Mexico	46	34	37	51
Romania	46	44	37	39
Costa Rica	45	54	40	30
Montenegro	45	41	40	42
China	44	39	42	45
Turkey	44	49	42	33
Chile	43	72	44	16
Thailand	42	37	45	47
Peru	41	38	46	46
Uruguay	39	72	47	16
Vietnam	37	31	48	55
Albania	37	33	48	52
The FYR of Macedonia	36	43	50	40
Brazil	34	43	51	40
Indonesia	33	32	52	53
Colombia	31	36	53	48
Argentina	30	35	54	50
Russia	29	28	55	56
Kazakhstan	28	28	56	56
Dominican Republic	28	32	56	53

Table 9 – Scores and Rankings for the year of 2013

	2013			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Finland	92	89	1	3
Denmark	90	91	2	1
New Zealand	89	91	3	1
Norway	86	86	4	5
Sweden	83	89	5	3
United States	83	73	5	15
United Kingdom	80	76	7	12
Canada	79	81	8	9
Australia	78	81	9	9
Singapore	75	86	10	5
Netherlands	74	83	11	8
Ireland	73	72	12	17
Switzerland	70	85	13	7
Austria	69	69	14	20
Belgium	68	75	15	13
Estonia	66	68	16	21
Latvia	65	53	17	31
Korea (South)	63	55	18	30
Spain	63	59	18	26
Portugal	62	62	20	23
France	61	71	21	18
Israel	60	61	22	24
Japan	60	74	22	14
Luxembourg	59	80	24	11
Slovakia	59	47	24	38
Czech Republic	58	48	26	36
Slovenia	58	57	26	27
Poland	57	60	28	25
Italy	56	43	29	41
Malta	54	56	30	29
Croatia	53	48	31	36
Cyprus	53	63	31	22
Lithuania	53	57	31	27
Malaysia	52	50	34	33
Georgia	51	49	35	35
Greece	51	40	35	45
Bulgaria	47	41	37	44
Mexico	47	34	37	50
Romania	47	43	37	41
China	46	40	40	45

Table 9 – Scores and Rankings for the year of 2013 (Continuation)

	2013			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Montenegro	46	44	40	39
Costa Rica	45	53	42	31
Chile	44	71	43	18
Peru	43	38	44	47
Turkey	42	50	45	33
Uruguay	41	73	46	15
Thailand	40	35	47	49
Vietnam	39	31	48	53
The FYR of Macedonia	38	44	49	39
Albania	36	31	50	53
Brazil	34	42	51	43
Colombia	33	36	52	48
Indonesia	33	32	52	52
Russia	33	28	52	56
Argentina	32	34	55	50
Dominican Republic	29	29	56	55
Kazakhstan	28	26	57	57

Table 10 – Scores and Rankings for the year of 2014

	2014			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Finland	94	89	1	3
Denmark	93	92	2	1
New Zealand	90	91	3	2
Sweden	88	87	4	4
United States	85	74	5	15
Norway	83	86	6	5
Canada	82	81	7	10
United Kingdom	82	78	7	12
Australia	81	80	9	11
Singapore	77	84	10	7
Ireland	75	74	11	15
Netherlands	75	83	11	8
Austria	72	72	13	19
Belgium	72	76	13	13
Switzerland	71	86	15	5
Estonia	67	69	16	20
Latvia	67	55	16	29
Korea (South)	66	55	18	29
Spain	65	60	19	25
France	64	69	20	20
Israel	64	60	20	25
Czech Republic	63	51	22	35
Portugal	63	63	22	22
Japan	62	76	24	13
Luxembourg	62	82	24	9
Slovakia	62	50	24	36
Slovenia	61	58	27	27
Poland	60	61	28	24
Italy	59	43	29	40
Lithuania	57	58	30	27
Malta	56	55	31	29
Cyprus	55	63	32	22
Croatia	54	48	33	37
Georgia	53	52	34	33
Greece	53	43	34	40
Malaysia	51	52	36	33
Romania	51	43	36	40
Mexico	50	35	38	50
Montenegro	50	42	38	45
Chile	48	73	40	17

Table 10 – Scores and Rankings for the year of 2014 (Continuation)

	2014			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
China	48	36	40	49
Costa Rica	48	54	40	32
Bulgaria	47	43	43	40
Peru	47	38	43	46
Turkey	45	45	45	38
Albania	43	33	46	53
Uruguay	42	73	47	17
The FYR of Macedonia	40	45	48	38
Indonesia	38	34	49	51
Thailand	38	38	49	46
Vietnam	38	31	49	55
Argentina	37	34	52	51
Colombia	36	37	53	48
Brazil	35	43	54	40
Russia	35	27	54	57
Dominican Republic	28	32	56	54
Kazakhstan	26	29	57	56

Table 11 – Scores and Rankings for the year of 2015

	2015			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Denmark	93	91	1	1
Finland	93	90	1	3
New Zealand	89	91	3	1
Sweden	88	89	4	4
Norway	85	88	5	5
United States	85	76	5	14
Canada	83	83	7	10
United Kingdom	82	81	8	11
Australia	81	79	9	12
Ireland	74	75	10	16
Netherlands	74	84	10	9
Singapore	74	85	10	7
Austria	72	76	13	14
Belgium	71	77	14	13
Switzerland	71	86	14	6
Estonia	69	70	16	19
Latvia	67	56	17	30
Spain	67	58	17	29
France	65	70	19	19
Korea (South)	65	54	19	33
Portugal	65	64	19	22
Czech Republic	64	56	22	30
Slovenia	64	60	22	26
Israel	63	61	24	24
Slovakia	63	51	24	35
Luxembourg	62	85	26	7
Poland	61	63	27	23
Italy	60	44	28	40
Japan	59	75	29	16
Malta	57	60	30	26
Croatia	56	51	31	35
Lithuania	56	59	31	28
Cyprus	54	61	33	24
Greece	54	46	33	38
Romania	54	46	35	38
Mexico	53	31	36	54
Montenegro	52	44	37	40
Georgia	51	52	38	34
Malaysia	51	50	38	37
Chile	50	70	40	19

Table 11 – Scores and Rankings for the year of 2015 (Continuation)

	2015			
	Scores		Ranking	
Country	Model	CPI	Model	CPI
Bulgaria	49	41	41	44
China	49	37	41	47
Peru	49	36	41	49
Albania	46	36	44	49
Costa Rica	46	55	44	32
Turkey	43	42	46	42
The FYR of Macedonia	42	42	47	42
Russia	42	29	47	56
Uruguay	42	74	47	18
Colombia	39	37	50	47
Indonesia	39	36	50	49
Brazil	38	38	52	45
Vietnam	38	31	52	54
Argentina	36	32	54	53
Thailand	35	38	55	45
Kazakhstan	32	28	56	57
Dominican Republic	27	33	57	52