Importance of fighting corruption in pandemic times:

Potential impact of anti-corruption laws on economic growth

Abstract

Understanding the impact that corruption can have in different economies can be a challenging task given that, although corruption weakens the macroeconomic environment and creates barriers that limit laws application it also can be used as an instrument to avoid bureaucratic systems and mitigate the costs of governance failures. By applying both a Fixed and Random Effects Model to a panel data on both LAC and EU countries for the 2012-2019 period this paper shows that corruption negatively impacts the Latin America and Caribbean's economic development and that its impact does not greatly differ from their European Union neighbours. Additionally, this study also reinforces the idea that, now, more than ever, it is important to invest in the implementation of anti-corruption policies to ensure the sustainable growth of the economy since corruption might have serious implications on the current funds' distribution gathered to deal with the global COVID pandemic.

Key words: Corruption; Economic Growth, Policies

1. Introduction

Currently, the world is facing the worst world crisis ever experienced, caused by the Covid-19 virus. The consequences of this pandemic are especially perceptible in Latin America and the Caribbean (LAC), the most affected region in the developing world. According to the executive secretary of the Economic Commission for LAC (ECLAC), this is the worst economic crisis faced in the region in the last 120 years. Even with fiscal incentives and temporary aid, the population continues to struggle from the consequences of this crisis, which for ECLAC are aggravated by the region's historical and structural problems (Valencia, 2020). One of the most notorious structural problems in the region has to do with corruption, which is believed to further undermine the LAC countries' ability to respond to this humanitarian emergency. This occurs because corruption leaves countries vulnerable and under-prepared to deal with public crises through the diversion of funds from essential services such as healthcare or education. Also, the lack of transparency in the allocation of resources weakens the efficiency of crisis responses and, the lack of accountability and transparency, which ultimately lead to corruption, has been common for many LAC's countries. On top of this, there is also evidence that countries with higher levels of corruption tend to be the worst propagators of democratic standards and human rights breaches in the context of their response to COVID-19 (Kukutschka and Vrushi, 2021). There is not so much research on the quantitative economic and financial costs of corruption in the LAC region, although there is an evident need for more available tools with a focus on anti-corruption in the region (Duri, 2020).

Despite the current situation in LAC, this region provides fertile ground for progress in the fight against corruption however the literature is ambiguous about how optimal it can be to fight corruption, especially when compared to other more developed nations. In particular, it is also possible that corruption, in general, may not be as damaging or an important factor in explaining economic growth, since, according to the literature, it has two opposite effects on economies' performance. Besides, normally corruption is assumed to be more difficult to combat where there exists a higher percentage of people in social and income distress because they have few opportunities to resist the pressures of corruption

(Bosco, 2016, pp. 67), and so fighting corruption might imply higher costs in countries with lower development levels. In other words, it may be more advantageous to fight corruption in countries with a higher degree of economic development such as European Union (EU) countries compared to less developed countries such as ALC countries.

To provide clarification for these doubts, this work tries to first re-examine the nexus between economic growth and corruption, and then, by using two different aggregates of countries, LAC and the EU, over the period 2012–2019, it aims to understand if there is any significant difference between the corruption economic impact between countries in different development stages, that is, if there are any differences in the anti-corruption policies economic impacts between developed and developing countries. Thus, the motivation of this empirical research lies in inspecting the influence of corruption on economic performance in the short run and its difference between developed and developing countries to provide more targeted suggestions to policymakers.

The remainder of the paper is organized as follows: Section 2 provides a view on corruption, the profound economic and political reforms that have been implemented in the region, and relevant empirical literature made on the study subject. Section 3 describes the data, the selected methodology, and introduces the model specification. Section 4 presents the regression results, and section 5 concludes the study discussing the implications and limitations of this work, as well as the steps for further developments.

2. Literature Review

The presence of corruption in society has been a major theme of debate between countries since no country is free of corruption however, its presence varies greatly across the world, being the poorest countries those who suffer the most from this issue. Empirical studies had argued that corruption can arise from bureaucracy and inefficient administrative and political structure; bad regulation; low transparency; lack of press, civil participation, and economic freedom; large ethnic division; low share of female representation on government bureaucracies and workforce; low levels of globalization, openness, trade or integration in the world economy; large and more centralized governments; low market and political competition; high concentration of natural resources; high poverty rate; low levels of property rights and urbanization; and low wages of public officials. Other factors such as the type of government structure, the kind of legal code, the political instability, the predominant religion of the country, and the geographical location, culture, values, and historical path can also influence corruption, however in a more ambiguous way. Other causes of corruption might be associated with immigration and a higher level of corruption in neighbouring nations, the non-existence of an eGovernment and the lack of use of the internet and education of a country. Economic growth and prosperity can also impact corruption through its detrimental effects on the private sector, the quality of institutions, and policymakers (Lambsdorff, 2008; Dimant and Tosato, 2018).

The fact is that corruption is mostly seen as a deceptive plague that has a wide range of corrosive effects on societies. It undermines the rule of law and ultimately democracy, distorts markets, leads to violations of human rights, erodes the quality of life, and allows several threats to human security to flourish (United Nations, 2004). LAC countries have been typically perceived as being one of the most corrupt sets of countries even more corrupt than East Asian countries, but comparable to other transitional economies (Shepherd, 1998; Lagunes et all., 2019). Since the 1980s, profound political and economic reforms have been implemented in LAC countries, and in fact, the region has seen a renaissance of democracy, accompanied by a widespread decentralization of power to lower levels of government. One of the firsts official commitments taken in America to fight corruption was launched in 1996, and it became known as the

Inter-American Convention Against Corruption (IACAC). The main purpose of this convention was to promote, facilitate and regulate cooperation among the States Parties, to strengthen the development of the mechanisms needed to prevent, detect, punish and eradicate corruption, and to ensure the effectiveness of measures and actions to prevent, detect, punish and eradicate corruption in the performance of public functions and acts of corruption. In 2002 it was designed as a Follow-Up Anticorruption Mechanism of the Organization of United States (OAS) for the Implementation of the IACAC (MESICIC). Later in 2003, the United Nations Convention against Transnational Organized Crime was launched to continue the work done so far. Other instruments have been implemented since then to fight corruption. The most famous and recent commitments to anti-corruption treaties were the 2030 Agenda for Sustainable Development adopted at the United Nations Sustainable Development Summit in 2015 and the Lima Commitment “Democratic Governance Against Corruption” adopted by the Heads of State and Government of the Hemisphere and held in 2018. All these events wanted to underscore the idea that prevention of and fight against corruption are fundamental to strengthening democracy and the rule of law in the States. However, these efforts are just worth it if corruption hinders economic growth.

An increasing number of studies considered the effects of corruption and have focused on the many dimensions through which corruption intimately potentially affects economic activity and development. There are two contradicting views regarding this subject, as proposed by Méon & Weill (2010). The first argument is supported by the ‘'grease the wheels'' hypothesis which states that corruption makes it possible to reduce unnecessary delays thus promoting the efficiency and speed of economic activities, thereby enhancing growth. The other opposite view, based on the ‘'sand the wheel'' hypothesis, states that corruption reduces economic growth by creating new distortions in the economy or by benefiting the less efficient producers.

On the one hand, contradicting collective morals, some studies have found a positive relationship between corruption and growth, supporting the “efficient” corruption theory. This appears to happen since, in some cases, corruption may be seen as a virtue, since it is likely to mitigate the costs of governance failures

on economic growth being these costs associated with the political instability, the presence of a poor public administration, inefficient public policies, a deficient regulatory framework to encourage private sector development and a weak rule of law, that might question contracts and threaten private properties (Shabbir, et. al. 2016; Kéïta, K., 2019). Corruption might also be a solution to avoid the bureaucratization involved in several industrial activities (Carraro, 2006). Furthermore, fighting corruption might be suboptimal since it requires the use of more resources when compared to a country with a reduced corruption level. This hypothesis was corroborated by some authors such as Huang (2016) or Cieślik, and Goczek (2018) who reported a positive relationship between corruption and economic growth.

On the other hand, a growing body of literature emphasizes the negative effects of corruption on growth, thus reinforcing the second hypothesis. This relation is more predominant in the literature being defended by several authors such as Swaleheen (2011), Grabova (2014), Ibrahim et al. (2015), Thach et al. (2017), and Machoski and Araujo (2020). One way to explain this is because bureaucrats, by diverting funds for personal purposes, facilitate outgoing cash flows from the country, which reduces the attractiveness of investment in the country, hinders their ease of doing business, questions the concept of free-market, and in turn impairs the growth potential of countries. Relating to this matter, several studies have shown evidence that the effect of corruption on real GDP per capita is more pronounced in countries with low levels of investment, supporting the idea that risk-averse investors prefer to invest in countries with low corruption and are hesitant to invest in countries where corruption is prevalent (Mauro, 1995; Cieślik and Goczek, 2018). Corruption might also decrease economic growth by promoting military expenditure (D'Agostino et al., 2016), increasing inflation rates (Anderson and Tverdova, 2003), and exacerbating the negative consequences of governance failures and high political instability on growth. Another indirect channel through which corruption might negatively impact the economic prosperity of countries is through the total factor productivity (TFP) that according to the economic literature significantly contributes to the growth of output as does human or physical capital, however, when the effect of the tax burden is taken into account, the overall effect of corruption on TFP becomes positive, which

means that it is possible to alleviate the cost of corruption over productivity through tax rate increases (Kéïta, K., 2019).

Some authors also found mixed evidence about the relationship between economic development and corruption. For example, Goh et al. (2015) found a negative relationship between corruption and growth in the long run but a positive impact on economic growth through channels of trade openness and government spending. More recently, Akrout et al. (2021) also demonstrated this temporal ambiguity showing that corruption negatively affects the long-term economic performance but it has a positive impact on GDP per capita in the short term. Kéïta (2019) showed mixed evidence in the relationship between these two variables depending on the political and government conditions of the economy. Due to these uncertainties, this paper presents the first hypothesis to be proved:

Hypothesis 1: Corruption is detrimental to economic growth

In practice, empirical evidence tends to support the “sand of the wheels” hypothesis, suggesting that corruption decreases economic growth but so far there has been no consensus as to which hypothesis corresponds to reality. One of the reasons behind this uncertainty may be related to the level of development of the countries under study. For example, Song et al. (2021) showed that in fact, the corruption-growth nexus differs according to the countries’ development stage. In particular for developing countries, corruption harms growth but causality is absent for developed countries. Given this ambiguity, this research also tries to find if the marginal effect that corruption has on economic performance varies according to the country’s development stage. In this sense, the second hypothesis to be proven is here presented by:

Hypothesis 2: The impact that Corruption has on growth depends on the Country’s development stage

3. Methodology

3.1. Data

This research uses data covering 7 years of data for the period 2012-2019 in a sample of 60 countries. The selected countries are all members of the EU and LAC. These two clusters were chosen due to their general constitution in terms of development degree, i.e., while the EU is constituted mainly by nations considered as “developed countries”, LAC includes only countries categorized as “developing countries”. Furthermore, the fact that both these aggregates were part of several mutual agreements implemented to fight corruption makes them good candidates for this study. Also, given the fact that nowadays there is a high spatial dependence within and across national borders (Borsky and Kalkschmied, 2019), the choice of these two Aggregates makes it possible to consider spatial interdependencies and not only a subnational region's characteristics.

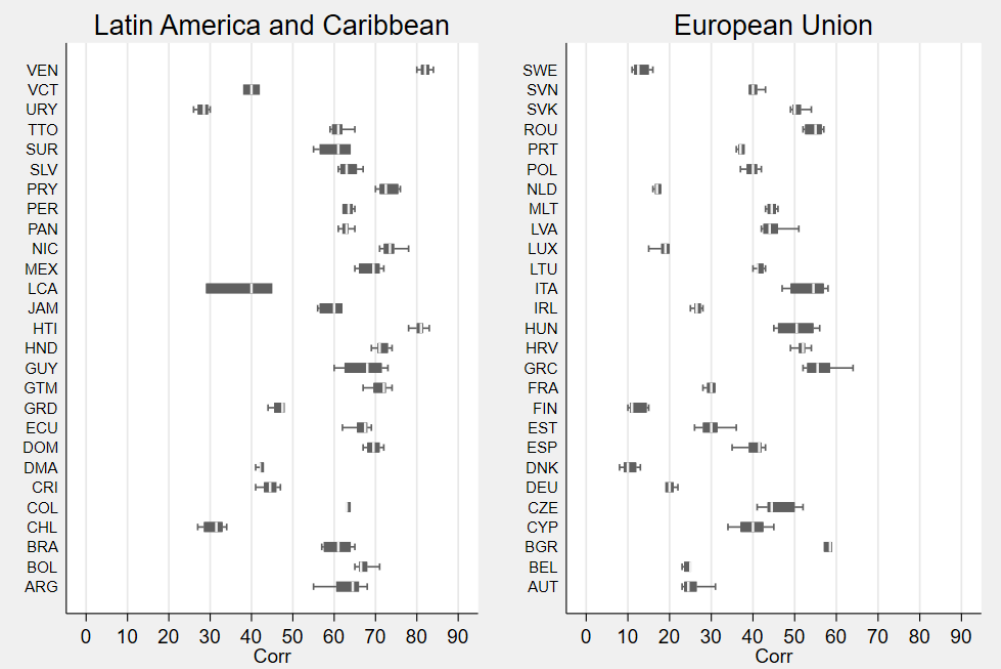
Previous studies regressed economic growth on three different corruption measures: Transparency International's Corruption Perception Index (CPI), the International Country Risk Guide (ICRG) index, and the World Governance Indicators (WGI). Because according to the literature the use of ICRG and WGI seems to be more controversial[1], it was used in this work as a proxy of corruption the reversed CPI (100 − CPI). This re-escalation provides a more intuitive result where a high score means that corruption is considered to be high and a low score the opposite. The data on CPI was obtained from the Transparency International Corruption Perception Index (TI-CPI). Despite its limitations, this measure seems to be more attractive because it provides a more intuitive measure of corruption, it has easier accessibility and it is produced by Transparency International, a reliable organization that has been very successful in developing strong ‘brand equity’ (Andersson and Heywood, 2009). Since CPI was not always comparable through time[2], to reduce possible measurement

[1] While ICRG measures investment risk of corruption rather than corruption per se and seeks to measure corruption that threatens only foreign investment, the WGI includes WGI's “Control of Corruption”, a sub-component that has been criticized for several methodological issues (Qu, G. et al, 2019).

[2] This is because until 2012 CPI in individual years included data for different components and it was measured on a 0-10 scale basis.

biases, this study only used data from 2012 onwards. Although the original dataset consisted of annual data for 60 countries from 2012-2019, there is no data available on this measure for Antigua and Barbuda, Belize, Caribbean small states, and St. Kitts and Nevis. In addition, data for 2015 in Domina, St. Lucia, and St. Vincent and the Grenadines are not reported and in Grenada, there is only information about the CPI since 2016. Figure 1 reports the box diagram of this variable for the available data where the tendency of the LAC countries towards a higher level of corruption is visible.

Figure 1: Perceived corruption across LAC and EU Countries.

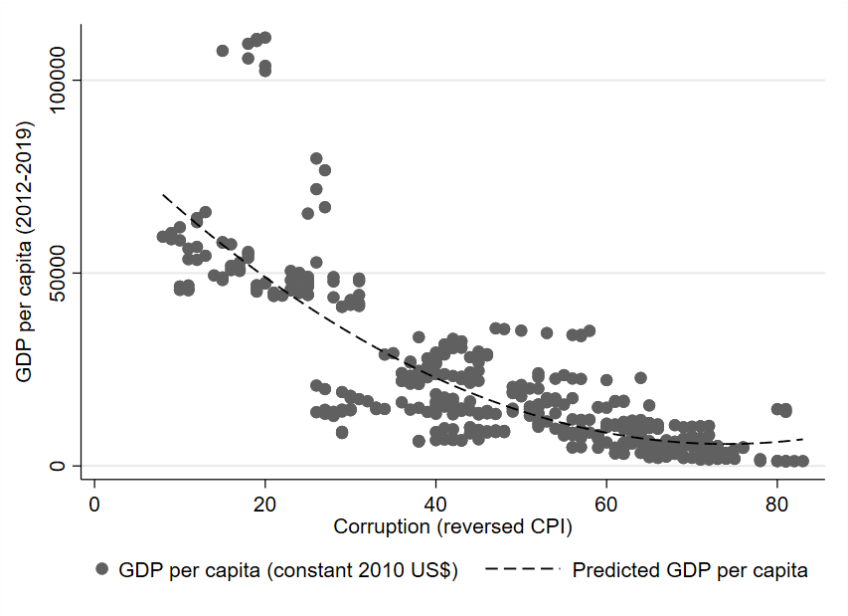


Source: Own Computations. Outside values were excluded from this representation.

The information on economic performance (*GDPpc*), here measured through Gross Domestic Product per capita in constant 2010 US dollars[3], was extracted directly from World's Bank World Development Indicators (WDI) as all the remaining variables. Figure 2 plots the average real GDP per person against the average corruption index for the 60 countries sample and figure 3 plots the same relation just for the LAC countries.

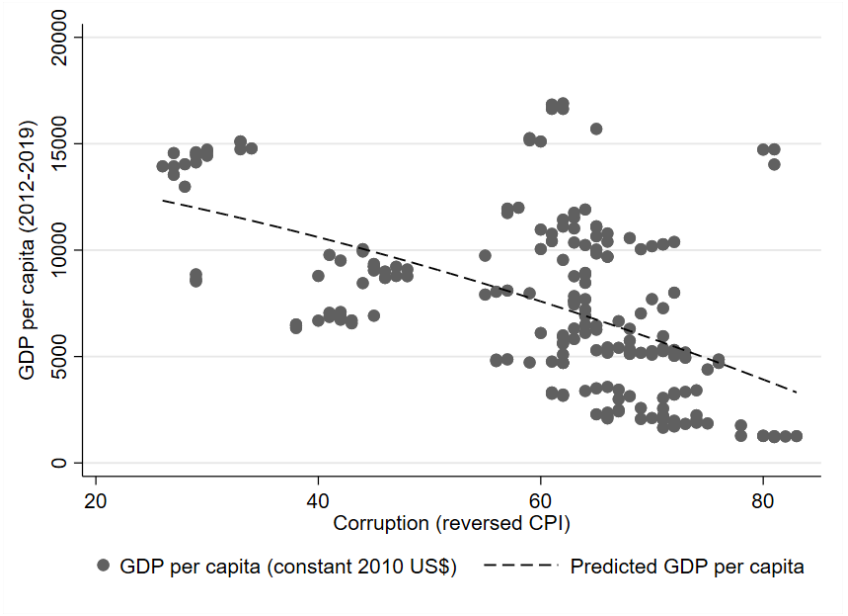
[3] According to Moiseev et al (2020), this measure produces a model with higher quality in relation to GDP per capita, adjusted by purchasing power parity.

Figure 2: Relationship between Corruption and GDP per capita



Source: Own Computations

Figure 3: Relationship between Corruption and GDP per capita in LAC countries



Source: Own Computations

The additional variables incorporated in this work have been frequently used as control variables in the literature since they represent possible channels of

transmission of the effects of corruption on economic performance and so their inclusion in the model allows us to isolate the direct impact of corruption on growth. They are also important contributors to growth according to Cobb-Douglas production function which states that per capita GDP rate is mainly determined by human and physical capital, labour, technological innovation, and other residual factors. Capital and labour inputs are proxied by Gross Fixed Capital Formation in constant 2010 US dollars (*Capital*) and by Labour force participation rate (*Labour*) respectively. Human capital accumulation is measured by tertiary enrolment (*Educ*) to enhance the quality of the labour force's educational profile. The country's population, here measured by population density (*Pop*) and Saving rate (*Savings*) are also found to be important in explaining economic growth. Here they are both considered as exogenous as in the first models of economic growth. Another important factor to take into consideration in this model is the technological function, here proxied by Research and development expenditure as a percentage of GDP (*Tech*). Other factors that potentially affect economic performance are the country's economic structure and macroeconomic performance, often included in the residual term. This study then includes a variable to characterize the government's weight on the economy (*Gov*), another to describe the Country's openness and global competitiveness (Trade), and finally a variable to control for the price level stability (*Inflation*).

The sample countries were further classified according to their degree of development. Due to the lack of consensus regarding the classification of countries into "developed" or "developing" economies and given the majority of the constitution of each Aggregate, this study assumed the EU countries as "developed" nations and the LAC countries as the "developing" economies. This information was gathered in a categorical variable defined as 1 if the country was a member of the EU and 0 if instead, it belonged to LAC.

The summary of statistics and the variable definitions and predicted signs are represented in tables 1 and 2.

Table 1: Summary statistics

	Unit	N	mean	sd	min	max	p50
GDPpc	10^4 constant 2010 US$	459	2.0148	2.0103	1.214	11.106	1.366
Corr	Index points	425	48.153	18.90	8	84	49
Educ	% of tertiary age group population	288	60.538	23.789	10.019	142.852	64.163
Savings	% growth	337	0.130	1.172	-1.287	20.172	0.030
Density	People per sq. km of land area	406	145	200	3	1514	93
Capital	10^9 constant 2010 US$	379	91.3	159	0.210	833	24.4
Tech	% GDP	280	1.176	0.958	0.015	3.419	0.919
Labor	% Population	432	61.274	5.553	48.56	78.4	61.275
Trade	% GDP	379	-0.003	0.096	-0.301	0.355	0.002
Gov	% GDP						
Inflation	% annual change of Prices	442	3.441	14.178	-3.093	254.95	1.736
Developed	% of European countries in the sample	464	46.5				

Table 2: Variable definitions and predicted signs

Variable	Description	Predicted Sign
GDPpc	GDP per capita in 2000 constant US $	
Corr	Reversed of CPI (Composite index, measuring the degree of perceived corruption on a scale from 0 to 100), where higher values indicate higher corruption	-
Educ	Gross ratio of total enrolment, regardless of age, to the population of the age group that corresponds to tertiary levels of education.	+
Pop	Number of people per square Kilometre	-
Savings	Rate of growth of gross domestic savings without final consumption expenditure	+
Capital	Gross fixed capital formation in constant 2010 US dollars.	+
Tech	Gross domestic expenditures on research and development as percent of GDP.	+
Labour	Proportion of the population ages 15 and older that is economically active.	+
Trade	Ratio of net of goods and services transactions (Exports minus Imports) to GDP.	+
Gov	Percentage of compulsory transfers to the central government for public purposes in total GDP	+
Inflation	Annual percentage change for the average consumer in the cost of acquiring a basket of goods and services derived from consumer prices index	-
Developed	Dummy variable equal to 1 if the Country belongs to European Union being here considered as developed and 0 if it rather belongs to Latin America, being these countries seen as developing economies	+

3.2. Empirical Strategy

Because there are important discrepancies in countries' structures, the OLS estimator is biased and inconsistent (Verbeek, 2014). Given that, to take into account unobserved individual effects, both Random (RE) and Fixed Effects (FE) models can be used as better alternatives, as supported by Wooldridge (2011). The baseline equation is then specified as:

$$\ln(\mathrm{GDPpc}_{i,t}) = \alpha + \beta Corr_{i,t-1} + \delta_i + \mu_t + \varepsilon_{i,t} \qquad (1)$$

Where GDPpc represents the income of a person in country i at time t, Corr says respect to the corruption measure, and ε_{it} is the error term which represents everything that is not explained by the model. To provide a more intuitive interpretation of the estimation results, the dependent variable was converted into a logarithmic form. Furthermore, given the suspicion of endogeneity problems caused by potential interactions of corruption with GDP per capita or other time-variant effects (Méndez and Sepúlveda, 2006; Kéïta, 2019; Moiseev et. Al (2020)), the corruption variable was considered in the period previous to the period of GDP. This is possible only because it is assumed that corruption takes time to affect GDP and it does not change significantly in the short run, e.g., corruption levels in year t-1 are similar to the ones in year t. Also, as stated before this model considers the unobserved specific temporal effects of each country, denoted by δ_i. Since probably some of the factors that affect economic growth might be fixed over time, the FE model might be more appropriate to use over RE. Panel data fixed effects estimators are then used to control for the time-invariable confounding such as religion, culture, and institutions' heterogeneity across Countries. This regression also takes into account countries' specific time shocks such as crisis, wars, or natural disasters, here denoted by μ_t.

The model was also further extended to include some control variables that potentially confound the relationship between corruption and GDP per capita, represented by vectors $X1'_{it}$ and $X2'_{it}$ in equation (2). Vector X1 includes socio-Demographic variables such as *Educ* (in the logarithm form) and *Density*. Vector X2 includes both Growth variables, in particular *Savings*, *Capital* (in logarithm), *Labour* and *Tech*; and Macroeconomic variables such as *Gov*, *Trade,* and

Inflation. To minimize endogeneity problems the variables included in vector X2 were lagged one period (except savings rate which was assumed as exogenous in this model). This model is represented in equation 2.

$$\ln(\mathrm{GDPpc}_{i,t}) = \beta Corr_{i,t-1} + X1_{i,t}\gamma_1 + X1_{i,t}\gamma_2 + \delta_i + \mu_t + \varepsilon_{i,t} \quad (2)$$

To test the second hypothesis i.e., to see if there is any difference in the economic effect generated by the increase in corruption perceived by individuals, three approaches have been proposed. The first one consisted of performing the same regression on a sample of EU countries. The second strategy involved gathering all the countries into a unique sample and introducing to equation (2) a new variable *Developed*. This new variable was then multiplied by our variable of interest (*Corr*) to provide an estimation of the differences in the marginal effect of corruption in economic performance between the developing economies and the Developed Countries, being this term presented by *Int*. This approach was more appealing relative to the first one because it was possible to directly compare the results of the two groups of countries and their significance. Finally, the last approach was similar to the second, but instead, the model was estimated by panel data random effects. This change was made to retain the effects of the characteristics that remain constant over the studying period for each Country, in particular, the country's degree of development (that would otherwise be dropped from the regression in the Fixed effects model). Although this approach ignores countries' characteristics, for this specific hypothesis, this loss might be a fair price to pay to include the constant effects that the previous approach ignores. This new regression is represented in equation 3.

$$\ln(\mathrm{GDPpc}_{i,t}) = \beta Corr_{i,t-1} + \varphi \mathrm{Int}_{i,t-1} + \vartheta \mathrm{Developed} + \sum \mathrm{Xi'}_{i,t}\gamma + \delta_i + \mu_t + \varepsilon_{i,t} \quad (3)$$

To make sure that the standard errors from the estimated regression did not suffer from heteroscedasticity problems the models were estimated using standard errors clustered by Countries.

4. Results

4.1. Corruption linkage to GDP per capita

Table 1 shows the estimation results of the proposed regressions after controlling for unobserved time-invariant country-specific features that the cross-sectional model ignores. To choose between the Fixed and Random effects it was performed a Hausman test in order to understand whether the difference in coefficients was systematic or not. As these factors were found to be correlated with some of the regression variables, the FE estimation was used instead of RE estimation.

Column 1 reports the simple effect of corruption on real GDP per capita. The estimated parameter indicates that an increase in a country's perceived level of corruption, i.e., lower CPI, has a positive marginal effect on the citizens' income however this impact does not seem to gather much explanatory power. In this sense, the model was further developed in order to include some control variables: demographic variables, growth variables, and macroeconomic variables[4]. Besides that, given the suspicion of endogeneity problems between corruption and GDP, which could lead to biased results, the variable Corr was also lagged by one period. Here the corruption coefficient has instead a negative sign but becomes statistically significant at a confidence level of 1%. In particular, following the estimation results from this last model, it is possible to find that a one-index-point increase in the perceived level of corruption implies an average decrease of 0,3% in GDP per capita in the following year ceteris paribus. This result might also indicate that corruption does not immediately impact economic growth but rather takes time to be incorporated into the economic performance.

Thus, the first hypothesis of this study is validated, confirming the conjecture about the detrimental impact of corruption on a Country's per capita economic development. It is however important to notice that these results might not be very accurate due to the limited size of countries and periods.

[4] For further information on the variables, see the methodological section of this paper.

Table 1: Estimation results

	Model 1	Model 2	Model 3	Model 4	Model 5
Corr	0.001	-0.003***	-0.003*	-0.005**	-0.007***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Int				0.002	0.004
				(0.003)	(0.003)
Developed					0.995***
					(0.229)
Educ		0.006	0.057	0.063	0.029
		(0.033)	(0.052)	(0.048)	(0.063)
Density		0.004	-0.001***	-0.001***	-0.000**
		(0.003)	(0.000)	(0.000)	(0.000)
Savings		0.002**	0.181**	0.002	0.003
		(0.001)	(0.083)	(0.004)	(0.004)
Capital		0.017	0.249***	0.211***	0.189***
		(0.057)	(0.054)	(0.036)	(0.044)
Tech		0.000	-0.038*	-0.048**	-0.024
		(0.048)	(0.021)	(0.020)	(0.021)
Labour		-0.003	0.016***	0.011***	0.011***
		(0.002)	(0.004)	(0.004)	(0.004)
Gov		-0.028	0.915***	0.675***	0.734***
		(0.256)	(0.264)	(0.177)	(0.185)
Trade		0.004***	-0.001	0.001	0.003
		(0.001)	(0.006)	(0.004)	(0.004)
Inflation		-0.002***	-0.008	-0.006**	-0.005**
		(0.000)	(0.005)	(0.002)	(0.002)
N	204	43	151	194	194
R2	0.327	0.971	0.881	0.841	

Notes: The Dependent Variable is the natural logarithm of GDP per capita. Summary statistics are presented in Table 1. *Educ,* and *Capital* are represented in the logarithmic form. The variables *Capital*, *Tech*, *Labour*, *Gov*, *Trade,* and *Inflation* are lagged one period in relation to the dependent variable as the *Corr* variable. Each model includes fixed and time period effects except for the last model which instead assumes random country effects. Models 1 and 2 uses just as a sample the countries of LAC countries, model 3 just the EU sub-sample, and models 4 and 5 uses both the samples Clustered Countries standard errors are reported in parentheses, *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

4.2. Developing vs Developed Economies

In order to understand if the negative impact of corruption on growth diverges among developed and developing economies, model (2) was re-estimated using instead the EU sub-sample. The results from the first strategy are reported in column 3 and they suggest that all the remaining factors being held constant the increase in corruption decreases EU citizens income by 0,3% being this measure also statistically significant, as for LAC countries. It is however important to remember that it is not possible to directly compare these results since they refer to two different regressions. Given this limitation, the second approach used in this paper consisted of instead including in the model the variable Developed and an interaction term between this dummy variable and Corr, here presented by Int. According to the estimated results, it is possible to infer that corruption still negatively impacts per capita LAC countries' GDP, and at the outset, there are no significant differences in this corruption economic effect among developing and developed nations. Because model 4 ignores the dummy variable Developed as an explanatory variable because within regressions treat this variable as a 'fixed effect' and drop it from the calculation, it was not possible to get the estimations for the differences in per capita income growth among the different groups in model 4. In this sense and for the purpose of the second hypothesis, random effects might be a more attractive and appropriate strategy to find the general differential impact of corruption on growth. With this model, the non-existence of differences in corruption economic effects among developed and developing countries remains. Furthermore, it is possible to see an evident difference in EU and LAC's income per capita which corroborates the initial classification of the two groups. In particular, Europe has on average a higher GDP per capita of 0,995pp relative to Latin America, mutatis mutandis.

In this model as in the previous one the estimated coefficients, the control variables have the expected sign although Educ and Savings do not seem to be statistically significant for any of the confidence levels presented. Also, Tech, although not significant in the last model, does not have the expected sign, which may be related to the fact that this indicator might not be the best proxy for the country's technology level or might take more time to positively impact economic growth.

5. Conclusion

Fighting corruption and knowing its sources and effects on the economy is an important issue that has gained relevance around the economic circles in recent years. Currently, the unprecedented COVID-19 relief package, the huge influx of cash flows, the medical supply shortages, and the widespread vaccinations and treatments raised to foster sustainable growth across the region, create jobs, and fight the impacts of the COVID-19 pandemic create a more fertile ground for fraud and corruption. The economic impact of this potential increase in corruption is still a matter of doubt on the part of researchers. In particular, literature presents two contradicting theories regarding the effects of corruption variation in economic growth: the "grease the wheels" and the "sand the wheels" hypotheses. This ambiguity might be associated with the sample of countries used in studies, the different control variables included by researchers, and the econometric models applied to study this relationship.

Given this fact, this work sought to re-studying this relationship using for this purpose two sets of countries with different levels of development. According to the results obtained in this research, it is evidenced that the increase in the level of perceived country's corruption is detrimental to individuals' income growth. This appears to happen since market mechanisms cannot work properly without a rule of law, and so, governments need to guarantee proper legal enforcement, which also includes having control over the corruption level that exists in the country (Méndez-Picazo, 2012). In addition, this study also aimed to understand if there are significant differences in the economic effect of changes in corruption between countries with different levels of development. The results indicate that the reduction of corruption appears to have similar effects on economic growth in developed and developing countries. So, it is possible to infer that the implementation of anti-corruption policies has similar relevance and effect on both European countries and Latin American countries.

Although these results appear to be appealing, this analysis comes with caveats and so it is important to briefly mention what are probably the most severe problems in this work. First, there are probably corruption measurement biases since CPI may not reflect in countries' scores of criminal acts or even institutional

weaknesses since its calculation results from surveys aimed at country experts and business leaders. Moreover, the proceeds of corruption often delay appearing in the CPI table because corruption schemes involving high-powered individuals or large amounts of money nearly always extend across multiple jurisdictions (Transparency International, 2021). Also, according to Pelizzo et al. (2017) since CPI is a subjective measure of corruption it is more accurate when corruption is less prevalent than otherwise. Williams and Siddique (2008) also questioned the use of this variable because the number of countries covered by the index has increased over time and so this could disturb the continuity of the index. Second, this work used a very rudimentary method to deal with endogeneity problems, and therefore, since reverse causality problems are a complex problem to solve, there is a high probability that the model presented misspecification problems. In these models, it was also not considering the possible causality between corruption and the control variables (human capital, government size, and investment) in the model, as it neglected the nonlinearities of corruption on economic growth. Finally, since economic growth appears to be much more volatile than the level of corruption in the short term it would be important in the future to recreate this work using a sample with a longer time horizon

Despite these obstacles, the results seem to provide important insights to policymakers. In particular, the results of this paper indicate that the fight against corruption can play a fundamental role in stimulating economies, at least in the short term. In particular governments of LAC countries should invest in anti-corruption policies to enhance economic growth and, given the current economic conjuncture, it is believed that exists an even greater need to combat corruption to ensure proper economic growth to unbridle the countries' economic potential and to counteract the negative effects of the humanitarian and viral crisis experienced in the economy, especially in countries with higher levels of corruption. This work also suggests some other vehicles which could be used by governments to sustain growth. On the one hand, governments might ease economic growth through the improvement of labour skills due to its education policies and the generation of knowledge externalities and economies of scale. Besides, governments play a critical role in designing measures to stimulate

income savings and investment through the introduction of taxation policies. Future research should incorporate the econometric limitations of this work and also deepen the dilemmas and trade-offs existing in the formulation of anti-corruption policies, how they may vary according to the degree of development of the countries and which are the best practices that may be applied to curb corruption in situations of humanitarian crisis.

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