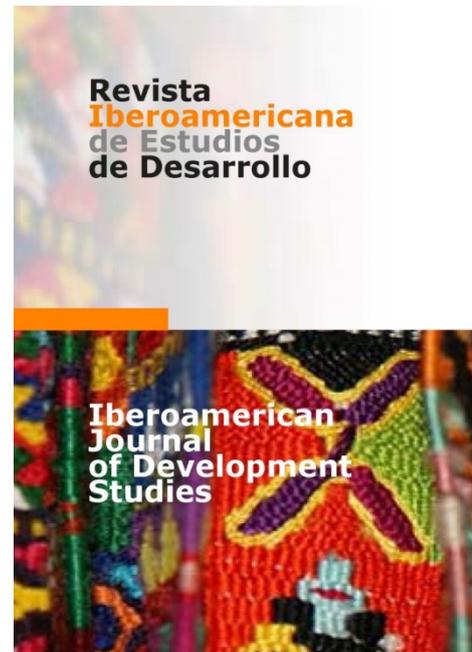


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The relationship between corruption and inequality in Colombia: empirical evidence using panel data for the period 2008-2017*

La relación entre corrupción y desigualdad en Colombia: evidencia empírica con datos de panel para el período 2008-2017

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AbstractResumen

- 1. Introduction**
- 2. Corruption and inequality**
- 3. Data, methodology, and results**
 - 3.1. Data and statistical exploration of the data**
 - 3.2. Results**
 - 3.2.1. Unit root tests**
 - 3.2.2. Panel cointegration tests**
 - 3.2.3. Estimation: equation-regression**
 - 3.2.4. Estimation: panel FMOLS**
- 4. Conclusions and recommendations**
- 5. References**

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Abstract

In this paper, we use annual data from 2008 to 2017 for 24 departments of Colombia, including Bogota DC, to study the relationships between Corruption and inequality. The econometric results obtained with the Pedroni methodology (1995, 2001) indicate a positive correlation between corruption and the GINI. This result coincides with the findings of various authors who argue that increases in the level of fraud or low institutional quality result in increased social class inequality. On the other hand, there is a positive and statistically significant relationship between the GINI, unemployment, informality and per capita GDP, while education has a negative impact on income inequality.

Keywords: corruption, GINI, inequality, cointegration.

Resumen

En este documento, utilizamos datos anuales de 2008 a 2017 para 24 departamentos de Colombia, incluida Bogotá DC, para estudiar las relaciones entre la corrupción y la desigualdad. Los resultados econométricos obtenidos con la metodología Pedroni (1995, 2001) indican una correlación positiva entre la corrupción y el GINI. Este resultado coincide con los hallazgos de varios autores que argumentan que los aumentos en el nivel de fraude o la baja calidad institucional ofrecen una mayor desigualdad en la clase social. Por otro lado, existe una relación positiva y estadísticamente significativa entre el GINI, el desempleo, la informalidad y el PIB per cápita, mientras que la educación posee un impacto negativo en la desigualdad de ingresos.

Palabras clave: corrupción, GINI, desigualdad, cointegración.

Introduction

Despite the broad repertoire of literature available today on the relationship between inequality and corruption, no definitive consensus has yet been achieved as to the degree of association that these variables have with political, economic, social and cultural factors that distinguish and characterize countries in general (Pedauga, Pedauga & Delgado-Márquez 2017).

While it is true that corruption can provide income advantages to individuals holding power (Ariely & Uslaner 2017, Rothstein & Uslaner 2005), it may also lead to the application of specific redistributive policies that tend to reduce inequality (Alesina & Angeletos 2005).

In the United States, Africa, and some European countries, studies have found a positive relationship between corruption and inequality (Apergis, Dincer & Payne 2010, Dincer & Gunalp 2008, Gyimah-Brempong & Munoz 2006). However, the Andres and Ramlogan-Dobson (2011) study shows that in Latin America increments in the level of corruption relate to decreases in inequality. This result, according to the authors, is associated with the bulk of informality that characterizes these countries.¹

In any case, corruption, understood as the abuser of the public office for private gain (Blackburn, Bose & Haque 2006), originates through different channels and has both microeconomic and macroeconomic effects (Gupta, Davoodi & Alonso-Terme 2002). Heidenheimer, Johnston and Le Vine (1989) and Li, Xu and Zou (2000) argue that corruption increases income inequality across multiple channels. It manages to do this firstly, to the extent that corruption decreases economic growth and the incomes of the poor are affected on a larger scale than those of the rich and this, of course, leads to an increase in income inequality and poverty. Secondly, corruption leads to biases in the tax system in favor of the rich, making the tax system effectively a regressive one, and leads to a higher tax burden on the poor.

¹ Informality is said to generate less inequality because an individual involved in informality generates income rather than being in the cohort of unemployed, which in some way produces a redistribution in the income of the poor (Andres & Ramlogan-Dobson 2011).

From a microeconomic point of view, one can identify what happens here and measure its effect, when public officials take advantage of their position, to receive money, for example, in return for a good or service. Such transactions involve an irregular economic benefit that extends to both parties. Wage differences are the result of additional injections in expected income, and under normal conditions since when corruption does occur, both parties receive benefits that are not represented in official government accounts.

From a macroeconomic angle, the problem appears when continuing acts of corruption generate a misalignment in public-finance (fiscal deficits) that they may force the state to take austere measures in compensation. Such actions may affect public spending in education and health (human capital) and lead to a decline in aggregate demand, GDP, and as a result, there is apt to be a further increase in inequality (Cano 2014).

These two analyses deserve special treatment; however, this research focuses on measuring the relationship between corruption and the level of income inequality for Colombia and this reason, an econometric analysis was performed based on the Pedroni Test (1995, 2001). There is a limitation by the small sample used (ten years), a situation that can not only produce errors in the estimators, but also may limit and skew the analysis of stationarity and cointegration of the series. However, ten years is the maximum availability of data for Colombia, and there are others Pedroni studies that they use less or the same amount of both, periods and observations.

The paper divides into five sections including the introduction. The second part is a general review of studies that address the relationship between inequality and corruption. In the third section, it is summarized the source of the data while, in the fourth part, it is examined the methodology and econometric results. Finally, the conclusions, recommendations, and references are presented.

2

Corruption and inequality

The argument that generally prevails in most studies is that higher levels of corruption lead to an increase in inequality. However, there are other studies that argue that a high level of inequality is conducive to corruption.

In any case, we must not ignore that disproportionate increases in income generate increases in inequality and therefore encourage the breakdown of the material and normative means that govern a society. Nor can we ignore that a society with high levels of corruption will be relatively poorer and will be more prone to be deprived of basic public services such as education and healthcare.

The relationship between inequality and corruption has not been rigorously theorized and, in the empirical studies that have sought to capture the degree of association between these two variables, different positions are observed. For example, Chong and Gradstein (2007) and Fakir *et al.* (2017) establish a positive and double causal correlation between corruption (poor institutional) and inequality.

According to Rothstein and Uslaner (2005), corruption affects similarly to an extra tax on citizens. This *extra tax* can in return, reinforce socio-economic inequality, not unlike a cost to citizens whose interests are not represented in works or projects designed to decrease economic inequality. Corruption accentuates inequality and inefficiency in the provision of public services, encourages the plunder of natural resources and generates widespread mistrust (Warf 2016).

Based on low institutional quality and the perception of high levels of corruption, Ariely and Uslaner (2017) and Chong and Calderón (2000) indicate high levels of income inequality. In contrast, Li *et al.* (2000) find that inequality is low when corruption levels are too high or too low, while inequality is high when corruption is at medium levels.

On the other hand, Wong (2016) finds that, when corruption takes the form of buying votes, it can at least under certain conditions decrease levels of inequality by creating redistributive channels. In addition, the study by Andres and Ramlogan-Dobson (2011) shows that, in Latin America, increases in the level of corruption are related to decreases in inequality.

The evidence shows that for poor countries institutional quality is positively related to income inequality, but for rich countries institutional quality is negatively related to income distribution (Chong & Calderón 2000). According to Fakir *et al.* (2017), factors

associated with low institutional quality play a principal role in determining high levels of inequality.

The highest levels of corruption occur in poor countries, with centralist systems, high levels of literacy, violence and low levels of press freedom. In contrast, the lowest levels of corruption are found in rich, democratic countries and high levels of literacy and press freedom (Warf 2016).

In the research of Pedauga *et al.* (2017), it is concluded that corruption increases income inequality in Latin America and therefore improvements in mechanisms and policies that control corruption should bring positive results in the fight against inequality. In the case of the United States, Apergis *et al.* (2010) find that there is a positive relationship between corruption and income inequality. In addition, inequality is positively related to unemployment and negatively related to the level of income, education and unionization ratios.

Interestingly, Tanzi (1998) points out that there are many factors that have a bearing on corruption, including the incomes of congressmen, politicians and public servants, in that better-paid officials are less apt to be corrupt.

On the other hand, with a sample of 129 countries, You and Khagram (2005) find that income inequality increases the level of corruption because the poor not only have access to fewer monitoring mechanisms, but they also tend to become accustomed to and legitimize corruption. Likewise, Rothstein and Uslaner (2005) observe that inequality provides incentives to those willing to violate property rights; for example, political, regulatory and legal institutions can be subverted to favor one's own interests.

In Latin America, in a study conducted by Gyimah-Brempong & Munoz (2006), it is established that a 10 % decrease in corruption increases the growth rate of income by about 2.6 % and has a statistical impact on income distribution. In the same way, Dobson and Ramlogan-Dobson (2012) find that the marginal impact of corruption becomes negative once the informal sector becomes large. On the contrary, the Andres and Ramlogan-Dobson (2011) study show that in Latin America increments in the level of corruption relate to decreases in inequality.

In Colombia, Revéz (2016) states that the causal relationship of inequality and corruption is related to the neoliberal model. In that model, the state plays a dominant role in

capturing and managing resources, allowing it to establish a system in which corruption can thrive. Under that system, the institutions of the state can easily be put at the service of large financial, economic and political groups (in what Revéiz calls «mesocontrato»). And, as may be expected, his shady alliance between money and politics impedes the functioning of democracy and free economic competition and is one of the main causes of inequality (Revéiz 2016). The concept of «mesocontrato» developed by Revéiz (2016) holds that corruption affects inequality since it redistributes income in favor of certain groups.

Also, at the national level, it is estimated that corruption, administrative failures of the State and the waste of resources are in the order of 3.0-3.5 % (Garay 2003, p. 16). Pérez and Da Silva (2015) show that corruption is an obstacle to democratic quality and has negative correlations with governance indicators. Likewise, Ribón (2015) shows that public social spending and the index of human development adjusted by inequality have a stable long-term relationship since they are cause and effect and are cointegrated.

In short, corruption tends to be profoundly inequitable and anti-democratic and taints the perceptions of citizens while increasing social exclusion, creating, for example, obstacles to accessing public services (Cardona, Gómez & Duque 2016, Garay 2003, Pérez & Da Silva 2015, Ribón 2015).

At the regional and local level, Langbein and Sanabria (2013) find significant differences in the level of corruption in different Colombian cities. Local governments have a significant impact on poverty alleviation: greater risk of corruption and inefficiency in spending on health and education increases municipal poverty and, on the contrary, transparent management, on the other hand, can reduce corruption (Cano 2014).

3

Data, methodology, and results

3.1. Data and statistical exploration of the data

We use annual data from 2008 to 2017 for 24 departments of Colombia, including Bogota. Corruption is measured by the number of people who were convicted of crimes related to corruption in a specific year. This indicator presents information about the penal

sanctions imposed in the national territory for crimes against the public administration associated with corruption. Its calculation is based exclusively on the records of the Accusatory Oral Criminal System (SPOA) of the Office of the Attorney General of the Nation (FGN), which in turn depart from the typified conducts (crimes) in Law 599 of 2000, Penal Code. The data is obtained from the Observatory on Transparency and Corruption of the Presidency of Colombia.² In the case of inequality, the recognized index or coefficient of GINI was taken as an evaluation measure. As additional control variables, educational attainment, GDP per capita, informality and the unemployment rate were included.

The calculation of economic inequality within a population measures the way in which the income (or expense) of the different economic agents is distributed amongst each other (Banerjee 2014, Lyon, Cheung & Gastwirth 2016, Modalsli 2015, Ourti & Clarke 2011, Tillé & Langel 2012, Yitzhaki & Schechtman 2005). The indicator of inequality is constructed based on the observations of income or expenditure of each of the agents, households or persons analyzed (Jiménez 2015, Medina 2001).

In this regard, Kuznets and Jenks (1953) emphasize that inequality must refer exclusively to the difference in income between population groups, without bearing in mind the desirability or undesirability of such a system a scheme. This is, the only thing relevant here is the numerical value that the variable represents for each person (Anand & Kanbur 1993). For their part, Dasgupta, Sen and Starrett (1973) center the concept of inequality on the differences that exist between certain groups within the population with respect to their ability to acquire the most basic elements of a dignified life (Sen 1973).

Atkinson (1970) offers new concepts and measures regarding inequality; he thinks the mere existence of income and wealth disparities does not constitute an adequate basis for making claims regarding the justice and injustice of the system; in his view, it is necessary

² The Transparency and Anticorruption Observatory is a tool for the measurement and analysis of the phenomenon of corruption, based on the interaction between entities, citizens, and public and private organizations of the national and territorial order, to help raise the level of transparency in public management.

The work of the Observatory revolves around three axes: *a)* analyze and make visible indicators on transparency and anti-corruption, *b)* provide tools for the promotion of transparency and the fight against corruption, and *c)* provide spaces for dialogue between citizens, Academia and public servants.

to compare individuals (referenced by Ferreira & Peragine 2015). And finally, Professor Kolm (1976) draws attention to the way in which inequality is measured, mainly because of the divergence in measurement results for some countries, by finding opposite results to those expected (Gradín & Ríó 2001).

Either way, the measurement of inequality within a population is obtained mainly by calculating the GINI coefficient, based on the Lorenz curve, which is a cumulative frequency curve that compares the distribution of a variable (specific income) with a uniform distribution representing inequality. By comparing the line of complete equity with the area of the Lorenz curve, one can draw an inequity coefficient where 0 is perfect equality and 1 is perfect inequality (Banerjee 2014, Jiménez 2015, Lyon *et al.* 2016, Medina 2001, Modalsli 2015, Ourti & Clarke 2011, Tillé & Langel 2012, Yitzhaki & Schechtman 2005).

The data that measure the income inequality (GINI coefficient), the achievement of education by level, the level of informality, the unemployment rate and the GDP per capita come from the National Department of Statistics (DANE).

In the present study, it is used the GINI index as a dependent variable while including independent variables related to corruption, unemployment, informality, average education coverage and GDP per capita. The data is a panel type for 24 Colombian departments.

The complete list of variables, the fundamental statistical summary, Table 1 and the descriptive analysis of the variables are presented below.

Variable	Mean	Standard Deviation	Minimum	Maximum
Y	0.51	0.04	0.43	0.619
X1	0.77	0.72	0	3.65
X2	0.1	0.03	0.06	0.22
X3	0.29	0.08	0.13	0.5
X4	0.38	0.09	0.18	0.55
X5	16.17	0.47	15.1	17.61

Y: departmental GINI coefficient, DANE.

X1: penal sanctions for every 100,000 people, transparency and anticorruption observatory.

X2: percentage of unemployment, DANE.

X3: informality (subjective underemployment), DANE.

X4: index of coverage of secondary education, Ministry of National Education.

X5: natural logarithm of GDP per capita, DANE.

Source: own calculations.

The GINI index of the 24 departments studied has an average of 0.51. It is noteworthy that, in the study period, it shows a progressive decrease. Cundinamarca, Meta, Caquetá, and Atlántico enjoy low levels of inequality. However, some departments of western Colombia (Chocó, Cauca, Huila, and Antioquia) have relatively high levels of inequality. The lowest GINI index is that of Cundinamarca (0.43 in 2015) while in Chocó it exceeds 0.6 in 2015.

In relation to the corruption variable, it is notable that departments of the Caribbean region such as Bolívar, César, La Guajira, Atlántico, and Córdoba that are frequently related to corruption issues present low levels of criminal sanctions. In contrast, the departments of the Andean region, among others, Santander, Quindío, Caldas, Risaralda, Meta, and Tolima have relatively high rates of sanctions.

The departments of the Andean region Nariño, Valle del Cauca, Quindío, Risaralda, Tolima, and Norte de Santander have the highest unemployment rates as well as have a relatively high proportion of criminal sanctions.

The departments of Sucre, Tolima, Valle del Cauca, Cauca, Huila, Cundinamarca, and Quindío have high rates of informality and, similarly, have high rates of criminal sanctions.

The index of coverage of secondary education notes that the peripheral departments of Nariño, La Guajira, Caquetá, and Chocó have serious lags in educational coverage, unlike the departments of the central region, that enjoy relatively high levels of coverage.

Finally, the natural logarithm of departmental GDP per capita shows large income differences between the Colombian departments and regions. In general terms, the central departments and those that have oil resources are the richest of the country. In contrast, the departments of the Pacific along with some Caribbean departments have the lowest income levels.

3.2. Results

Our empirical analysis begins with the unitary root test for the data panel and the search for the cointegration vector following the Pedroni methodology, until the end with the estimation of the cointegration equation under the fully modified ordinary least squares method (FMOLS) of Phillips and Hansen (1990).

3.2.1. Unit root tests

Consider the following equation:

$$Y_{it} = P_i Y_{it-1} + \delta_i X_{it} + U_{it} \quad (1)$$

where $i = 1, \dots, N$ for each department of Colombia; $t = 1, \dots, T$ for each period; X_{it} represents the exogenous variables of the model; P_i are the autoregressive coefficients and ε_{it} are the terms stationary errors. If $P_i < 1$, Y_{it} is considered a weak stationary trend; on the other hand, if $P_i = 1$, Y_{it} , it has a unit root, that is, a non-stationarity situation.

To determine the necessary transformations to correctly treat the data, it has been decided to do the Augmented Dickey-Fuller (ADF) test in levels and in first differences.

The ADF test can be written as follows:

$$Y_{it} = P_i Y_{it-1} + \sum_{j=1}^{P_i} \varphi_{it} \varepsilon_{it-j} + \delta_i X_{it} + U_{it} \quad (2)$$

where P_i represents the number of lags in the ADF regression, the null hypothesis is that each series in the panel contains a unit root ($H_0 : P_i = 1 \forall_i$). The alternative hypothesis is that at least one of the individual series of the panel is stationary ($H_1 : P_i < 1$).

Variable	P-value
Y	0
$d2(Y)$	0
$X1$	1

$d1(X1)$	0
$X2$	0
$d1(X2)$	0
$X3$	0.99
$d1(X3)$	0
$X4$	1
$d1(x4)$	0
$X5$	1
$d2(x5)$	0

Table 2

Unitary root tests, departments 2008-2017

Source: own calculations.

In short, Table 2 shows that the variables are not stationary in levels, except for GINI and unemployment, while they are stationary in differences (first or second differences). Therefore, this research will work with the differences to avoid problems of spurious regressions and predictions of low quality.

3.2.2. Panel cointegration tests

The heterogeneous panel cointegration test advanced by Pedroni (1995, 2001) allows for cross-section interdependence with different individual effects. They are specified as follows:

$$Y_{it} = \alpha_i + \delta_i t + \sum_{j=1}^5 \theta_{ji} x_{it} + \varepsilon_{it} \quad (3)$$

where $i = 1, \dots, N$ for each department of Colombia; $t = 1, \dots, T$ for each period. The parameters α_i y δ_i allow the possibility of including fixed effects and deterministic trends by the department, respectively; ε_{it} are estimated residuals that represent the deviation of long-

term relationships. If $P_i = 1$, Y_{it} considered that there is no cointegration (null hypothesis), but if the opposite, $P_i = 1$, Y_{it} , it has a unit root, that is, a non-stationarity situation.

Within dimension test statistics		Between dimension test statistics	
Panel PP-statistic	-3.22 ^a	Group PP-statistic	-2.68 ^a
Panel ADF-statistic	-9.55 ^a	Group ADF-statistic	-10.83 ^a

Note: the critical value denoted by «a» is 1 %.

Table 3

Panel cointegration tests: Departamental, 2008-2017

Source: own calculations.

As a result, four of the seven statisticians reject the null hypothesis of non-cointegration with a level of significance of 99 %.³

3.2.3. Estimation: equation-regression

The estimation of the effects that corruption and control variables generate on income inequality was made based on Equation 4. In it, the dependent variable is the GINI coefficient, which has regressors shaped by corruption, unemployment, informality, coverage in education and the Gross Domestic Product Per capita γ indexes the coefficients to estimate and ξ represents the term of error. The estimated GINI equation is presented in the next estimation.

$$Gini = \gamma_0 + \gamma_1 Corrup + \gamma_2 Desem + \gamma_3 Infor + \gamma_4 Edu + \gamma_5 lngdp + \xi \quad (4)$$

³ The co-integration panel of Pedroni (1995, 2001) based on within dimension approach includes four statistics: panel v, panel p, panel PP and panel ADF. These statisticians group show the autoregressive coefficients through unit root tests on the estimated residuals taking into account common time and heterogeneity factors across the states. The group based on the dimension approach includes three statistics: group p, group PP and group ADF. These statistics lie in the averages of the autoregressive coefficients associated with the unit root tests of the residuals for each state of the panel. Both tests are asymptotically distributed with the normal standard deviation (Apergis *et al.* 2010).

3.2.4. Estimation: panel FMOLS

The estimated coefficients for each variable in Table 4 are 99 % significant. As one would expect, corruption has a positive impact on inequality, that is, higher levels of corruption are associated with higher levels of inequality.

This result affirms that corruption is playing the role of an «extra tax on the population» affects an array of government programs, including the efficiency in the provision of public services (Rothstein & Uslaner 2005, Warf 2016), as well as surveillance mechanisms. And inefficiency can, in turn, generate a vicious circle between corruption and inequality (You & Khagram 2005). In the Colombian case, it seems evident that corruption and inequality go hand in hand (Apergis *et al.* 2010, Chong & Calderón 2000, Chong & Gradstein 2007, Fakir *et al.* 2017, Pedauga *et al.* 2017, Revéiz 2016).

In relation to the control variables, education, as would be expected, negatively impacts the level of inequality, while unemployment and informality have a positive impact on the GINI index. However, it is striking that higher levels of GDP per capita are associated with high levels of inequality.

$Y = 0,0069(X1) + 1,1773(X2) + 0,2507(X3) - 0,8074(X4) + 0,0384 (X5)$
t-Stat. (6.4) (73.51) (23.01) (-57.48) (171.37)
Prob. (0.00) (0.00) (0.00) (0.00) (0.00)
$R^2 \text{ adjusted} = 0.97$

Table 4

Panel FMOLS long-run estimates: Departmental, Colombia, 2008-2017

Source: own calculations.⁴

4

Conclusions and recommendations

⁴ Panel method: grouped estimation, long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth), Durbin-Watson stat: 2.44; long run variance: 1, 03E-06.

The econometric results obtained with the Pedroni methodology indicate a positive relationship between corruption and the GINI. This result is consistent with the findings of most other studies that signal the negative effect that corruption has on the efficient provision of public services.

Likewise, there is a positive and statistically significant impact between the GINI, unemployment, informality, and GDP per capita, while a negative impact is observed with education.

High levels of unemployment and informality increase the level of inequality since the scarcity of formal employment tend to force a considerable proportion into poverty.

An inverse relationship between inequality and education reflects the importance of continuing to invest in this education as a means of fighting inequality. The positive coefficient of the logarithm of GDP per capita is not surprising; it is well known that the high concentration of the production of goods and services by the departments of greater economic power suggests that, in Colombia, the Kuznets Curve does not apply, at least according to panel data taken for this period.

The corruption index used in this study (departmental penal sanctions for one hundred thousand inhabitants) shows some biases since departments of the Caribbean region, such as Bolívar, César, Guajira, Atlántico, and Córdoba, that are frequently related to corruption issues, presenting low levels of criminal sanctions.

An important point worth noting is that due to the information limitations that were presented, given that the Observatory of Transparency and Corruption of the Presidency of the Republic of Colombia began to operate in January 2012, the sample with which work for this study only takes ten years. It is expected that in the next few years a larger sample size will be available.

In any case, this apparent restriction does not diminish the weight of the findings that were found in the study, given that a panel of data involving 24 departments of the country is being worked on, which adds a total of 240 observations, that according to Banerjee (1999), the estimates obtained with the FMOLS or DOLS methods are asymptotically equivalent for more than 60 observations. Additionally, it is worth noting that for more than a decade have proliferated a number of investigations that have used the Pedroni methodology with smaller samples and have obtained excellent estimates. See, for example, Kwabena Gyimah-

Brempong (2002), «Corruption, economic growth, and income inequality in Africa», *Econ. Gov.* (2002) 3:183-209; Nicholas Apergis, James E. Payne (2008), «Energy consumption and economic growth in Central America: Evidence from a panel cointegration and error correction model», *Energy Economics*; Tomoko Tamakoshi and Shigeyuki Hamori (2015), «Health-care expenditure, GDP and share of the elderly in Japan: a panel cointegration analysis», *Applied Economics Letters*; Seow Eng Ong, Lan Yuan Lim, Shi-Ming Yu and Amy Khor (2011), «Do Financial and Institutional Variables Enhance the Impact of Remittances on Economic Growth in Latin America and the Caribbean? A Panel Cointegration Analysis», *International Advances in Economic Research*, among others.

Taking into consideration the inherent limitations of these results, the following recommendations can be made:

- The results of this research and review of the literature suggest an important conclusion: those most affected by corruption are the poor and most vulnerable. It may, therefore, be important to think in terms of an establishing a national program, involving the different levels of government, to combat corruption, decrease the misuse and inefficient use of public resources and ensure a more progressive fiscal approach.
- Although reducing corruption is easier said than done, policies can be designed and applied to reduce the role of bureaucracy in the allocation of resources; such policies may include price controls, controls over excessive taxation and subsidy programs. In addition, governments could consider creating policies to reduce the reallocation of resources and distribution of state goods and services, in such a way that the resources allocated for each fiscal period are effectively transferred to the most disadvantaged groups, and do not end up in the pockets of the corrupt.
- Coverage in education seems to be a great ally in the fight against inequality; therefore, the main objective should be to ensure equal opportunities through an accessible and quality education. On the other hand, encouraging economic activity and formal employment play fundamental roles in reducing the concentration of income.

- It is important to continue advancing in the compilation and improvement of the departmental corruption indexes, especially in the one related to criminal sanctions, avoiding the high variance that appears between the departments that have a high level of perception and that show a lower value and those that have a lower scale in perception, and yet reflect greater weight. Likewise, given that the corruption perception index contains a stochastic process that produces biases in its construction, the application of multivariate methods is recommended, such as factor analysis or main components for its elaboration. It is understood that to achieve this task, it is necessary to strengthen the institutional channels (control and failure bodies), especially in those departments that have physical, financial, human and institutional limitations, to achieve greater efficiency in the condemns this type of crime and the capture of information.

5

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