



## Corruption, competitiveness and economic growth: evidence from Latin American and Caribbean countries 2004-2017

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*Corrupción, competitividad y crecimiento económico: evidencia de los países de Latinoamérica y el Caribe 2004-2017*

*Corrupção, competitividade e crescimento econômico: evidências de países latino-americanos e caribenhos 2004-2017*

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*The generally accepted idea is that corruption is an unethical behavior that breaks legitimate and socially accepted norms, harming social well-being. The aim of this paper is to analyze the evolution and determine the structural relationships between competitiveness, economic growth and corruption perception in a sample of 20 Latin American and Caribbean countries from 2004 to 2017, using correlation and performance analysis. Findings show that there has been a short advance against corruption during this period. Although most of the countries increased their competitive score, GDP growth decreased considerably. Mixed evidence appeared on the correlation between corruption, competitiveness and economic growth.*

*La idea generalmente aceptada es que la corrupción es un comportamiento antiético que rompe las normas legítimas y socialmente aceptadas, afectando el bienestar social. El objetivo de este artículo es analizar la evolución y determinar las relaciones estructurales entre la competitividad, el crecimiento económico y la percepción de la corrupción en una muestra de 20 países de América Latina y el Caribe de 2004 a 2017, mediante análisis de correlación y desempeño. Los hallazgos muestran que se han presentado pequeños avances contra la corrupción en este periodo. Aunque la mayoría de los países mejoró su posición competitiva, el crecimiento del PIB se redujo considerablemente. Se encontraron evidencias ambiguas sobre la correlación entre corrupción, competitividad y crecimiento económico.*

*A idéia geralmente aceita é que a corrupção é um comportamento antiético que quebra normas legítimas e socialmente aceitas, prejudicando o bem-estar social. O objetivo deste artigo é analisar a evolução e determinar as relações estruturais entre competitividade, crescimento econômico e percepção de corrupção em uma amostra de 20 países da América Latina e do Caribe de 2004 a 2017, utilizando correlação e análise de desempenho. Os resultados mostram que houve um pequeno avanço contra a corrupção durante este período. Embora a maioria dos países tem aumentado a sua pontuação competitiva, o crescimento do PIB diminuiu consideravelmente. Evidências mistas apareceram na correlação entre corrupção, competitividade e crescimento econômico.*

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## 1. Introduction

Corruption is a worldwide phenomenon that has negative consequences both at individual and aggregate levels. The World Bank (2003, p. 112) has stated that it is *“the single greatest obstacle to economic and social development”* with a large impact on less developed countries. According to the World Economic Forum (2017) estimate, 2 trillion USD are wasted at the global level every year, a shocking amount that could wipe out hunger (116 billion USD), provide basic education to all children in the planet (26 billion USD), eradicate malaria (8,5 billion USD) and bridge the global infrastructure gap (1 trillion USD). Although Latin America and the Caribbean have made great efforts in the battle against corruption, the region continues showing poor effective results (Transparency International, 2018a).

From an economic point of view, corruption leads to resource misallocation in two ways (Aahmad, Ullah and Arfeen, 2012): first, it results in sub-optimal choices on public budgets because of the inclusion of potential “corruption payments” as a decision criterion, where corruption incomes for the public servants prevail over their social value. Second, it changes private assessments of investments by distorting relative prices of goods, services and factors of production.

Empirical research has shown that corruption discourages local and foreign investment, reduces productivity and thus lowers economic growth (Acemoglu and Verdier, 1998; Baena, 2012; Assiotis and Sylwester 2014). Besides, the high incidence of corruption has a strong correlation with a country’s overall competitiveness (Corpart, 2012; Chim-Miki and Domareski-Ruiz, 2018; Saputra, 2019).

The main purpose of this paper is to analyze the evolution and determine the long-term relationships between competitiveness, economic growth and corruption in a representative sample of 20 Latin American and Caribbean countries during the 2004-2017 period, using correlation and performance analysis. As structural variables, they are relatively stable through time and therefore data and analysis can be considered valid. The remainder of the paper is organized as follows: in Section 2 a theoretical background on the definition of corruption and its relationship with competitiveness and economic growth is presented; Section 3 presents the methodology and data sources; Section 4 analyzes the performance and correlations between those variables; Section 5 concludes.

**KEYWORDS**  
**Corruption, competitiveness, economic growth, Latin America and Caribbean.**

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**PALABRAS CLAVE**  
**Corrupción, competitividad, crecimiento económico, América Latina y el Caribe**

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**PALAVRAS-CHAVE**  
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## 2. Theoretical Framework

### 2.1. On the concept of corruption

Corruption is a very complex phenomenon with no univocal definition, it has multiple causes, effects, forms and functions in different contexts (Bardhan, 1997; Pritchett and Kaugmann, 1998; La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1999; Rose-Ackerman and Palifka, 2016; Azevedo, Gonçalves, Lima, Cavalcante and da Silva, 2018), in a wide range that goes from an illegal payment to the structural malfunction of a political and economic system, i.e., it is a cultural and individual moral problem and at the same time an endemic issue of a whole nation, a negative practice, an unethical behavior that breaks legitimate and socially accepted norms, harming social well-being (Aahmad, Ullah and Arfeen, 2012; Cárdenas, García and Salas, 2018; Dimant and Tosato, 2018; Prasad, Martins da Silva and Nickow, 2019).

In this study, we use the approach of Transparency International (2017) in which corruption is defined as *“the abuse of entrusted power for private gain”*. This organization classifies three types of corruption, depending on the sector where it occurs and the amount of money implied: (i) petty corruption, related to apparently minor abuse by low- and mid-level public servants, (ii) political corruption, which consists on a manipulation of rules, policies and institutions by political decision makers in order to sustain wealth and power, and (iii) grand corruption, which is committed by top leaders of the government, distorting policies and functioning of the state.

Transparency International developed the Corruption Perceptions Index (CPI) in 1995, as a composite indicator that measures perceptions of corruption in the public sector around the world, drawing upon 13 different sources that reflect the assessment of experts and business managers on behaviors such as bribery, diversion of public funds, use of public office for private gain, nepotism and state capture.

Each of these sources is standardized in order to convert all the data points to a 0 - 100 scale, where 0 is the maximum level of perceived corruption and 100 the minimum perceived corruption value. A country's CPI is the simple average of all rescaled scores, reported alongside a standard error and 90 per cent confidence interval (Transparency International, 2018b).

### 2.2. On the relationship among corruption, competitiveness and economic growth

A rich debate among two opposite points of view has characterized the theoretical and the empirical literature on the economic impact of corruption during the last three decades. On one hand, corruption at any degree is considered harmful for an economy because it distorts government goals and deviates public resources to private interests, increasing public administration costs and bureaucratic processes, slowing down public works, degrading human capital, promoting social discomfort and generating a problematic business climate that discourages domestic and foreign investment, with a negative impact on economic growth and competitiveness (Krueger, 1974; Myrdal, 1989; Shleifer and Vishny, 1993; Mauro, 1995, 1998; Tanzi, 1998; Woodside, Chang and Cheng, 2012; Hakimi and Hamdi, 2017; Giordano and Lopez-Garcia, 2018; Lim, 2019).

On the other hand, certain degrees of corruption are considered favorable to promote GDP growth: in an ill-functioning economy affected by pervasive and inefficient regulations along with increased and dis-

torted transaction costs, variables such as bribery may help to reduce rigidities which constrain economic processes at a relative low cost, improving efficiency of production and fostering economic growth, especially in less developed countries (Anh, Minh and Tran-Nam, 2016; Kalyuzhnova and Belitski, 2019).

In this sense, a given level of corruption may help to get a "second best" solution, supporting economic growth in economies that suffer market failures and in presence of incomplete contracts (Lui, 1985; Acemoglu and Verdier, 1998, 2000; Anechiarico, 2010; Paul, 2010; Swaleheen, 2011; Abotsi, 2018). A particular example was given by Heckelman and Powell (2010) who showed that corruption enhanced GDP growth in cases economic freedoms were most limited, considering the Economic Freedom Index. Other authors as Aidt, Dutta and Sena (2008) propose that in highly accountable political regimes corruption has a negative impact on economic growth, while it has low or no impact under limited accountability regimes. Although some of these arguments may sound plausible at a first glance, they have been refuted both theoretically and empirically (Mauro, 1995; Barreto, 1996; Tanzi, 1998; Obamuyi and Olayiwola, 2019).

Aliyu (2009) states that an emerging consensus raised in which corruption is considered to have a detrimental impact on economy and society. Empirical research has consistently found a robust negative relationship between level of corruption and economic growth (Sachs and Warner, 1997; Hall and Jones, 1999; Treisman, 2000; Mo, 2001; Pellegrini and Gerlagh, 2004; Méon and Sekkat, 2005; Hodge, Shankar, Rao and Duhs, 2011; Dridi, 2013; Cooray and Schneider, 2018; Pirtea, Sipos and Ionescu, 2019).

Corruption is negatively correlated with domestic and foreign direct investment, affecting GDP growth (Mauro, 1995, 1996; Li, Colin and Zou, 2000; Belgibayeva and Plekhanov, 2019) Particularly, bureaucratic malpractice generates a bias in the composition of public budgets by allocating resources on low-productivity investments at the expense of giving up value-enhancing projects (1983; Tanzi and Davoodi, 1997; Le and Sakchutchawan, 2018; Onrubia, Perez and Sanchez-Fuentes, 2019).

Ades and Di Tella (1997) found a disturbing two-way causal relationship between corruption level and economic growth, stating that bureaucratic rent-seeking not only influences, but is also influenced by a country's level of development. This conclusion is supported by Treisman (2000) who found empirical evidence that concludes that from 50% to 73% of variations in corruption indices were explained by variations in per capita income levels, i.e., low-income countries are generally rated as having more corruption than high-income countries, creating a self-reinforcing vicious circle.

Given the fact that competitiveness is created and highly influenced by institutions, policies and public investments, corruption has a major impact on it by affecting a nation's economic performance, prosperity, wellness and standards of living (Mauro, 1995; Tanzi and Davoodi, 1998; Samanta and Sanyal, 2010; Smith, Gruben Johnson and Smith, 2013; Ulman, 2013, 2014; Castro-Gonzales, Espina and Tinoco-Egas, 2017; Bologna, 2018; Li, An, Xu and Balamoune-Lutz, 2018).

Based on Porter's (1998) work, the World Economic Forum defines competitiveness as "*the set of institutions, policies, and factors that determine the level of productivity of a country, which in turn sets the level of prosperity that the country can earn*" (World Economic Forum – WEF, 2015, p. 4). In turn, productivity determines the levels of return earned by investments, which defines production decisions and the overall GDP growth rate (Fischer, 1993; Romer, 1994; Barro and Sala-i-Martin, 1995; Sala-i-Martin, 1996; Alesina, Spolaore and Enrico, 1998; Lucas, 1988; Podobnik, Horvatic, Kenett and Stanley, 2012 Schwab, 2012; Amir, Danziger and Levi, 2019; Mohammad and Hulya, 2019).

The Global Competitiveness Index, published by the World Economic Forum, identifies 12 variables that explain competitiveness, where the first pillar, “institutions”, includes a specific subsection on “ethics and corruption”, that evaluates “diversion of public funds”, “public trust in politicians” and “irregular payments and bribes”; in fact, corruption appears as one of the largest prevailing problematic factors for doing business in developing countries such as those in Latin America and Caribbean region (World Economic Forum, 2017b).

Corruption has a negative impact on a nation’s competitiveness level by reducing financial investments, economic growth and socially beneficial public expenditure, sending wrong market incentives and leading to a sub-optimal national resources allocation (Tanzi, 1998; Wilson, 2006; Curtis, Rhoades and Griffin, 2013; Huang, 2016; Kordalska and Olczyk, 2016; Cieřlik and Goczek, 2018; Sharma and Mitra, 2019).

According to Samanta and Sanyal (2010), the competitive status of a country is hurt when bribery is part of the prevailing culture of doing business. Corruption creates additional costs of doing business, decreases profitability of investments, enlarges uncertainty regarding future overall economic, social and political conditions and thus discourages foreign investment, resulting in lower competitiveness levels (Herciu, 2006; Khan, 2012; Curtis, Rhoades and Griffin, 2013; Cieslik and Goczek, 2018; Brada, Drabek, Mendez and Perez, 2019).

Based on this theoretical framework, the initial hypothesis of the authors is that higher corruption perception levels should be correlated in the long term with lower economic growth and competitiveness in Latin American and Caribbean countries, i. e., a positive correlation between real GDP growth, competitiveness and transparency is expected.

### 3. Methodology

In the first stage, data sources were established and the validity of data was confirmed. Information was organized in terms of time series at three different levels: individual countries, subgroups of countries and Latin America and Caribbean region as a whole. A representative sample of countries that represents 99,3% of the region’s total GDP (International Monetary Fund, 2018) was chosen based on the availability of information for the 2004-2017 period; Cuba and Haiti could not be included due to a lack of information. Other countries were not considered formally to be Latin American, as French Guiana, Guadalupe, Martinique, Puerto Rico, Saint Barthélemy and Saint Martin.

Indicators used in this research were: (i) for competitiveness, index of competitiveness published by the World Economic Forum (2017b); (ii) for economic performance, historical series of rates of change in real gross domestic product published by the International Monetary Fund (2018); and (iii) for corruption, the Corruption Perceptions Index (CPI) published by Transparency International (2017c).

Cluster analysis tests were performed in the second stage for the three variables under study, establishing data ranges and quintiles, in order to rank countries in five categories: very low, low, intermediate, high and very high positions. Comparative position matrices were built for each variable.

In the third phase, six linear correlations between competitiveness, economic growth and corruption were calculated for each country in the sample, based on time series (2004-2017) and among the three variables.

Afterwards, the fourth phase consisted in determining linear correlation coefficients in terms of groups of countries, which were determined based on two criteria: (i) three sub-regions: Mexico, Central America and Caribbean; Andean countries and MERCOSUR plus Chile; and (ii) four groups in terms of size of economies: large, medium, small Central American and Caribbean, and small South American, as follows:

*(i) Sub-regions:*

- Mexico, Central America and Caribbean countries: Costa Rica (CRI), Dominican Republic (DOM), El Salvador (SLV), Guatemala (GTM), Honduras (HND), Jamaica (JAM), Mexico (MEX), Nicaragua (NIC), Panama (PAN), Trinidad and Tobago (TTO).
- Andean countries: Bolivia (BOL), Colombia (COL), Ecuador (ECU), Peru (PER), Venezuela (VEN).
- MERCOSUR plus Chile: Argentina (ARG), Brazil (BRA), Chile (CHL), Paraguay (PRY), Uruguay (URY).

*(ii) Size of economies:*

- Large: Brazil, Mexico.
- Medium: Argentina, Chile, Colombia, Peru, Venezuela.
- Central America and Caribbean small size economies: Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Trinidad and Tobago.
- South America small size economies: Bolivia, Ecuador, Paraguay, Uruguay.

In the last stage, coefficients of linear correlation for the time-series and the three variables under study were calculated for Latin America and Caribbean as a whole.

## 4. Results and Discussion

The following tables show the results of the performance and correlation analysis; each country is identified with the correspondent ISO 3166 three-letter code.

**Tables 1 and 2** compare the score in the Competitiveness Index in 2004 and 2017 for each country. Chile remains as the most competitive economy in the region, although its score reduced from 5,01 to 4,71. Costa Rica, Mexico and Panama keep their position among the high-competitive economies and all of them increased their score. Other countries that showed progress in their competitiveness score are Colombia (3,84 – 4,29), Jamaica (3,82 – 4,25), Peru (3,78 – 4,22) and Guatemala (3,38 – 4,08), ranking into the intermediate level on 2017.

While Paraguay was the least competitive country in the region for 2004, for 2017 is Venezuela, with a decreasing score from 3,30 in 2004 to 3,23 in 2017. Among the group of very low and low competitive countries in 2004 and 2017 are Paraguay, Venezuela, Honduras, Ecuador, Bolivia and Argentina.

**Table 1 – Competitiveness index. Latin American and Caribbean countries 2004-2017**

2004				2017						
Cluster	Country	Competitiveness	Average	Cluster	Country	Competitiveness	Average			
Very high	CHL	5,01	5,01	Very high	CHL	4,71	4,71			
High	MEX	4,17	4,09	High	CRI	4,50	4,46			
	CRI	4,12			MEX	4,44				
	TTO	4,12			PAN	4,44				
	SLV	4,10			COL	4,29				
	URY	4,08		JAM	4,25					
	BRA	4,05		PER	4,22					
	PAN	4,01		URY	4,15					
Intermediate	COL	3,84	3,81	Intermediate	BRA	4,14	4,17			
	JAM	3,82			TTO	4,09				
	PER	3,78			GTM	4,08				
	DOM	3,63			ARG	3,95				
Low	ARG	3,54	3,59		Low	NIC		3,95	3,92	
	VEN	3,30				HND		3,92		
Very low	ECU	3,18	3,17			ECU		3,91		3,57
	NIC	3,12				DOM		3,87		
	HND	3,10		SLV		3,77				
	BOL	3,09		PRY	3,71					
	PRY	2,99		VEN	3,23					
						BOL*	-			

Source: World Economic Forum (2018b).

\* Competitiveness on Bolivia was not published by the World Economic Forum for 2017.

It is relevant to notice that 17 out of 20 countries in the sample increased their competitive score (except Chile, Trinidad and Tobago, and El Salvador), with outstanding percentage increases in the competitiveness index in Nicaragua (26,6%), Honduras (26,5%), Ecuador (23,0%) and Guatemala (20,7%).

The Latin American and Caribbean region increased its competitiveness score in 9,8% during the period, the most salient percentage increase was for the South American small economies (17,6%), while large economies showed the shortest percentage increase (4,4%). When analyzing these results, it is important to take into account that a condition of statistical rebound may be present, that explains how

when comparative conditions are referred to low levels of an indicator, the potential for improvement tends to be faster and may be achieved with relative easier efforts.

**Table 2 – Comparative matrix competitiveness rankings. Latin American and Caribbean countries 2004-2017**

Year		2017				
		Very low	Low	Intermediate	High	Very high
2004	Very low	↑ BOL* ↑ PRY ↓ VEN	↑ ECU ↑ HND ↑ NIC	↑ GTM		
	Low		↑ ARG ↑ DOM			
	Intermediate			↑ COL ↑ JAM ↑ PER		
	High	↓ SLV		↑ BRA ↓ TTO ↑ URY	↑ CRI ↑ MEX ↑ PAN	
	Very high					↓ CHL

Notes: ↓ decreasing score from 2004 to 2017; ↑ increasing score; = keeping same score.  
\* Competitiveness on Bolivia was not published for 2017, therefore the table shows score on 2016.

As it is shown in **Tables 3 and 4**, the most shocking result is that Venezuela had the highest economic growth (18,29%) in the region in 2004, but the lowest (-14%) in 2017, a fact that evidences not just the impact of low oil price but its serious social and political crisis. The second worst case is Trinidad and Tobago, that went from a 7,95% growth in 2004 to a -2,60% growth in 2017, with the drop in international oil prices as the main explanation.



Table 3 – Economic growth. Latin American and Caribbean countries 2004-2017

2004				2017			
Cluster	Country	Econ. Growth	Average	Cluster	Country	Econ. Growth	Average
Very high	VEN	18,29	18,29	Very High	PAN	5,40	5,40
High	ARG	9,03	7,98	High	NIC	4,90	4,56
	ECU	8,21			HND	4,80	
	TTO	7,95			DOM	4,60	
	PAN	7,52			PRY	4,30	
	CHL	7,21			BOL	4,20	
Intermediate	HND	6,23	5,43	Intermediate	CRI	3,20	2,80
	BRA	5,76			URY	3,10	
	COL	5,33			ARG	2,90	
	NIC	5,31			GTM	2,80	
	URY	5,00			ECU	2,70	
	PER	4,96			PER	2,50	
Low	CRI	4,34	4,22	Low	SLV	2,40	1,77
	MEX	4,30			MEX	2,00	
	BOL	4,17			COL	1,80	
	PRY	4,06			CHL	1,50	
Very low	GTM	3,15	1,91	Very Low	BRA	1,00	1,00
	SLV	1,85			JAM	1,00	
	JAM	1,32		Contraction	TTO	-2,60	-8,30
	DOM	1,31			VEN	-14,00	

Source: International Monetary Fund (2018).

Argentina and Ecuador had high GDP growth rates at 2004, but it was considerable slower for 2017, a year in which Panama and Nicaragua were the fastest-growing economies. Jamaica is the only country that remains in the very-low-growth zone for both starting and final year of the time series.

A clear downturn in the business cycle was observable: the simple average GDP growth for the overall Latin American and Caribbean region in 2004 was 5,77%, while it decreased to 1,93% in 2017. Just four out of 20 economies showed a larger growth (Bolivia, Dominican Republic, El Salvador and Paraguay), while the remaining 16 had lower growth rates in 2017.

Table 4 – Latin American countries 2004-2017: Comparative matrix economic growth

Year		2017				
		Very low	Low	Intermediate	High	Very high
2004	Very low	↓ JAM		↑ GTM ↑ SLV	↑ DOM	
	Low		↓ MEX	↓ CRI	↑ BOL ↑ PRY	
	Intermediate	↓ BRA	↓ COL	↓ PER ↓ URY	↓ HND ↓ NIC	
	High		↓ CHL	↓ ARG ↓ ECU		↓ PAN
	Very high	↓ TTO ↓ VEN				

Notes: ↓ decreasing growth rate from 2004 to 2017; ↑ increasing growth rate; = keeping same growth rate.

The Corruption Perceptions Index (CPI) published by Transparency International was used to evaluate the perceived level of corruption for each country in the sample. A lower CPI score indicates lower transparency, i.e., a worse situation. Although Latin American and the Caribbean region suffers a considerable corruption problem, no country in the world is free of this scourge: for 2017, the best-ranked countries were New Zealand (CPI=89) and Denmark (CPI=88).

At the same time, more than two thirds of countries had a score of 50 points or less, with a global average of 43 points, and despite efforts around the world, it seems that little progress has been made (Transparency International, 2018c).

Table 5 – Corruption perceptions index (CPI). Latin American and Caribbean countries 2004-2017

2004				2017			
Cluster	Country	CPI	Average	Cluster	Country	CPI	Average
Very high	PRY	19	19,00	Very high	VEN	18	18,00
High	BOL	22	24,38	High	NIC	26	28,33
	GTM	22			GTM	28	
	HND	23			DOM	29	
	VEN	23			HND	29	
	ECU	24			MEX	29	
	ARG	25			PRY	29	
	NIC	27			Intermediate	ECU	
	DOM	29		BOL		33	
Intermediate	JAM	33	36,33	Low	SLV	33	32,67
	PER	35			BRA	37	
	MEX	36			COL	37	
	PAN	37			PAN	37	
	COL	38			PER	37	
	BRA	39			ARG	39	
Low	SLV	42	44,33	Very low	JAM	44	38,50
	TTO	42			CRI	59	
	CRI	49			CHL	67	
Very low	URY	62	68,00	Very low	TTO	70	66,50
	CHL	74			URY	70	

Source: Transparency International (2018c).

CPI captures the assessment of experts and business executives on public sector behaviors such as bribery, diversion of public funds, use of public office for private gain, nepotism and state capture, as well as procedures to prevent corruption including government's ability to enforce integrity mechanisms, effective prosecution of corrupt officials, red tape and excessive bureaucratic burden, adequate laws on financial disclosure, conflict of interest prevention and access to information, and legal protection for whistleblowers, journalists and investigators (Transparency International, 2018b).

Tables 5 and 6 show that Paraguay had the highest corruption perception of the region on 2004, while Venezuela does in 2017. Guatemala, Honduras, Nicaragua and Dominican Republic remain in the high-corruption cluster. A change in the CPI from 35 to 39 as simple average for Latin America and the Caribbean shows that the region made a short advance during this period.

Table 6 – Comparative matrix corruption perceptions index (CPI). Latin American and Caribbean countries 2004-2017

Year		2017				
		Very low	Low	Intermediate	High	Very high
2004	Very low	↑ CHL ↓ URY				
	Low	↓ CRI ↓ TTO		↑ SLV		
	Intermediate		↑ BRA ↑ COL ↓ JAM = PAN ↓ PER		↑ MEX	
	High		↓ ARG	↓ BOL ↓ ECU	= DOM ↓ GTM ↓ HND ↑ NIC	↑ VEN
	Very high				↓ PRY	

Notes: ↓ decreasing corruption perception from 2004 to 2017; ↑ increasing corruption perception; = keeping same corruption perception.

Venezuela had the worst CPI behavior, which turned from 23 to 18, what means that transparency decreased by 21,7%, followed by El Salvador (-21,4%), and Mexico (-19,4%). Countries with the largest advance in CPI were Trinidad and Tobago (66,7%), Argentina (56,0%), Paraguay (52,6%) and Bolivia (50,0%). Meanwhile, Chile and Uruguay remain in the very-low corruption perception section, although CPI decreased for Chile (from 74 to 67, equivalent to a 9,5% deterioration) while it increased for Uruguay (from 62 to 70, equivalent to a 12,9% of improvement).

Linear correlation coefficients between the three time-series (GDP growth, competitiveness and corruption index) are shown on Table 7. Due to the limitation concerning degrees of freedom, this study did not incorporate multiple correlation tests.

Table 7 - Linear correlations years vs. Competitiveness, economic growth and corruption index. Latin American and Caribbean countries 2004-2017

Country	Time Series vs. Competitiveness	Time Series vs. Economic Growth	Time Series vs. Corruption Index
ARG	0,31	-0,59	0,91*
BOL	0,71*	0,15	0,87*
BRA	0,45	-0,68*	0,50
CHL	-0,82*	-0,57	-0,54
COL	0,93*	-0,58	-0,51
CRI	0,82*	-0,26	0,83*
DOM	0,70*	-0,06	0,35
ECU	0,86*	-0,51	0,80*
SLV	-0,69*	-0,10	-0,62*
GTM	0,79*	-0,15	0,38
HND	0,65*	-0,33	0,83*
JAM	0,60	-0,00	0,68*
MEX	0,78*	-0,15	-0,66*
NIC	0,93*	0,18	0,27
PAN	0,80*	-0,34	0,59
PRY	0,85*	0,08	0,73*
PER	0,90*	-0,52	0,50
TTO	0,21	-0,76*	0,42
URY	0,53	-0,69*	0,85*
VEN	-0,44	-0,89*	-0,86*

Notes: \* A coefficient equal or higher than 0,6 is considered to have statistical significance with 0,01 of error (18 degrees of freedom).  
Sources: International Monetary Fund (2018); Transparency International (2018c); World Economic Forum (2018).

It can be seen in **Table 7** that 15 out of 20 countries showed a statistical significant correlation between times series and competitiveness, 13 of them had a high positive correlation and just two a strong negative correlation.

Table 8 - Linear correlations among competitiveness, economic growth and corruption index Latin American and Caribbean countries 2004-2017

Country	Competitiveness vs. Corruption Index	Competitiveness vs. Economic Growth	Economic Growth vs. Corruption Index
ARG	0,29	-0,14	-0,56
BOL	0,76*	0,50	0,46
BRA	0,52	-0,01	-0,35
CHL	0,43	0,56	0,78*
COL	-0,58	-0,37	0,07
CRI	0,86*	-0,26	-0,35
DOM	0,18	-0,28	0,14
ECU	0,73*	-0,37	-0,19
SLV	0,43	-0,02	0,48
GTM	0,67*	-0,06	-0,40
HND	0,47	-0,38	-0,12
JAM	0,60*	0,32	0,46
MEX	-0,52	-0,01	-0,04
NIC	0,33	0,22	0,43
PAN	0,35	-0,11	-0,45
PRY	0,69*	0,16	-0,17
PER	0,52	-0,37	-0,47
TTO	0,53	-0,06	-0,27
URY	0,50	-0,18	-0,55
VEN	0,26	0,41	0,83*

Notes: \* A coefficient equal or higher than 0,6 is considered to have statistical significance with 0,01 of error (18 degrees of freedom).

Colombia, Nicaragua and Peru had the strongest positive correlation (0,93, 0,93 and 0,90 respectively) what indicates that their competitiveness has consistently increased through time, while Chile and El Salvador presented a strong negative correlation (-0,82 and -0,69), meaning that their competitive position has eroded constantly during the analyzed time period.

Regarding economic growth, four countries showed significant inverse relationship with time series: Venezuela (-0,89), Trinidad and Tobago (-0,76), Uruguay (-0,69) and Brazil (-0,68). These results indicate that GDP growth has followed a clear declining trend through time. For the remaining countries no statistical significant correlation was found.

A significant positive correlation between time series and corruption level was found for eight countries, led by Argentina with a 0,91 coefficient, meaning that transparency has increased consistently through time. In the other extreme, Venezuela had the highest inverse correlation (-0,86) what implies that corruption has structurally increased over the 2004-2017 period. Mexico and El Salvador also had negative correlation coefficients between time and corruption (-0,66 and -0,62 respectively).

Linear correlations between competitiveness, corruption and economic growth are summarized on **Table 8**. A notorious finding is that no significant correlation was found between competitiveness and GDP growth, although an inverse relationship was present in 14 of the 20 countries analyzed.

Six countries showed a significant correlation between competitiveness and corruption: Costa Rica is the most salient case, with a 0,86 coefficient, meaning that, in average, higher competitiveness scores are accompanied by higher transparency levels. Just in two of the 20 countries under analysis an inverse correlation among competitiveness and transparency was found (Colombia = -0,58 and Mexico = -0,52), what suggests that in some years a better competitive position went together with a higher corruption level.

Chile and Venezuela were the only countries that showed a significant correlation between economic growth and corruption index (0,78 and 0,83) what indicates that higher GDP growth goes along with higher transparency. An interesting finding is that a negative correlation coefficient appeared in 12 out of 20 countries, meaning that lower perceived transparency is accompanied by higher GDP growth, what seems to support the argument explained in section 2.2 according to which certain degrees of corruption may promote economic growth. Nevertheless, such coefficients did not have enough statistical significance, but these results deserve particular attention in future research works.

Finally, linear correlation coefficients based on groups of countries are shown on **Table 9**. As mentioned earlier, these groups were defined by sub-regions and by size of economies. For all sub regions, all size of economies (excepting medium-sized) and considering Latin America and the Caribbean as a whole, a significant positive correlation was found between time series and competitiveness levels, what means that the region seems to show a better competitiveness performance through time.

Table 9 - Sub-regions and size of economies (linear correlations among variables) Latin American and Caribbean group countries &amp; as a whole 2004-2017

Sub-Regions / Size of Economies	Groups	Time Series vs. Competitiveness	Time Series vs. Corruption Index	Time Series vs. Economic Growth	Competitiveness vs. Corruption Index	Competitiveness vs. Economic Growth	Economic Growth vs. Corruption Index
Sub-regions	Mexico-Central America-	0,81*	0,70*	-0,33	0,45	-0,25	-0,24
	Andean Countries	0,80*	0,72*	-0,81*	0,55	-0,46	-0,41
	MERCOSUR + Chile	0,62*	0,90*	-0,54	0,63*	-0,20	-0,48
Size of Economies	Large	0,65*	-0,02	-0,55	0,16	-0,16	-0,04
	Medium Size	0,48	0,09	-0,82*	-0,21	-0,27	0,08
	Small Size, Central America & Caribbean	0,80*	0,76*	-0,35	0,49	-0,27	-0,27
	Small Size, South America	0,86*	0,94*	-0,32	0,88*	-0,08	-0,25
Latin America as a whole		<b>0,80*</b>	<b>0,83*</b>	<b>-0,62*</b>	<b>0,57</b>	<b>-0,40</b>	<b>-0,47</b>

Notes: \* A coefficient equal or higher than 0.6 is considered to have statistical significance with 0.01 of error (18degrees of freedom).

The same trend stands for time series and corruption index: all sub-regions, all small-sized economies and the region as a whole showed a statistical significant positive correlation, meaning that transparency consistently increased during the 2004 - 2017 period. Large countries (Brazil and Mexico) are the exception, showing a -0,02 correlation coefficient between time series and corruption index, but such result lacks significance.



An alarming conclusion from **Table 9** is that for every sub-region and size of economy a negative relationship between time series and economic growth is present, being significant for Andean countries (-0,81), medium-sized economies (-0,82) and the whole region (-0,62). This means that, even taking into account the impact of the global recession, GDP growth of most Latin American and Caribbean countries has consistently decreased during this lapse. No significant correlation was found between economic growth and corruption.

Regarding competitiveness, there was no significant correlation with economic growth at any level, but in general it presented a negative coefficient, a result that must be analyzed. High correlations between competitiveness and corruption index were found for the MERCOSUR + Chile group (0,63) and small-sized South American economies (0,88) meaning that for these countries a better competitive position goes along with higher transparency levels.

Excepting medium-sized economies, all sub-regions and size of economies showed the same positive correlation, what supports a relevant finding: competitiveness has a strong correlation with transparency for the Latin American and Caribbean countries.

## 5. Conclusions and Final Considerations

Corruption is an omnipresent problem around the world – to a greater or lesser extent – with serious socioeconomic damages. In the case of Latin America and Caribbean countries, there has been a short advance during the 2004-2017 period.

According to the Corruption Perceptions Index, Chile and Uruguay remain in the very-low corruption perception group, while Guatemala, Honduras, Nicaragua and Dominican Republic remain in the high-corruption cluster.

Countries with the most salient advance were Trinidad and Tobago, Argentina, Paraguay and Bolivia, but those with highest deterioration were El Salvador and Mexico. Meanwhile, Venezuela stands as the country with the highest corruption perception in 2017, and is at the same time the less competitive economy and the one with the worst economic performance.

Chile remains as the most competitive economy in the region, despite its decreasing condition in competitiveness level. A positive finding is that most of the countries in this region increased their competitive score (17 out of 20 countries analyzed).

The overall Latin American and Caribbean region increased its competitiveness score in 9,8% from 2004 to 2017. Nevertheless, the representative situation was that GDP growth decreased considerably. Correlation analysis showed that competitiveness levels have consistently increased through time for Colombia, Nicaragua and Peru, while they have decreased significantly for El Salvador and Chile.

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The initial hypothesis was confirmed for Bolivia, Costa Rica, Ecuador, Guatemala, Jamaica and Paraguay, countries that showed a significant positive correlation between competitiveness and transparency, meaning that higher competitiveness scores are accompanied by higher transparency levels. Nevertheless, this correlation coefficient was negative for Colombia and Mexico, suggesting that a stronger competitive position went along with a higher corruption level; although the correlation was not statistically significant, a more detailed research should be made.

An interesting finding is that a negative correlation coefficient between transparency and economic growth appeared in 12 out of 20 countries, meaning that higher perceived corruption was positively correlated to faster GDP growth. This result seems to support the argument by which certain degrees of corruption may promote economic growth. However, none of such coefficients had statistical significance. Chile and Venezuela were the only countries that showed a significant correlation between economic growth and corruption index, indicating that higher GDP is positively correlated with lower corruption levels.

These findings support the need for further research on the transmission mechanisms between corruption problems and economic performance in Latin American and Caribbean countries. In order to understand how to fight corruption and reduce its economic and social pervasive impacts, a deeper understanding on the nature of such phenomena must be carried out by applying transdisciplinary research.

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