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### Does Corruptin Affect Productivity in Terms of Growth in Brazil?

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Does Corruptin Affect Productivity in Terms of Growth in Brazil?

Alessandro Lannes

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## **Abstract**

This paper explores the relationship between the corruption that occurs in Brazil and its effect on productivity in terms of economic growth. While there are multiple facets of corruption, currently, the only measure of corruption is Transparency International's Corruption Perception Index (CPI). This index is measured from 0, most corrupt, to 10, least corrupt. The productivity of Brazil in terms of economic growth will be measured using GDP per capita. My hypothesis is that the corrupt acts that occur in Brazil have a direct negative influence on the productivity of Brazil. Mainly, this is through the rent seekers theory that political influencers in Brazil use or take resources for their personal gain instead of for the good of the people without adding any sort of benefit for the people. Additionally, I will be using the Solow growth model to explain productivity and growth.

## **Introduction**

The spark that ignited the recession in Brazil was the Petrobras scandal that was brought to light in 2013. One of Brazil's most infamous money launderer's, Alberto Youseff, attempted to save himself by handing over information that led to the discovery of the Petrobras scandal, the biggest in Brazilian history (Forbes, 2015). Petrobras is a state-run oil conglomerate and, before the scandal, it was the 6<sup>th</sup> largest company in the world and accounted for almost 10% of Brazil's GDP. Since 2012, their market cap has dropped by close to 130 billion US\$, some of that is due to the decrease in the price of oil, but it's mainly due to the corruption scandal (Yahoo Finance).

This scandal was the tipping point that led to the current recession. After the scandal was brought to the forefront the value of the Brazilian Real plummeted to an all-time low of 4.0665 per dollar, from its previous price of 1.5 Reals per dollar. This made imports more expensive than they already were, adding to the already rising problem of inflation in Brazil. The Petrobras scandal coupled with rising inflation and uncertainty in the economy caused a sharp decrease in foreign investments flowing into Brazil. The Central Bank of Brazil (BCB) met in October to discuss the current issues in Brazil and determined that monetary policy wouldn't have much of an effect on the economy until there is a "reduction of uncertainty," meaning that until the Petrobras scandal winds down there isn't much they can do (Banco Central do Brazil). This brings investor confidence in the Brazilian economy close to zero.

Political scandals, like the Petrobras scandal, aren't uncommon in Brazil. Corruption has plagued Brazil for decades, it has caused some of the largest economic setbacks Brazil has faced. On numerous occasions analysts predicted that Brazil would become the next economic super power, however, corruption has held the country back from achieving this economic super power status.

When talking about corruption it should be made clear that there are multiple facets of corruption. The most well established measure of corruption is Transparency's International measure of corruption, the corruption perception index (CPI). Transparency International is the global civil society organization leading the fight against corruption. Transparency International classifies corruption into 3 separate categories: grand corruption, petty corruption and political corruption, depending on the amounts of money lost and the sector where it occurs.

The three types of corruption are:

**Grand corruption** consists of acts committed at a high level of government that distort policies or the central functioning of the state, enabling leaders to benefit at the expense of the public good.

**Petty corruption** refers to everyday abuse of entrusted power by low- and mid-level public officials in their interactions with ordinary citizens, who often are trying to access basic goods or services in places like hospitals, schools, police departments and other agencies.

**Political corruption** is a manipulation of policies, institutions and rules of procedure in the allocation of resources and financing by political decision makers, who abuse their position to sustain their power, status and wealth.

For this paper, however, I will be using Transparency International's simplified definition of corruption because it is hard to differentiate where one type of corruption stops and another starts. Transparency International defines corruption as "the abuse of entrusted power for private gain."

### **Analytical Framework**

In order to understand economic growth and corruption I will be using two different economic models. For growth, I will be using the Solow growth model. Additionally, I will be using rent seekers theory in order to further understand the effects of corruption, which lead to slow economic growth.

In a corrupt country, most politicians use the resources available to them for their own individual economic gain. This is known as rent seeking theory, where an individual uses a governments or company's resource for personal gain without reciprocating any benefit to society. Rent-seekers theory involves an individual, or party of individuals, seeking to increase their share of existing wealth. Additionally, these individuals increase their own wealth without creating any new wealth. The caveat to this theory is that there is a net loss to society. This is accomplished only by monopolies, and in the case of corruption, the government is the monopoly. If we look at graph 2, a graph of a monopoly, we observe the significant gain accrued by a monopoly. This gain is taken from consumers (society) but also leaves a loss in efficiency. This noticeable loss in efficiency is also realized by society. In this case society is the people of Brazil. Research done by Paolo Mauro concluded that corrupt countries tend to spend much lower rates on education and health, this allows government officials to use this extra capital for their own corrupt agenda. Due to the inherent nature of rent seeking behavior, the GDP per capita will stagnate or decrease since wealth is being taken away from society (Daveri, n.d.).

The second economic model being used is the Solow growth model. This model specifically focuses on the output of the country, assuming that it only produces 1 good. Robert Solow theorizes that output is a product of two factors, labor and capital. In our case, labor refers to the population of Brazil. An additional factor that can have an effect on output is technology. For instance, we are a lot more productive at farming because of the use of technology that allows us to harvest fruits and vegetables with large machines instead of doing it by hand. At the same time, this productivity function does exhibit diminishing marginal

returns, meaning there is an optimal capital to labor ratio. Additionally, it should be noted that this model is primarily focused on long term economic growth (Solow, 1956).

## **Literature Review**

Paolo Mauro, who is one of the biggest contributors to the research of corruption has determined that the primary cause of corruption is rent seeking behavior. Mauro gives multiple examples of rent seeking behavior induced by governments. As listed below:

**Trade Restrictions** are a prime example of government induced form of rent seeking. If there is a restrictive limit on how much of a certain good can be imported into the country each year the necessary import licenses become very valuable and importers will consider bribing officials who control their imports. In general, this protects a home industry from foreign competition through tariffs. This creates a semi-monopoly for the local industry. Local manufacturers will lobby for the establishment and maintenance of these tariffs. And some may even be willing to bribe local politicians to keep this semi-monopoly going. If you have an open economy, with free trade, your country is usually associated with lower corruption levels. Meaning, countries tend to be less corrupt if their trade is relatively free of government restrictions that corrupt officials can abuse. However, this can also be seen as a strategy to boost a local economy's GDP by forcing its people to buy locally made products instead of imports. This strategy was used by the United States in the past to boost the US auto industry. It is worth noting that, in the long run, this strategy will decrease competition, decreasing the power of the consumer and inevitably reducing or stagnating the quality of their products (Mauro, 1997).

**Government subsidies** can also be a source of rent seeking. Previous studies have shown that corruption can thrive under industrial policies that allow poorly targeted subsidies to be appropriated by firms for which they are not intended. The more such subsidies are available to industries, correlates with a higher corruption index score. Like trading restrictions, in the long run this can be an issue, however countries like the US have used subsidies in the farming industry for decades and the United States is known as a low level corrupt country.

**Price controls**, whose purpose is to lower the price of some good below its market value (usually for social or political reasons), are also a source of rent seeking. These price controls create incentives for individuals to bribe officials to maintain the low prices of such goods or to acquire an unfair share at the below-market price. On the other hand, price controls are regularly used by economies to ensure the profitability of a product for low margin products or to ensure that companies don't take advantage of the population in times of crisis.

**Multiple exchange rate practices and foreign exchange allocation schemes** also lead to rent seeking. Some countries have several exchange rates, one for importers, one for tourists, one for investors, for example. Differences among these rates can lead to attempts by parties to obtain the most advantageous rate, although this rate might not apply to their intended exchange. Multiple exchange rate systems are often associated banking systems in which key banks have close ties to the government. This is done so that the government can make huge profits by arbitraging between markets. If a bank is state-owned the banks can ration scarce foreign exchange by allocating it according to the priorities of government officials. This is a big issue in Brazil, as most of their banking system is state-owned.



**Low wages in the civil service** relative to wages in the private sector are a source of low-level corruption. When civil service pay is too low, civil servants may be obliged to use their positions to collect bribes as a way of making ends meet, particularly when the expected cost of being caught is low. This is a primary reason why much of Brazil's police force is corrupt. This is a constant issue in Brazil, as police officers aren't able to feed their families, in turn, they turn to bribes to make up for that deficit.

**Natural resource endowments**, such as oil, gold and lumber are another example of a source of rent seeking behavior, since they can typically be sold at a price that far exceeds their cost of extraction and their sale is usually subject to stringent government regulation, which corrupt officials can turn a blind eye to. Economies rich in natural resources may be more subject to extreme rent-seeking behavior than economies with little natural resources (Roy, 1970)

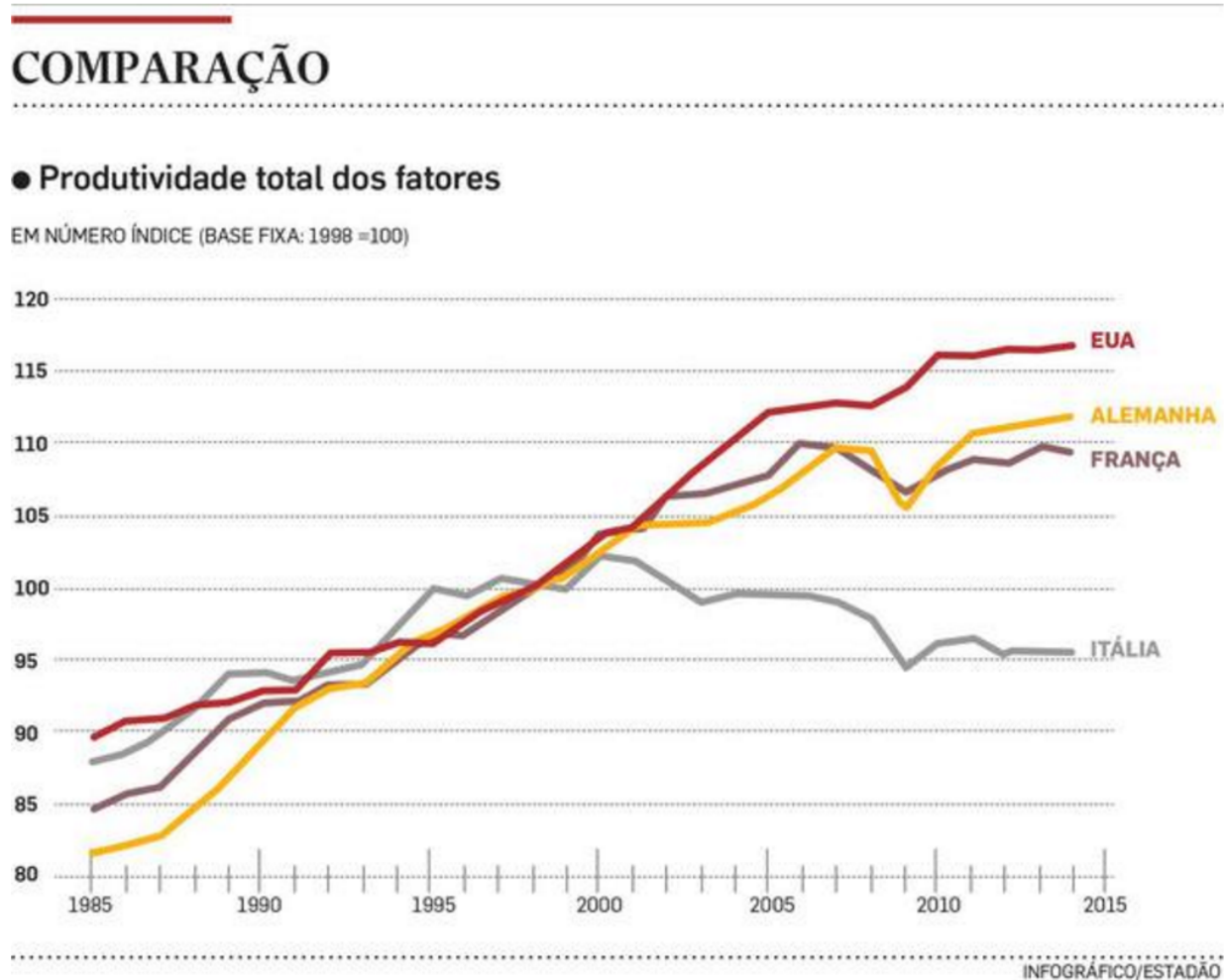
**Sociological factors** may contribute to rent-seeking behavior as well. Public officials are more likely to do favors for their relatives in societies where family ties are strong. This is constantly seen in corrupt countries, such as Vladimir Putin giving building contracts to his close friends and families instead of the most qualified contractors.

While the above-mentioned forms of rent seeking are "loose" definitions of corruption, as in they can be seen as corruption but also as governmental strategies. Maria Pinotti looks at an example of corruption in which she compares a corrupt countries high-speed rail line building process to a clean country's process of building a high-speed rail line. She compares the spending of Italy's government and France's government on high speed train lines. Both countries used private firms for the job, however, Italy's government is known to be more

corrupt than the France's government. Construction on the 125km Milan-Turin stretch started in 2002 and ended in 2009, the total cost of the project was €7.8 billion (€62 million/km). The construction on the 300km Paris-Alsace Lorraine stretch also started in 2002 and ended in 2007, the total cost of the project was €5 billion (€16.6million/km). Had the Italian route been built at the same cost of the French route it would have cost them only €2 billion, instead of the €7.8 billion paid. Not only was the Milan-Turin route 4 times as expensive as the Paris-Alsace Lorraine route but it also took two years longer to build. On top of that, the private corporation received 3.6% of the total value of the work in the case of the Italian's and 2% in the case of the French, that's close to double the amount for a contract that cost quadruple the price of the French contract (Cristina, 2009).

Since it's always hard to measure the effects of corruption because usually there's more input in a given situation than just corruption it's hard to have a concrete measurement for corruption. However, in this case corruption is the one factor that shows the differences in the costs of public works in Italy compared to other countries. The below graph shows the effect of all the inefficiencies that corruption causes on productivity. The graph below is a measure of the efficiency of the available labor and capital used in total production, this is known as Total Productivity Factors (TPF). In this case, the TPF of Italy is being compared to that of the United States, Germany, and France from 1985 to 2014. As seen in the graph, Italy's productivity began to slow down and eventually decline around 1995, right when the Italian political system began to protect and pass laws to protect corruption. Had Italy followed the path of the United States, in terms of productivity, its GDP would be 22% higher than observed in 2014 (Cristina, 2009).

Figure 1: TPF (Total Productivity Factors) (Cristina, 2009)



This graph clearly shows the effect of corruption on a country's productivity. While there could obviously be additional factors causing such a drastic drop, it is mainly due to the presence of corruption. As you can see from figure 1, none of the other countries declined until around 2008, which can be blamed on the recession, the uniformity of the lines show a clear indication that corruption is the cause for the change in the productivity in Italy.

Even though you can clearly see the cause of corruption on Italy's economy in figure 1, we have yet to determine what the effect of corruption is on a micro level. Paolo Mauro was

one of the first to determine that corruption lowers private investment, thereby reducing economic growth. This observed reduction in growth determines a lower productivity factor in these corrupt countries. Paolo Mauro did this by looking at nine factors that any firm would be interested in when selecting a new market to enter. The nine factors Paolo Mauro used were: Political change – institutional, political stability, probability of opposition group takeover, stability of labor, relationship with neighboring countries, terrorism, legal system – judiciary, bureaucracy and red tape, corruption. He then determined that a firm's perception of political uncertainty helps determine the investment rate. Afterwards, he was able to determine that the perceived most politically uncertain countries were also the countries that were the most corrupt. This led to his conclusion that high levels of corruption lead to low investment rates, which ultimately leads to a lower GDP (Mauro, 1997).

The issue with Paolo Mauro's argument is that his 9 factors are very broad and can range drastically. Brazil is on both spectrums, when looking at the nine factors Mauro uses to determine political instability. There is a low chance of an institutional change in Brazil's political system, however, it is important to recognize that less than 60 years ago the Brazil was ruled by a military dictator. Brazil does not have any toxic relationships with its neighbors, nor does it have much terrorism. The efficiency of the judiciary system in Brazil is correlated with the corruption in Brazil, you can pay to have your problem resolved at an expedited rate if you know the right political officials. Overall, Brazil has a big issue with political uncertainty, the recent Petrobras scandal drove Dilma Rousseff from office and put the opposition party in power. The streets of Brazil were littered with protestors throughout the entire process, calling for systemic change to the corrupt system that Brazil continues to leech onto.

In Brazil specifically, it is evident that corruption erodes the pillars of democracy, undermines the ethical values of individuals, and exacts a high price on the growth and competitiveness of the economy. Markets are dominated by distortions and inefficiencies, affecting the country's competitiveness.

In Maria Pinotti's continuing research she determines that corruption involves primarily three variables: the opportunity for the illegal act to occur, the chance that the corrupt action will be discovered and the likelihood of the perpetrator being punished (Cristina, 2011). For example, in the Brazilian public administration there are many opportunities for corruption. There are more than 20 thousand positions in commission for which the president of the Republic can appoint servers without public approval. These positions, at least in part, are filled by political patrons, in disregard of the criteria of technical competence.

This relates to John Macrae argument that corruption has a lot to do with game theory and prisoners dilemma. In game theory, you always pick the most optimal outcome, known as the Nash equilibrium. If you're able to benefit more by being corrupt and there's a low risk of being caught you're going to pick that optimal outcome. The problem with corruption is that it's always a game of prisoner's dilemma, meaning that if both parties don't say anything you're not going to go to jail, however, if one party talks and the other doesn't one is more likely to get in trouble. Additionally, if both confess then both are in trouble. Since corrupt deals are always done in private there is a low risk of being caught as long as both parties stay quiet (Macrae, 1982).

While Mauro was able to determine that foreign direct investment (FDI) was affected by the level of corruption of a country, Maria Pinotti was able to determine the exact tradeoff

between corruption and FDI. It has been shown that reducing a country's level of corruption by a half a point increased economic growth by 1% each year and increased investment levels by 4.9% (Cristina, 2009).

However, as Mauro states, rooting out corruption is difficult because when a country is known to be corrupt, corruption is widespread. It just does not make sense for individuals to attempt to fight it, even if everybody would be better off if corruption were to be eliminated. For example, the case of a civil servant in an administration where everybody, including his superiors, are very corrupt. It would be difficult for this civil servant to decline offers for bribes in exchange for favors, because his superiors may expect a portion of the bribe for themselves. Additionally, if corruption is widespread agents are less likely to be caught or prosecuted for corruption. "If many people steal, then the probability of any one of them being caught will be low (Mauro, 2002)."

By contrast, in bureaucracies that are generally honest, a real threat of punishment deters individual civil servants from behaving dishonestly (Again going back to prisoners dilemma and game theory). This is an example of a strategic complementarity, whereby if one agent does something it becomes more profitable for another agent to do the same thing.

However, politicians have to take into account the fact that if they hurt the economy citizens will not reelect them, which means they'll no longer be able to collect bribes. This means politicians have to decide what type of private bribe system they wish to set up. Paolo Mauro uses an example of two politicians part of the same government, politician A and politician B. Politician A is very corrupt and has established a private bribe collection system purely for his

own gain. The need to pay substantial bribes reduces the incentive for investment and imposes on the economic growth. Once citizens realize that economic growth is being harmed by the corrupt government they'll be less likely to reelect the government, even if they don't know who exactly is at fault for the corrupt acts they'll still be less likely to reelect the current government. This, in turn, reduces the amount of time politician B has to obtain the gain from bribes. This will make politician B more inclined to extract a larger share of current outputs and disregard any adverse effects on future outputs. In other words, politician B will want to obtain as large of a portion of the cake today and disregard policies aimed at increasing the size of the cake tomorrow, because he knows that the government he participates in will be ousted. This shows how corrupt countries can spiral out of control, going from politician A and B to future politician A and B who will be wanting to gain their share without any regard for the future of the country, leaving it to the next versions of politician A and B. This leads to less belief in the government and causes the government to lose its effectiveness and ultimately decrease the productivity overall (Mauro, 2002). Again, this relates back to rent seekers theory, both politician A and B are looking to boost their own economic status while returning nothing back to the economy for its citizens.

Omer Gokcekus found a way to measure the level of corruption of a country through rent seeking. He was able to do this through conspicuous consumption, which is when consumers purchase a good not for its intrinsic value but for its signaling value. Take the example given by Gokcekus, the silver spoon. If you buy a handmade spoon it has no greater utility than a machine-made spoon. Even further, you can buy a silver spoon that is made out of aluminum or out of silver, neither has more utility than the other. However, people still buy

silver handmade spoons all the time, even though they are no more useful than a machine made aluminum spoon. Gokcekus was able to apply the same idea of conspicuous consumption on corruption using luxury cars. Gokcekus took an unbalanced panel data of 20 OECD countries between 2004 and 2010, using Marklines Automotive Information, he identified cars either as luxury or non-luxury. He used the data of total luxury car sales in a country, coupled with the level of corruption (using the CPI score), and the average per capita income. He was able to determine that luxury car sales are 191% higher in a country with a high perceived corruption level. In an example, for the year 2007, the average per capita income in the Netherlands was \$46,500 and the CPI score was 9 (meaning the country is very clean) and the luxury car sales were 48.8 per 10,000 people. However, in the same year, the per capita income in Greece was around \$25,000 and the CPI score was 4.6, with luxury car sales of 33.4 per 10,000. Had Greece had a similar CPI score to the Netherlands their luxury car sales would have been 11.5 per 10,000 people, nearly a third of what it actually is. Gokcekus was able to conclude that there is a positive relationship between the level of corruption and conspicuous consumption (Gokcekus, 2014). This helps solidify the argument that rent seeking theory is related to corruption.

Gupta argued that corruption reduces growth and investment and redirects foreign direct investment towards countries with lower levels of perceived corruption. Gupta also concluded that higher corruption is associated with higher income inequality. He explained this by using the rent-seekers theory, where a select few increase their wealth and don't contribute any new wealth. The paper also backs up the theory of increased inequality among highly corrupt countries using Transparency International's corruption perception index (CPI) and



found that the countries with the highest levels of perceived corruption also had the highest levels of poverty (Gupta, 1998). Gupta uses evidence from previous studies to back up his work, making his findings more credible. This can be shown by looking at the most corrupt countries and measuring their poverty rates, the findings are concurrent with Gupta's findings. This shows that not only does rent seekers theory decrease the economic growth of a country but that it also creates income inequalities.

Simon Kuznets took another approach at trying to explain the inequality disparity of corrupt countries. His argument assumes that countries that are more corrupt have import tariffs that local corrupt enterprises bribed government officials to enact. This allows these local companies to put their desired price on specific products, in other words, increasing the price. This takes away from local consumers, causing them to spend more on specific products, giving them less monetary compensation to save (Kuznets, 1955). This decreases your wealth, since the less you can save the less you have.

Another study done by Paolo Mauro, he was able to determine that corruption adversely affected the government spending on education. He did this by studying the composition of government expenditure and how corruption alters government expenditure. Previous research determined that school enrollment rates and educational attainment play considerable roles in determining economic growth. This parallels one of Maria Pinotti's conclusions that the education level of its people is a major indicator in thwarting corruption, backing it up with multiple academic journals that have come to similar conclusions (Cristina, 2009). Mauro found that corruption alters the composition of government expenditure, more

specifically, by reducing its spending on education. Mauro goes on to explain that this happens because of the ensuing need for secrecy when performing corrupt acts. One way to do this is to invest government expenditure into specialized, high technology goods, whose exact value is harder to pin point. This allows officials to skim off the top because the exact value of such a highly-specialized item isn't fully known. Instead of officials investing in educations, which requires fairly low, mature technology which is a lot easier to calculate the value of. Through his economic model, he was able to find significant evidence that corruption is negatively associated with government expenditure on education. In addition, Mauro was able to find slight evidence of an association between corruption and government expenditure on health (Mauro, 1998).

Dzhumashev has done additional research studying the relationship between government spending and corruptions and its effects on economic growth. He concluded that in low-income countries, where the wage is low, resulted in low rent seeking and corruption costs. However, increases in public spending encourages more rent seeking and corruption. These increases in public spending led to a decline in the growth rate because of the increased rent seeking and corruption, resulting in a greater social loss. Additionally, he determined that low-income economies with high incidence of corruption, the size of government spending should be less than for an economy with a higher income and a lower incidence of corruption. He also states that governments with low-income economies and high amounts of corruption were 18.5% larger than optimal. Dzhumashev concludes that this increase in government spending and corruption is more likely to reduce growth rates by reducing the amount of inflows of foreign investment. Dzhumashev also points out that these higher than optimal

government spending numbers lead to even more corruption (Dzhumashev, 2013). This is an issue in Brazil, their government continues to increase and spending in specific sectors, however the effectiveness of the government or the benefits the people of Brazil should receive from a larger government are not seen.

While Dzhumashev's arguments about the increase in rent seeking behavior and corruption in low income economies with increased government expenditure add up, it's a little shaky on how he determined the optimal size of a government. He determines that a low income economy is 18.5% larger than optimal doesn't completely add up as he doesn't specify how he determined the optimal size of the government. Additionally, Dzhumashev states that an increase in rent seeking and corruption due to increased government expenditure would decline in the growth rate. He argues that it decreases due to rent seeking, however, he never specifies how rent seeking decreases the growth rate. Through this extensive literature review I have been able to conclude that rent seeking behavior reduces growth through multiple avenues, such as the decrease in government spending on education. However, Dhumashev give no evidence on how rent seeking will decrease the growth rate.

Where Dhumashev left off, Lambsdorff attempts to connect the idea that corruption, or rent seeking causes a decrease in productivity or growth. Lambsdorff argues that corruption renders governments incapable or unwilling to achieve public welfare as a result of inefficiency, wasteful rent-seeking or distorted public. The allocation of capital goods will not be optimal when affected by corruption because those projects that promise large side-payments and exhibit low risks of detection are preferred to those that benefit the public at large. The best-

connected contractors and those most willing to offer bribes are preferred to those offering the best product. The effort level of public servants suffers from adverse incentives because creating artificial bottlenecks can increase the need for paying speed-money (money used for bribes). The most visible sign of the adverse impact of corruption are 'white-elephant projects', projects that totally disregard public demand or that are wrecked shortly after completion.

There is existing evidence of an adverse impact of corruption on the ratio of investment to GDP. There is also an adverse impact of corruption on foreign direct investments and capital inflows. Both of these points have been proven by previous literature review research. This article furthers the effect of corruption on productivity by determining that corruption decreases the productivity in terms of GDP to capital stock ratio. The capital stock ratio is determined using the perpetual inventory method. The absence of corruption is positively associated with the ratio of GDP to capital stock. This indicates that corruption reduces the productivity of capital. An increase in corruption by 1 point on a scale from 0 (highly corrupt) to 10 (Very clean) lowers productivity by 2 percent. This can be seen in the case of Tanzania, which lowered its corruption score by 6 points on Transparency International's corruption perception index (CPI, the most well known way to measure corruption) and increased its GDP by more than 10 percent of the total capital stock (Lambsdorff, 2003).

In some form or another all of the journal articles discussed above have come to the conclusion that corruption is bad for a local economy as a whole. However, Leff disputes this, insisting, that corruption allows for individuals to bypass bureaucratic delay and claims that government employees would work harder in order to levy bribes.

Leff defines corruption as “an extra-legal institution used by individuals or groups to gain influence over the actions of the bureaucracy.” Leff limits his argument of corrupt acts furthering economic development to one particular type of corruption “namely, the practice of buying favors from the bureaucrats responsible for formulation and administering government’s economic policies.” Leff argues that this form of corruption aids economic development in two distinct ways. First, corrupt practices such as “speed money” would enable individuals to avoid bureaucratic delay. Second, the government employees who are allowed to levy bribes would work harder, especially in the case where bribes act as a piece rate (Leff, 1964). However, Leff does mention that the flow of private capital and technical skills was insufficient for promoting large-scale growth.

Leff also distinguishes between bureaucratic corruption and bureaucratic inefficiency. Referring corruption to “extra-legal influence on policy formulation or implementation (Leff, 1964)”. Inefficiency, however, refers to not achieving maximum productivity, or making the best use of your resources. This argument is difficult to follow because performing a corrupt act can be considered an allocation of your resources. Begging the question, is corruption really the best use of your resource? It’s hard to argue that performing a corrupt act is the best use of your resource. Rent seeking behavior is linked to corruption and rent seeking is not an efficient use of your resource. This can be exemplified by Krueger’s work. Krueger gives the example of trying to obtain an import license. If you are a corrupt individual, you will attempt to expedite the process of acquiring this license by bribing an official. However, if we consider time a valuable resource, the first corrupt official might not be the only one competing for a license through “extra-legal” means. This causes an inefficiency, as the individual who authorizes these

licenses will be back at square one because he/she can't give out all licenses at once (Krueger, 1974). This poses the question, if the best use of the resources available to the corrupt individuals is competing on licenses.

Additionally, through Leff's data findings it was determined that countries, on average, with higher amounts of corruption do tend to grow at a faster rate than countries with lower corruption scores. This can be explained by convergence theorem. Countries with higher corruption are a lot smaller than countries with lower corruption scores. Convergence theory states that smaller countries will grow at faster rates than larger countries due to diminishing returns.

Additionally, Joh Macrae argues against Leff's point, stating, that delays are no more the cause of corruption than the consequence of it. "Delays provide an indication of the 'shadow price' of an arrangement. There will be delays before the arrangement is negotiated, but the contracting of the arrangement will presumably bring these delays to an end. Although bribery by one individual or firm may lead to a more efficient resolution of that individual's or firm's problem, this cannot be so for everyone. If everyone resorts to bribery no one will gain much, yet the underlying problems motivating the bribing – queues, greed for monopoly profits, impatience in front of structural inefficiencies all remain (Macrae, 1982)."

Most of the literature tends to support the theories of other literature used in this study. One exception to this is the Leff's paper, as previously discussed. There are also some dissimilarities between papers that share similar theories, for instance, Paolo Mauro mentions that in the presence of corruption some businessmen are often made aware of up front bribes

required before the project even gets going. Therefore, businessmen often interpret this form of corruption as necessary tax. Even though this tax can be seen it can also be harmful, given the need for secrecy and the uncertainty that the bribe-taker will fulfill his part of the agreement. This diminishes the briber's incentive to invest, however, this is a common practice in highly corrupt countries (Mauro, 1997). However, John Macrae see this "tax" completely differently. To Macrae, the idea that these bribes are an integral and deeply-rooted method by which men make decisions in the Third World and consider them costs does not line up with Macrae's ideologies. Macrae claims that these bribes shouldn't be seen as incurred costs but instead as profit motives. It contradicts the views that capital-rich countries of being a cost. If a capital-rich country is gaining projects or positions in capital poor countries it should be seen more as an investment. This is because you're expecting to see reoccurring benefits, which you wouldn't normally expect from a cost (Macrae, 1982). While this is a minor detail whether this is seen as a cost or an investment drastically changes the undertone. If it's seen as an investment, you're expecting to yield continuous returns and could possibly see this as an opportunity. However, if you see this as a cost you might think of it as a tax that is just a part of doing business with the other party, which isn't true because you're expecting something in return.

To review, through previous research we've been able to determine that rent seeking behavior is linked to corruption. This has, in turn, changed the composition of the of government expenditure, as public officials tend to invest government spending into high technology/new technology, as it is hard to pin point the exact price of newer technologies. This takes spending away from mature, low technology, sectors such as education where the

costs are known. Previous literature has also determined that an increase in the education level of its citizens would decrease the level of corruption.

## **Methodology**

### Sample

The goal of this study is to determine whether corruption influences the economic growth of Brazil. In this study, GDP per capita of Brazil is the dependent variable. Since there is no formal way to measure corruption, I will be using a perceived score for corruption. The score's come from Transparency International, the leader in the fight against corruption. The perceived score being used is the Corruption Perception Index (CPI), which is an index measure from a scale of 0 to 10. 0 meaning you are the most corrupt and 10 being the cleanest country. Since this is only a perceived index and has no true equation I will be measuring several other factors to determine the impact corruption has on economic growth. One measurement that relates back to rent seekers theory is the income inequality witnessed in more corrupt countries. It is well known that in corrupt countries the income disparity between the richest and poorest is very apparent. This directly relates to rent seekers theory, as the individuals in power use those resources for their own personal gain without adding any benefit to the economy for the people. In order to further observe the effect of corruption I will also be testing the government spending of Brazil on education as a percentage of GDP. This, again, directly relates to rent seekers theory as corrupt officials tend to spend less on education (officials take capital from the education sector) in order to fund their own endeavors. This is difficult to prove because these "endeavors" corrupt officials participate in are kept in secret.



However, previous research done by Mauro has determined that more corrupt countries tend to spend less on education. Another variable is the unemployment rate, which directly relates to Solow growth model. If you have less than optimal amount of labor in the workforce then your economy is not optimally productive. This translates into stagnant or decreasing economic growth. Additionally, I will be using foreign direct investment (FDI) to measure capital as a factor of economic growth. This applies to the Solow model as an increase in capital, in my case FDI, increases the productivity which leads to economic growth. All data, except for the CPI score, has been taken from the World Bank.

I hypothesize that rent seeking behavior, which has led to an increased income disparity between the rich and poor and a low percentage of government expenditure being spent on education, will lead to stagnating or decreasing economic growth. Previous research has already determined that rent seeking behavior, observed in more corrupt countries, has caused lower levels of spending on education and greater income inequality.

Additionally, I hypothesize that an increased unemployment rate coupled with lower foreign direct investment will lead to slower economic growth. Previous research has already determined that more corrupt countries have lower levels of FDI.

## **Measures**

There are 6 measures being used in this model. The dependent variable in this model is GDP per capita measured in US\$ and defined as  $gdp_{pci}$ . There are 5 independent variables in this model. The first is the CPI score, which, as previously mentioned, is a perceived score of corruption and defined as  $cpi_i$ . The second independent variable is the Gini Coefficient, which

measures the level of inequality of a country. The Gini Coefficient is defined as  $Gini_i$ . The Third independent variable is unemployment rate, which is calculated as a percentage and defined as  $Unemploy_i$ . The final independent variable is government spending as a percentage of GDP, which is defined as  $GovtE_i$ .

## Design

## Model

$$\text{Model 1: } gdp_{pci} = \beta_0 + \beta_1 cpi_i + \beta_2 Gini_i + \beta_3 Unemploy_i + \beta_4 FDI_i + \beta_5 GovtE_i + \varepsilon_i$$

## Sample Regression

## Results

This section analyzes the relationship between productivity and several factors that relate to corruption. This study finds that the unemployment rate, level of foreign direct investment, and percentage of government expenditure spent on education have a direct effect on the productivity of Brazil.

Table 1 shows the results between productivity and multiple factors that relate to corruption, in this model,  $Unemploy_i$ ,  $FDI_i$ , and  $GovtE_i$  are all statistically significant. This means that a higher unemployment rate and a lower level of FDI will translate to decreased productivity, which will inhibit economic growth. Additionally, it has been determined that lower percentages of government expenditure spent on education also decreases the productivity of Brazil, which my data supports as well.

However, not all variables being tested were statistically significant. Most notably, the CPI score, which is a perceived index of the level of corruption in Brazil, was not statistically significant. This is surprising because this score directly reflects the level of corruption witnessed in Brazil and has no effect on productivity. Additionally, the level of income inequality had no effect on the productivity. This is surprising as previous research has determined that large income inequality can be observed in countries labelled as more corrupt. It should also be noted that, even though there was no multicollinearity detected overall, there was multicollinearity detected between the percentage of government expenditure spent on education, the gini coefficient, and the unemployment rate. I hypothesize the explanation for this multicollinearity between the gini coefficient and unemployment exists because the lower the gini coefficient usually translates to lower unemployment levels. Additionally, I believe that the CPI score was insignificant because there was no major change in the CPI score throughout my dataset. This just means that Brazil has been perceived as corrupt since the start of my data. While the CPI score stayed constant the other variables continuously changed in values.

Table 1:

Variables	Model 1
CPI <sub>i</sub>	71.1% (.711)
Gini <sub>i</sub>	54.6% (.546)
Unemploy <sub>i</sub>	.4%*** (.004)
FDI <sub>i</sub>	.1%*** (.001)

GovtE <sub>i</sub>	.1%*** (.001)
Constant	735.81
R <sup>2</sup>	99.7%

All standard errors are in parentheses

\* indicates significance at 10% level of significance

\*\* indicates significance at 5% level of significance

\*\*\* indicates significance at 1% level of significance

Table 2:

Variables	VIF
GovtE <sub>i</sub>	6.24
Gini <sub>i</sub>	6.04
Unemploy <sub>i</sub>	5.38
FDI <sub>i</sub>	4.49
CPI <sub>i</sub>	2.06
Mean VIF	4.84

## Diagnosis

The purpose of this study was to determine whether the corruption in Brazil has influenced the productivity in terms of economic growth. The significance of unemployment, FDI, and percentage of government spending on education proves that there is a correlation between productivity and corruption in Brazil. Through previous literature we were first able to determine that rent seekers theory is correlated to corruption through conspicuous consumption. Knowing that rent seeking behavior and the level of corruption are correlated, we were able to determine that higher corruption was associated with higher income inequality. Again, this could be explained through rent seekers theory. The more corrupt a country is the more likely individuals in power are to take public resources and use them for their own economic gain, without reciprocating the benefit to the people. Additionally, previous research done by Paolo Mauro determined that increased levels of corruption decreases the level of FDI of a country. It is already known that foreign direct investment is a factor of growth, the correlation between productivity and FDI of my model strengthens this argument even more.

The rent seeking behavior exhibited by individuals in power increases the income disparity as one party gets rich off public expenditure, while the other struggles to get by. While previous research aligns with my hypothesis that a higher Gini coefficient correlates with lower levels of productivity this correlation was not observed in my model. This could be due to multicollinearity. The next bit of the literature solidifies the relationship between the level of corruption and the level of government expenditure spent on education. Prior research

determined that school enrollment and educational attainment play roles in determining economic growth, additionally Pinotti concluded that the level of education aids in thwarting corruption. This is in line with my hypothesis that lower percentages of government expenditure spent on education decreases the productivity and growth rate of Brazil. My hypothesis shows that there is a correlation between percentage of government expenditure spent on education and productivity. This solidifies the theories of previous research.

Previous literature has brought out observations of rent seeking being correlated to corruption and income inequality. The literature has also been able to pin point correlations between education and corruption. My addition to the research has shown that not only do we observe a relationship income inequality, education levels, FDI and corruption, but we can also observe a relationship between income inequality, education levels, FDI and productivity. This translates to the level of corruption being directly correlated to the level of productivity of a country in terms of growth. However, there are a couple things to note. It is unclear whether the level of corruption affects the productivity or whether the level of productivity (or growth) affects the level of corruption. Even with the variables this can go both ways. Brazil could have a decreased level of corruption, which increases the FDI brought into the country, raising its productivity. Or the level of productivity could increase, causing more firms to invest into the Brazilian economy, causing a decrease in corruption. It's hard to know which variable causes which variable to change. Additionally, it could be something entirely unrelated that decreases the level of corruption. It's hard to know because acts of corruption aren't public information and are kept secret.

However, the available research can tell us a lot. Many organizations and researchers of corruption have called for greater transparency in the government, which is hard to achieve. Although, we know that the education level of the population aids in thwarting corruption, meaning if there were more policies geared towards getting people educated it could reduce the level of corruption. Maria Cristina Pinotti has done some excellent research displaying the costs of corruption and how it affects our lives and what it could change. The price of corruption costs Brazil between R \$ 41.5 and R \$ 69.1 billion per year. According to the report Corruption: Economic Costs and Combat Proposals, the cost of corruption represents between 1.38% and 2.3% of the Gross Domestic Product (GDP). If invested in education, for example, this could increase the number of students enrolled in the public elementary school network from 34.5 million to 51 million, in addition to improving the living conditions of the Brazilian. "The extremely high cost of corruption in Brazil impairs the increase in per capita income, growth and competitiveness of the country, compromises the possibility of offering better economic conditions and social welfare to the population, and to company's better infrastructure conditions and A more stable business environment, (Cristina, 2011)." The report also points out that if the money gap in the country were lower, the number of hospital beds in public hospitals could rise from 367,397 to 694,409. The deviant money could also house more than 2.9 million households and bring basic sanitation to more than 23.3 million households. And all this, without a doubt, influences the competitiveness of the country.

This shows a clear influence corruption has over the economic wellbeing of Brazil. While it's hard to measure the effects off adding public hospitals or funding for education, all previous research points to a rise in the level of education decreasing the levels of corruption.

Additionally, an increase in education would increase the skill of the labor force, giving them the opportunity with more well skilled jobs and increases the chances of international companies coming to Brazil to hire the new skilled workforce. This could boost the productivity of Brazil as it would encourage FDI and increase the level of education of the country.

Now that there has been a relationship determined between the level of corruption and productivity the next steps should be determining how to boost productivity/growth of Brazil, while decreasing the level of corruption. This is no easy task. Future research should further investigate the behavior of corrupt individuals with relation to game theory. If future research can determine the exact point at which the behavior of the individual or party changes from believing the corrupt act is worth the extra risk to believing that it's better to stay away from corruption this would greatly enhance the fight against corruption. This research can be started by looking at how much extra compensation is needed for an individual to consider performing a corrupt act. This research should not only look at monetary incentives but also the psychology behind an individual choosing to be corrupt. Are they doing it because they have no fear of being caught? Or for the monetary incentive? If you can find the motivators and detractors for individuals performing corrupt acts there's a greater chance at lowering levels of corruption.



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