

Corruption and Economic Growth:

Latin American Countries



Abstract

Corruption is one of negative social traits that may occur in the government, by making use of their authority to gain personal benefits for the public's cost in return. There are many opinions regarding the wrong and right of corruption, as the arguments are divided in two opposing group; the 'sand' and the 'grease' of economic growth's wheel. These term means hindering and stimulating the economic growth respectively. Using both formal and empirical analyses we will find the impact of corruption towards 18 Latin American countries. We find corruption to be damaging the economic growth based on fixed effect analysis with panel data.

Keywords: corruption, economic growth, fixed effect analysis, panel data

I. Introduction

Corruption is not a new phenomenon in the economy as it appears on the book *Arthashastra* from two thousand years ago and highly spotted again in the sixteenth century Britain.¹ Then again in 1990s, reports regarding political corruption resurged. Corruption has since then emerged to become a global problem, from a corrupt communist in Indonesia until corrupt government in Brazil. In this paper, we are focusing on corruption activities and economic development in Latin American countries.

In early 1830s, Latin America experienced political chaos by Spanish ex-colony leaders who were unequipped for ruling. Even Simón Bolívar, the hero of independence in Latin America did not shy away from corruption at the time. Although the region was gradually leaning towards a greater democracy, the emergence of drug cartels and harsh military regimes hinder the development of the region in mid-20th century.

How about the true meaning of corruption? Some perceived corruption as an ill-mannered behavior, performed by any party in the economy. However, we are going to focus only political corruption. Corruption is one form of rent-seeking behavior by the government, an abuse of entrusted power for personal gain in the expense of the public good according to Transparency International (TI). According to the organization which has determined corruption index of countries across the globe, corruption can result into various political, economic, social, and environmental costs. Politically, corruption will deplete the values of democracy. While economically, corruption makes the provision of public good limited via diminishing national wealth. The practice of corruption is an ill-mannered behavior as it corrodes social values. The form of environmental cost resulted from corruption is for example climate change, because the government are neglecting the importance of law on environments. The priority has changed to become fulfilling the highest bidder or the briber's interest; for example, in the case when businesses try to expand or create palm tree plantation.

Although public grasp the hypothesis of corruption being the obstacle for the economic growth, a group of scientists prove otherwise. Thus, emerged two opposing group regarding impact of corruption towards the economic growth (Aidt, 2009).

¹ See Vito Tanzi (1998) to know more of corruption history

The **first group** immediately agrees with the premise of corruption being the ‘sand’ of the wheel, which means hindering the growth. The idea of corruption hindering growth is that it undermines the law, resources become depleted, and may discourage investment because then making business will become more expensive.

Meanwhile, the **second group** has voicing the unpopular opinion of corruption being the ‘grease’ to the wheel, concluding the behavior is not entirely harmful even capable of boosting economic performance. Corruption is not always costly; it may promote efficiency of a system or establish trade that may never happen in the first place.

The main hypothesis that we will be testing is whether corruption is related to economic growth, with the help of other economic indicators that strongly relate to growth. We expect to find a negative relationship between growth and corruption. We will also conduct a robustness analysis, along with discussion of whether there is an endogeneity problem within our model.

We are interested in making Latin American countries as our subject of research because organized crime is a common phenomenon, and this region is known for its illegal drug-driven economy. This loose system is surely due to lack of attention being given by the government or because of schemes involving the authorities. We are curious given the fact that these countries who trade more frequently with the United States experience less damage when the 2008 crisis took place comparing to Europe region who trades less. European countries experienced -4.5% GDP growth, meanwhile the Latin Americas only experienced -1.7% GDP growth. There must be other factors contributing to these countries’ performances. Does corruption benefit Latin American countries?

In the next section, we will discuss the many meanings of corruption as well as the diverse opinions regarding its consequences. Second, we continue to the description of data we have collected, and supporting variable chosen to achieve to the conclusion we are interested in. Thirdly, we will use the regression method of our choice to obtain the results which we are going to deeply analyze in the fourth part. Finally, we will state limitations we faced during the making of this paper within the conclusion.

II. Literature Review

Scholars agree to the definition of corruption as an abuse of power in return for personal gains. In other words, corruption is an extra-legal activity completed by an individual to gain influence over bureaucratic actions (Leff, 1964). Now that we know the definition of corruption, how does corruption occur? To understand how corruption arise we first need to understand the existence of the state and the agents.

In the paper written by Acemoglu and Verdier (2009), people are considered as agents capable of choosing between two jobs according to their talents. Some choose to serve for the government, and some choose to become entrepreneurs. Entrepreneurs then divide their roles as suppliers who invest on inputs and producers who transform these inputs into products (outputs) which will pay for supplier's investment. This is where the government is starting to take a role. To make payments from one another credible, government must enforce contractual agreements between said two parties. Agents have their own payoffs, and will act based on these payoffs. If government's payoff from doing corruption is higher than doing their job honestly, the government will choose to be corrupt. Producer may falsely report their revenue for their personal benefit to the supplier, and bribe the government for its authority to enforce a contract to a certain degree. If supplier's return of investment is considered low, it will be likely that the degree of investment will be constant, or grow. Now, we may establish a connection between corruption and investment.

In the economy, the degree of investments depends on the degree of contractual enforcement which depends on the size of the government, degree of corruption (contractual enforcement), and the probability of detecting corruption. The paper offers another approach to reduce corruption acts which is by paying some efficiency wages, and letting some degree of corruption. This is far less expensive approach than to eradicate corruption. Wage rate affects degree of corruption through size of bureaucracy and quality of bureaucracy. By increasing wage, larger bureaucracy will increase efficiency of contractual enforcement. If holding the size constant, increasing wage will increase the quality of bureaucracy. The better the government enforce contracts, the higher the return of investment of suppliers. This will be good for the economy.

Corruption is also being studied empirically, for example in a paper written by Mo (2001). The effect of corruption on the growth rate of a country and how it transmits is

analyzed. The study assures that the most promising access of corruption is through the political channel, which means caused by political instability. Four variables were included, such as proxies for investment, human capital, rate of population growth, and GDP per capita. The result from the regression shows the effect of corruption on the growth rate is significantly negative, then when the author started to include the transmission channels into the calculation, the authors found that 28% of the reduction of growth rate is transmitted from corruption in investment channel, 9,4% through the human capital channel, last but not least corruption due to political stability accounts for 64% of the reduction of productivity growth.

Despite many analyses on the topic, theoretically there is no exact conclusion as to decide whether corruption is desirable or the other way around. There are many scholars concluding corruption as a disadvantage, while many agrees otherwise. In this part, we are going to focus on two different conceptions of corruption. As explained in the previous part, the former is identified as 'the sanders' while the latter is 'the grease'.

The **first group** consists of several scholars who agree that there are disadvantages for a country whose government is corrupt. They argue that corruption is an endemic in all government yet it receives so little attention from the authorities (Friedrich, 1963). Corruption is beneficial for the country only if it is eradicated, however government seem to be unable to break the circle of corruption and low economic growth. Hence, they are trapped in this circle for lacking of effort to abolish corruption (Mauro, 2002).

In evidence, corruption hinders investment both in the sense of statistics and economics, based on their significant and negative relationship. There is an evidence that bureaucratic efficiency causes high investment and growth. For that, we consider if corruption can increase bureaucratic efficiency, it may be able to boost investment and later, growth. In empirical evidence, poor countries tend to have more corrupt and unstable government (Mauro, 1995). There is a supporting research that concludes corruption slows down growth through channels such as investment, education, trade openness, and political instability however mainly though investment and trade policies (Pellegrini, 2004).

Emphasizing corruption's effect towards trade, there is also a quantitative survey on literature regarding corruption which confirm there is indeed an effect of corruption on growth and based on the data set which compromise 460 estimates of the effect from 41 different econometric studies. The support is leaning towards the hypothesis of 'sanding' the wheels, with evidence corruption blunts the positive effect of institution and trade openness

on growth. The survey also found a paradox in Asian countries, and more intense impact of corruption in the Middle East and North Africa (Campos, et al., 2010).

To support the statement for the first group through the government's side, a study tried to unravel which of the two group's hypotheses is more significant. Paper written by Aidt (2009) stated there is no robust evidence regarding corruption. However, this does not say that corruption is beneficial or a disadvantage. Also, it used an assumption that a country to be quite similar to a company, and they found that there is no correlation between manager's experience; in this context government's length of ruling, with corruption. This means, government seniority has no impact towards the frequency or the act of corruption itself.

There is a study which found that corruption is not beneficial for growth because of distortions in tax collections, public expenditure level, and composition of government spending (Shera, 2014). Corruption is one of rent-seeking behavior by the government (Murphy, 1993), and rent seeking exhibit increasing return and will hurt innovative production rather than everyday production in an industry. Innovative production here means the emergence of new businesses, which is vital for economic development. Thus, rent-seeking is costly. This argument is also supported by Mo (2001) because he argues that these innovative industries need government supplied goods such as permits and quotas in order to be able to grow. Corruption favors only a group of a people, meaning there will be no equality of opportunity.

The **second group** voices the unpopular vote of hidden benefits behind corruption. If corruption promotes economic growth, there are three channels in which the process is going through, which are capital formation, flexibility in central planning, and entrepreneurial activity (Nye, 1967).

Corruption can be a source of capital formation when private capital is scarce, and it is unlikely for the government to impose tax. Paradoxically, corruption reduces resources and capitals needed for economic growth because the funds are diverted into corrupt politicians' pockets. The paper could not decide on a definite answer between these two statements, because the empirical results were mixed, with an indication that growth rate may be diverged in highly corrupt countries. For an example, there is a possibility of having rapid growth like China in countries while mainly it is otherwise in other countries (Svensson, 2003).

Secondly, corruption may create flexibility in central planning, thus becoming more effective. In doing investments, an existence of a contract is necessary to enforce property rights. Contract is done between entrepreneurs, however are incomplete without the help of the governing authority. This creation of wealth incentivize corruption, and in order to eliminate incentive of corruption an 'efficiency wage' might be desirable. This may be too expensive for developing countries, thus enforcing less than full contract enforcement may be the most efficient way. This does not imply government intervention to be counter-productive (Acemoglu and Verdier, 2009) which we have discussed this paper in the earlier paragraphs.

Thirdly, corruption may protect discriminated entrepreneurs. As an example, corruption can help build incentive for Chinese entrepreneurs in East Africa. If certain business is at a disadvantage, corruption can help them exist, and will boost growth especially if these businesses more influential than the government. These bribes act as a tax on economic activities, even though the payment and extraction process is politically incorrect. Corruption also help in the case of breaking out of a low-income equilibrium trap, by inducing competition as to reduce monopoly powers. Corruption reduces losses from bad policy where it acts as a hedge (Leff, 1964).

In the end, it is found that cost of corruption in less developed countries will exceed its benefit, except for situations in which corruption is the only solution for development obstacles (Nye, 1967). A research indicates that the growth-maximizing level of corruption is greater than one, supporting Acemoglu and Verdier (1998) paper regarding corruption is beneficial if applied until a certain degree, until it is detrimental at high levels of incidence (Mendez and Sepúlveda, 2006). Looting corruption is not desirable for economic growth while dividend-collecting corruption may explain the case of high growth in a highly corrupt country (Wedeman, 1997).

Another research attempted to figure out how some countries may have rapid growth despite high corruption rate, by examining the role of trust in corruption-efficiency relationship. There are two types of trust being tested, generalized trust and particularized trust. The former means a high trust is given by the citizen for the government, trusting the government like they would trust a stranger. Burdened by the high level of trust given by the people, government will be put in a high pressure position to steal from the citizen. The latter trust type would facilitate corruption, because particularized trust means trust is only given to

someone citizen personally knew or in the same network. Empirical evidence supports this statement (Li and Wu, 2010).

Overall, the conclusion of corruption and its relation to economic growth is still mixed. Meanwhile some scholars agree on its adverse effect; they commonly agree distortion of allocation will hinder investment growth, the other scholars insist on other effects corruption may carry which is economic growth due to establishment of efficiency. They also commonly agree corruption is better to happen up until a certain degree, for the economic growth to be at its maximum point.

III. **Data**

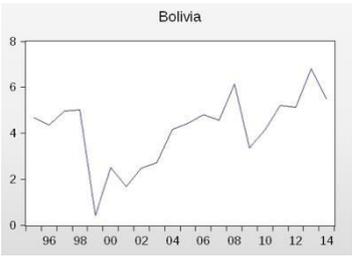
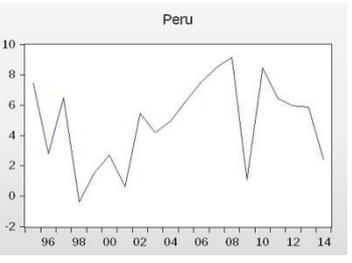
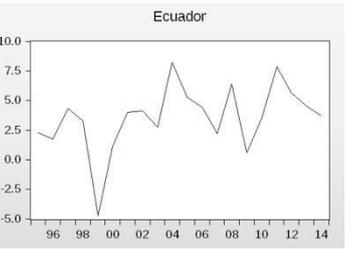
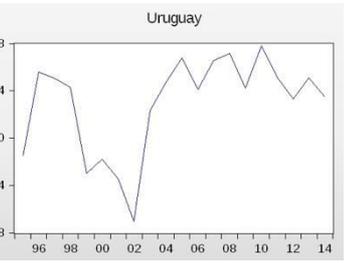
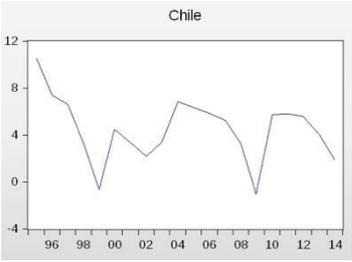
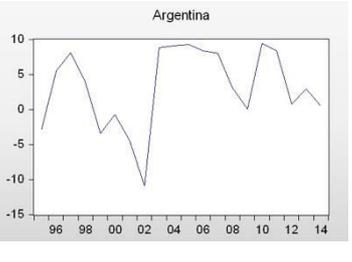
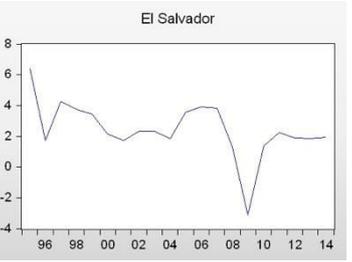
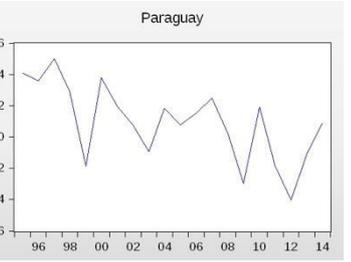
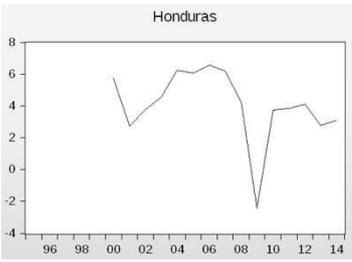
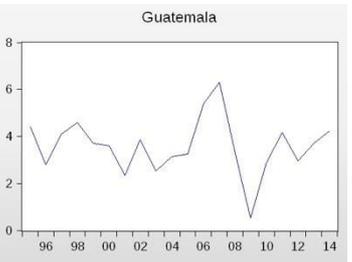
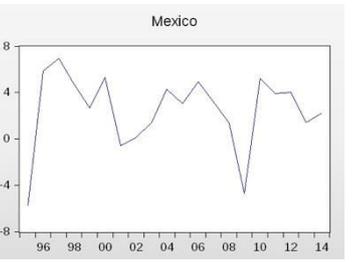
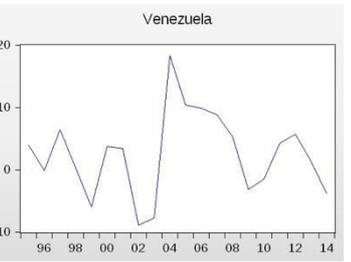
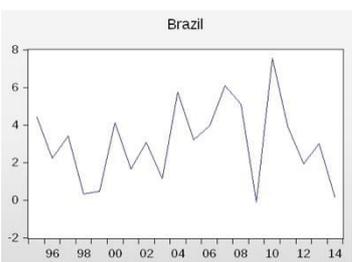
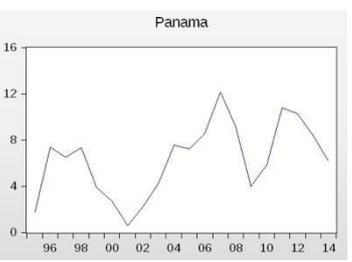
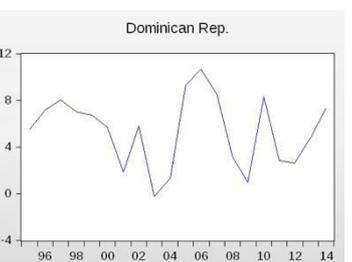
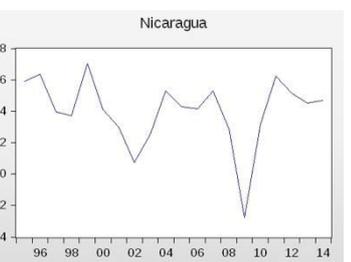
The type of data we decided to use is panel data. It is advantageous to use panel data as our data relates to countries in which heterogeneity is likely to bind. Panel data techniques can take heterogeneity explicitly into account by allowing individual-specific variables. Panel data also gives more informative data while provide more variability and less collinearity, more degrees of freedom, and suitable to study the dynamics of change. It can minimize bias when we aggregate countries' data into broad aggregate.

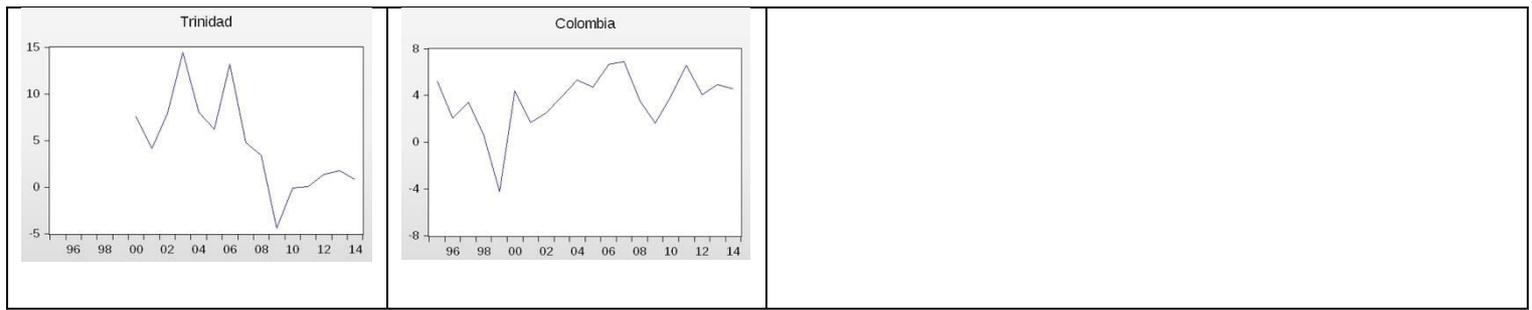
We collected samples taken from eighteen Latin American countries namely Argentina, Bolivia, Brazil, Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela for the time period 1995 to 2014. The reason is due to there is lack of up to date corruption analyses in these countries, while one of the countries' biggest worry is corruption itself.

a. Dependent variable

We are interested in the causal effect of corruption towards the economic growth, thus we include yearly economic growth as the dependent variable in this model. The growth is represented in GDPGROWTH yearly change in percentage.

Table I. GDP Growth of Latin American Countries

<p>Bolivia</p> 	<p>Peru</p> 	<p>Ecuador</p> 	<p>Uruguay</p> 
<p>Chile</p> 	<p>Argentina</p> 	<p>El Salvador</p> 	<p>Paraguay</p> 
<p>Honduras</p> 	<p>Guatemala</p> 	<p>Mexico</p> 	<p>Venezuela</p> 
<p>Brazil</p> 	<p>Panama</p> 	<p>Dominican Republic</p> 	<p>Nicaragua</p> 
<p>Trinidad and Tobago</p>	<p>Colombia</p>		



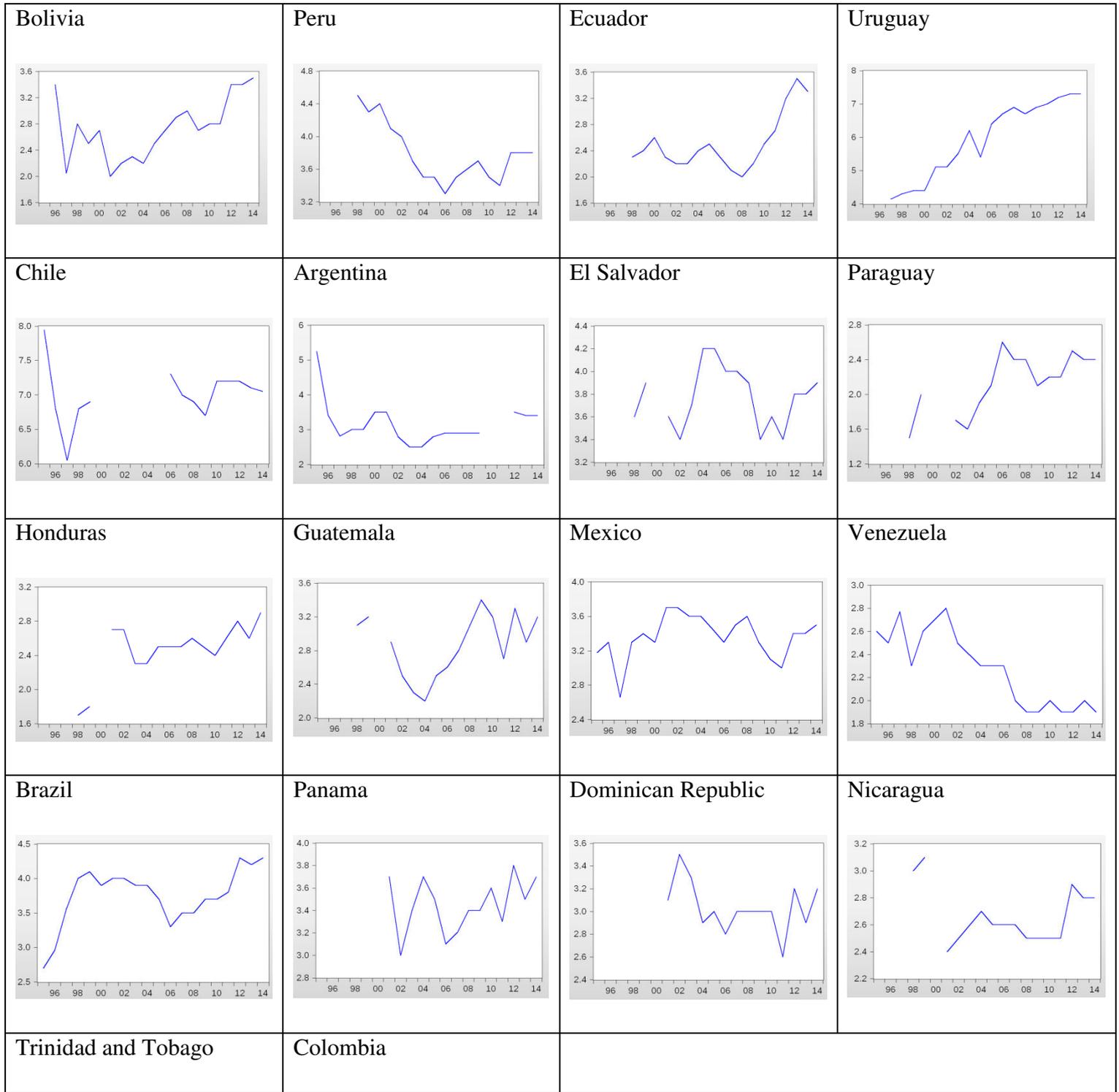
b. Treatment variable

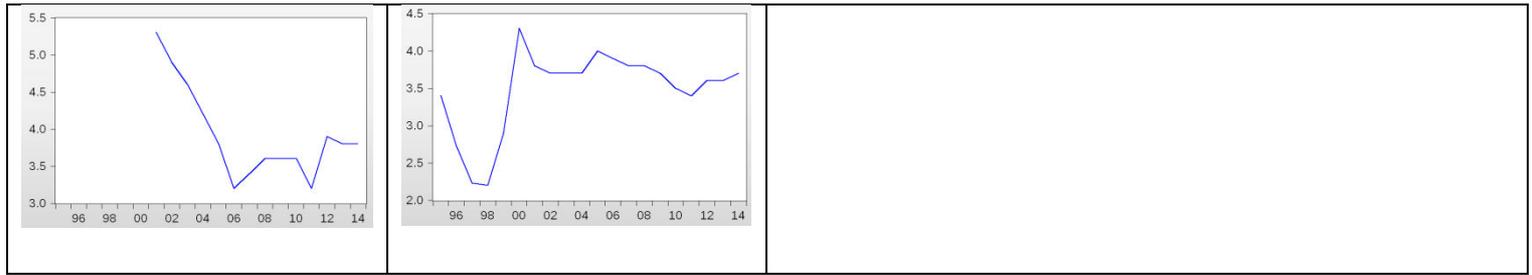
In order to analyze the impact of corruption we rely on Corruption Perception Index (CPI) from Transparency International (TI), an organization which has published these corruption indexes (CORRINDEX) since 1995 from 41 nations at the time to 177 nations currently. They first collect data necessary to determine corruption index with various criteria that should be met (for example, the data must quantify perceptions of corruption, reliable and valid, and performed by a credible institution). The organization then standardize the data into 0-10 scale, by subtracting the mean of the data set and dividing them with the standard deviation. The score is assumed as the average of all standardized scores in that particular country. CPI can help distinguish each sample nation corruption level thus can be evaluated statistically. They measure the index using quantified criteria thus making country wide comparison more subjective. The higher the score, the less corrupt the country is.

However, there is a problem with corruption index that it is based on perception, and perception often differs from one country to another. The method used is also questionable, because there is no perfect measurement of corruption. Hence, the reliability of the measurement is also an issue. Another objective measurement such as cases reported in the media or convicted does not represent all corruption cases in the economy.

There are many perceptions of how corruption might affect an economy's performance as explained in the previous chapters, whether it will give a boost towards the GDP growth, or it will hinder from economic development.

Table II. Corruption Index of Latin American Countries (2000-2014).





c. Control variables

Various control variables were chosen in order to support our analysis regarding corruption impact towards these countries economic growths. Control variables are important to reduce the effect of confounding variables. Without control variable, there will be an omitted variable bias in the regression. If it happens, the correlation between treatment variable Corruption Index and dependent variable GDP growth will be biased, hence we will not be able to found its true correlation. Various control variables were chosen in order to support our analysis regarding corruption impact towards these countries' economic growths.

- Fixed capital formation (CAPFORM)

Fixed capital can be referred to as a Property, Plant, and Equipment. According to the World Bank activities such as land purchases and improvements, constructions of school and hospitals, roads, industrial clusters includes in fixed capital formation. An increase in fixed capital formation will boost economic growth, as a sign that the economy is planning for many development programs.

- Secondary education percentage (EDUSEK)

According to Global Partnership for Education, education may eradicate poverty and increase income, thus improving standard of living. This results in boosts of economic growth, as well as more capable and healthier citizens.

More educated citizens would help boost economic growth (Pegkas, 2014). The research also sates a long-run relationship between educational levels and gross domestic product. Secondary and higher education has crucial impact on growth comparing to primary education, indicating the importance of acquiring higher level of education.

- Government expenditure (GOVEXP)

Government expenditure is proven to have stable long-run relationship with gross domestic products empirically in Europe (European Commission, 2008). While Wu, et al. (2010) found government expenditure and economic growth cause each other; making the hypothesis that government expenditure is indeed important in determining economic growth. However, this hypothesis is only drawn from non-low income countries.

- Inflation (INF)

According to Investopedia, inflation is the rate in which the purchasing power of a currency is falling, general level for goods and services is rising instead. The Central Banks attempt to limit inflation, and producers in the economy expect controlled inflation in order to avoid volatility in the economy. There is an adverse relationship between inflation and economic growth. Inflation is proven to have strong, negative relationship with growth and investment (Barro, 1995).

- Investment (INV)

Increased government spending will increase the attractiveness of investment because government spending may be allocated for the improvement of infrastructure of government system that may boost the effectiveness of an investment. Thus, investment will also be a determinant for GDP growth

- Population growth (POPGROWTH)

Population growth would depress the standard of living in the long-run (Malthus, 1978). The idea behind this statement is that population growth would impose threat to economic development because with a fixed land and resources, growth in population would simply reduce citizen's individual consumption.

Meanwhile George Stigler stressed the advantage of economics of scale and specialization due to increase dependency. Citizen live in the economy world, we thought population growth would be a good determinant towards economic development.

- Trade (TRADE)

This variable is adopted as a percentage of GDP, and is a sum of import and export. According to the Institute of Development Studies, in order to achieve economic growth a country must reach out to other markets through trade. Trade is never not beneficial, and trade openness is always encouraged.

If there is a causal relationship between trade and income, income will rise if there is a development in volume trade. This is a good sign for the economy because it will rise the GDP (Busse and Königer, 2012).

Table III. Control Variable Properties

Variable	Mean	Standard Deviation	Min	Max
GDP Growth (growth%, y-o-y)	3.657	3.510	-10.895	19.287
Corruption Index (CPI, y-o-y)	3.436	1.252	1.500	7.940
Fixed Capital Formation (%, y-o-y)	5.401	14.259	-44.184	14.259
Secondary Education Enrollment (both sexes, gross%, y-o-y) This variable is based on gross enrollment ratio regardless of age to the population of the population of the age group that must attend secondary school.	75.813	16.816	4.577	12.207
Government Expenditure (% of GDP, y-o-y)	12.207	3.231	4.577	22.734
Inflation (growth%, y-o-y)	9.320	11.748	-1.167	99.876
Investment (%, y-o-y)	21.789	5.920	11.022	47.046
Population growth (growth%, y-o-y)	1.379	0.558	-0.064	2.456
Trade	-0.826	-19.152	39.583	7.553

(%,y-o-y)				
Number of observations	270			

IV. Methodology

We employ *fixed effects* model (FE) in this research to show us the relationship between independent variables (both control variables and the other explanatory variables) and dependent variables (GDP growth) within the same unit. Every sample which is the Latin American countries, has its own unique characteristics that may affect the independent variables. For example, being a bigger country may provide more land for infrastructure development, policies made in the countries may have different effects towards its economic determinants, differing climate and land condition may affect the output of the country. The examples mentioned before is the time-invariant variables, and FE is useful when we are interested in knowing the impact variables that vary over time.

The model is also useful to avoid biases in the equation, which rose from the correlation between independent variable and the error term. We want to avoid the biases caused by the omitted variables thus we allow for initial differences between the samples and observe the changes in treatment (in this part, corruption). FE technique then ignores the effect of time-invariant characteristics from independent variables that changes over the time, thus capturing more accurately the desired effect. In this research, FE is critical because it studies the factors of change within an entity (in this estimation; place) and the features are for individual countries and each of the countries' characteristics are not all correlated with the other countries. We ignore characteristics that do not change with time because this has no effect towards the individual countries due to its constant nature. FE is useful due to the fact it is nearly impossible to take account of all these differences between the countries. By applying FE, country specific variable which are time-invariant will be controlled and will not end up correlated with the error term, hence reducing biases.

However, Fixed Effects model is not perfect due to its incapability of capturing all variables. Other time-varying variables that may have connection with the variable of interest (corruption) and outcome variable (GDP growth), must be added to the equation in order to avoid bias, increase internal and external validity, and to receive desirable result. Thus, variables such as fixed capital formation, gross secondary education enrollment rate,

government expenditure, inflation, investment, population growth, and trade are included into the calculation.

Model 1

$$GDPGROWTH_{t,i} = \beta_0 + \beta_1 CORRINDEX_t + u_{it}$$

We decide to analyze this model to find the initial indicator whether corruption index has a correlation with economic growth indicator which is GDP growth. However, there is no inclusion of omitted variables.

Model 2

$$GDPGROWTH_{t,i} = \beta_0 + \beta_1 CORRINDEX_t + \beta_2 CAPFORM_t + \beta_3 INV_t + \beta_4 GOVEXP_t + \beta_5 TRADE_t + u_{it}$$

After finding if there is any correlation of corruption index with GDP growth, we are going to add more variables which theoretically represent GDP growth best, such as the government expenditure, trade, and investment which makes up I , G , and NX of gross GDP formula. Then we also add capital formation for the proxy of private investment.

Model 3

$$GDPGROWTH_{t,i} = \beta_0 + \beta_1 CORRINDEX_t + \beta_2 CAPFORM_t + \beta_3 INV_t + \beta_4 GOVEXP_t + \beta_5 TRADE_t + \beta_6 POPGROWTH_t + u_{it}$$

After finding that there is still indeed a relationship between GDP growth and the variables, we then add a proxy for consumption which is the population growth. As population grows, the demand for goods and services also grows, also the number of agents (entrepreneurs, labors, government authority, et cetera) making this variable a good proxy.

Model 4

$$GDPGROWTH_{t,i} = \beta_0 + \beta_1 CORRINDEX_t + \beta_2 CAPFORM_t + \beta_3 INV_t + \beta_4 GOVEXP_t + \beta_5 TRADE_t + \beta_6 POPGROWTH_t + \beta_7 EDUSEK_t + \beta_7 INF_t + u_{it}$$

For the next step, we add inflation variable as one of the determinants in economic growth. Thus, we could minimize the omitted variable necessary to capture the relationship between corruption index and economic growth. Also, to make the model more represented and equitable. We add secondary education which is a proxy for human capital, because if the citizen becomes more educated, the agents in the economy would perform more efficiently and truthfully (Acemoglu and Verdier, 1998). We also add inflation because the variable has strong and negative relationship with GDP growth (Barro, 1995).

V. Main Estimation Result

In this section, we will analyze the correlation between corruption index and economic growth based on out regression. We will also briefly interpret the results from each model along with statistical tests employed in the estimation.

Model 1

In column (1) table IV, we input our first model by employing fixed effect model to implicitly control time-invarying variables. This is due the model we employ will only regress the treatment variable to the outcome variable without including additional control variables. Based on our calculation, we found a positive yet in-significant correlation between corruption index and dependent variable GDP growth. Due to the variable is using an index, we need to multiply the standard deviation of the variable with the regression coefficient to acquire the accurate result. The regression result is then interpreted to be: an increase of 1% of standard deviation in Corruption Index will result in 0.68% increase in GDP growth.

However, this model is still an initial indicator to find whether corruption does have relationship with economic growth, and in the next models we will add omitted variables to make the model more equitable.

Model 2

In this model we will try to add more variables to the equation. We first try with variables that might best calculate growth such as consumption, investment, government expenditure, and trade balance. However, because it is not easy to find the exact variable to include, we use proxies. We include corruption index, capital formation as a proxy for private investment, government expenditure, investment, and trade. We will describe our findings

below. The correlation between corruption index and economic growth is still in-significant. However, the coefficient value lessens when we add more variables into the model. As for corruption index, the regression result is then interpreted to be: an increase of 1% of standard deviation in Corruption Index will result in 0.30% increase in GDP growth.

As for other variables, although it is quite odd the government expenditure has relatively negative relationship with economic growth. 1% increase in variable government expenditure is characterized with 0.29% decrease in GDP growth. This may be due to ineffective spending on government projects, corruption, and failure in determining growth strategies. This relates on how the government distribute their resources. According to Mitchell (2005), most government spending has destructive effect on a nation's wealth, regardless on how it is being planned. This contradictory expectation is maybe due to costs that appear, for example negative multiplier cost, whereby government is naïve enough to finance harmful interventions. The report also includes behavior penalty cost, which arise from government's lacking of effort to enforce productive initiatives.

Another variable which is investment is very much significant in economic growth. For 1% increase in investment variable, will impact to 0.19% increase in GDP growth. Meanwhile, following most of the economic theory, our calculation showed that trade is indeed beneficial. For 1% increase in trade will increase the GDP growth rate by 0.14%. Although small, trade is proven to have positive impact towards the wealth of the nation. We also found significant effect of capital formation to economic growth. The result is interpreted with 1% increase in capital formation variable resulting in 0.14% increase in dependent variable (GDP growth).

Model 3

After we add variables, seemingly we need to add more variables to increase the equitability of the equation. We decided on population growth which can be a proxy for consumption. Population growth, however, is known to have confusing effect towards the economy. According to many researches, population growth would increase economic growth. However, due to an increase in economic development, population growth would drop. For 1% increase in population growth, there will be a decrease in 0.65% of the GDP growth although it is in-significant. Furthermore, we also look at the correlation between corruption index and GDP growth. For 1% increase in the standard deviation of the

corruption index correlate with 0.23% increase in GDP growth. However, the corruption index variable is still in-significant.

Model 4

In the last model we attempted to capture the effect of corruption to GDP growth by including all time-varying control variables and fixed effect into the calculation. Hence, we added variables such as education and inflation rate.

Given the nature of education, a person who spends time on acquiring education will later contribute to the economy in the future. Based on our calculation, 1% increase in secondary education enrollment contributes to a little 0.018% increase in economic growth. This supports the hypothesis to mainstream researches which indicate education as necessary to the development of a nation, as well as a very important investment for the future (Chandra, 2017). However, the estimation result is not significant because as explained in previous chapters, secondary education might need time to give an impact because it is also an investment in human capital.

Another variable we included is inflation, and we found the variable inflation to have significant yet negative effect towards economic growth although small. With 1% increase in inflation rate, economic growth will decrease by 0.05%. The relationship may be perceived such as if growth is at the rate which is not desirable or too fast, inflation is needed to slow down the economy.

Then what about corruption rate? Based on the calculation on last model, now the regression result is then interpreted to be: an increase of 1% of standard deviation in Corruption Index will result in 0.68% increase in GDP growth.

Table IV. Estimation Result

Variable	Model			
	GDP Growth Rate			
	1	2	3	4
Corruption Index	0.545 (0.436)	0.239 (0.32)	0.184 (0.320)	0.297 (0.375)
Government Expenditure		-0.292** (0.119)	-0.317*** (0.121)	-0.247 (0.165)
Investment		0.194*** (0.040)	0.198*** (0.040)	0.124*** (0.045)
Trade		0.146*** (0.030)	0.143*** (0.030)	0.11** (0.015)
Capital Formation		0.14*** (0.010)	0.144*** (0.010)	0.169*** (0.012)
Population Growth			-0.977 (0.880)	1.12 (1.380)
Secondary Education				0.018 (0.026)
Inflation				-0.054*** (0.010)
Number of Observation	302	285	285	241
Number of Countries	18	18	18	18
Within R	0.055	0.561	0.563	0.613
Between R	0.054	0.111	0.076	0.251
Overall R	0.01	0.444	0.437	0.541

Regression result ***p<0.01 **p<0.05 *p<0.10. Fixed effects were included to all of the estimation. Number 1 to 4 represent regression model from 1 to 4, different number of countries due to some country may not have a complete data across the period of observation.

Sensitivity Analysis

Sensitivity analysis is done to further prove the accuracy of the model by removing one or two seemingly significant country, to see if the coefficient change in each of the variable is significant or not. We are interested in corruption index as our treatment variable, thus we try to check whether the model is robust or not, and the previous result's significance is not heavily reliant on the data, but the equitability of the model itself.

In order to do this, we eliminate Brazil and Venezuela. These countries are the most prone to corruption cases, and the biggest out of the samples. Hence, the correlation between the variable of interest and the outcome variable may be heavily affected by these two countries.

Table V. Sensitivity Analysis Result

Variable	Model	Estimation Result
Corruption Index	Model 1	0.732* (0.081)
	Model 2	0.434 (0.177)
	Model 3	0.409 (0.216)
	Model 4	0.467 (0.223)

Based on the result, there are only little changes to the result, thus we can assure that the result is in general and not levied heavily on Venezuela and Brazil. Based on the result, the constant and the significance are larger but not much. Thus, we are very assured that our model is equitable. Although we change the amount of data, the results do not vary by much.

Discussion and Possible Endogeneity Problem

On the previous section we learn that the correlation between variable of interest (corruption rate) and dependent variable (GDP growth) is strongly in-significant. Each model

does not provide us with an equitable result, no matter how many additional time-varying control variable we added into the calculation. For that, we believe that a problem known as **endogeneity** might exist. We need to first understand what is endogeneity. Endogeneity is a phenomenon when the treatment variable is correlated with the error term. When there is omitted variable bias; when the regression is missing some of its important control variables, error term is the one capturing the effect of these missing variables. According to researches, it is unlikely to check endogeneity.

One factor that may cause endogeneity to arise is the possibility of a reverse causality in an equation; in this example, if GDP growth is the one causing Corruption Index, not otherwise. Based on our literature review, we have yet to find any evidence regarding reverse causality. Although reverse causality might possibly occur in real life, there are other studies indicating otherwise. For example, a study in Africa by Grimah-Grempong (2001), corruption causes growth to decrease through channels such as investment in physical capital directly and indirectly. As far as it is concerned, we do not find any sign regarding reverse causality in this research. Also, in this research we merely try to find a correlation between treatment and outcome variable.

Another problem that might occur in our research is **lagged effect problem**. Lagged effect is due to lagging variables, in which the effect of some policy or variable do not occur simultaneously or under a short period of time. The effect will take place after one to several years later when the treatment has started. This phenomenon would likely occur on variables such as education. If the government were to increase educational budget, it would not rise human capital instantly. To prove whether lagging effect occur in our model, we conducted a simple regression with subject to the first model.

Model 1: Lagged Effect

Based on our interest in the treatment variable which is corruption index, we conducted a calculation based on corruption index without lag. However, we fail to find a significant relationship between the outcome and treatment variable with this model. We then try to adjust the time occurrence in the variable, to see if lags were added, the results will change or not. We found that when the model does not include lag in corruption index variable, the result is less significant than the model that includes the lag of one year.

Table VI. Regression Result (Lag Included)

Variable	Estimation Result
Corruption Index (t=0)	0.545 (0.213)
Corruption Index (t=-1)	0.982** (0.029)

T=0 indicate corruption index with no lag, while T= -1 indicate corruption index has been lagged by one year.

The lagged variable (T= -1) means the value of corruption index regressed is not the value between the same year, instead it takes the value of corruption index a year before. Hence, it acts like a gap between the corruption and its effect toward economics growth.

Based on our calculation above, we show the effect of corruption toward economic growth a 1% increase in the standard deviation of the corruption index is being followed with 1.23% increase in GDP growth keeping other variables constant. The correlation value also significant at 5%.

VI. Policy Implication

Corruption is a sign of a hole in a country's government system, as it happens not independently. It imposes greater risk for investment as investors perceive corruption as a great deal breaker, following the unpredictability of economic and law conditions. As discussed above, property rights will not be enforced following poor bureaucracies. In conclusion, weaker law enforcement.

Looking at Nordic countries which are quite successful in tackling and preventing corruption, there are lessons that might work to battle corruption in other countries. Denmark limit cash payments in to ease suspicious transactions in the economy and tax reduction for purchases in informal sector, meanwhile Finland carry out massive investigations. Awareness raising is also implemented in the rest of Nordic countries. However, for almost all Nordic countries, lobbying is not regulated and no specific actions are considered in tackling the activity (Delna, 2016).

Meanwhile in other countries, corruption punishment is the one making a bigger headline rather than the corruption prevention itself. In China, corrupt government officials are sentenced to lifetime imprisonment, in Indonesia up to 5 years and in Brazil 8 years in time of imprisonment. Seeing this, we could say that prevention is a better approach since the countries which has elaborate prevention plan is less corrupt than countries which are focused on punishment plan.

According to Transparency International, the law concerning corruption must be clear on defining what categorizes as corruption and what its criminal charges are. The punishments of the crime should be clear whether it is determined prior or post-investigation. Investigators who handle corruption cases must be have the expertise in the field, and capable of handling the cases. An adequate access to data is very beneficial such as bank information, data from customs and tax authorities, et cetera.

VII. **Conclusion**

Our thesis attempts to reveal what is the correlation between corruption and the economic growth in Latin American countries, which are world famous due to illegal activities occurring in the part of the world. These illegal activities include corruption, drug and human trafficking, et cetera.

Many researches has tried to unravel the definite result of corruption towards the wealth of the nation, however there are many confusion regarding the after-effect. There are two opposing sides, one argues corruption emits negative consequences meanwhile the others remain positive on the thoughts that corruption may increase productivity for countries with poor governing system. We then try to unravel the answers ourselves by using fixed effects method, to identify the effect of corruption on several countries in Latin America.

Fixed effects model employs such method that we could analyze the effect of an independent variable simultaneously using panel data on several samples by ignoring time-invarying variables and accepting the initial differences between the samples. We also input lags and underwent stationary tests on independent and control variables to obtain more realistic and significant result.

Other academic paper regarding corruption in Latin America is yet to be found. We conduct stationary test because we deemed it to be necessary in this model, and sensitivity analysis is also being done to prove the accuracy of the model we employed.

Based on our result, we found corruption to be unfavorable for Latin American countries' economic growth. Corruption did not boost productivity in the way we hoped, instead with 1% increase in the standard deviation of corruption index, the growth would decrease by 0.37%. Illegal activities which was thought to support the weak governing system in the part of American continent turned out to be destructing. We also found that the correlation between corruption index and GDP growth is more significant if lagging of one year in the treatment variable exist.

We think that there is a lot of room for improvement especially another research with adequate amount of data (observation of more than 10 years in length). There is also an importance in checking whether we need to include lagging variables or not, and if lagging variables are necessary in the model; how many years to be included. Checking whether reverse causality exist in the experiment is also necessary, to avoid endogeneity problem.

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