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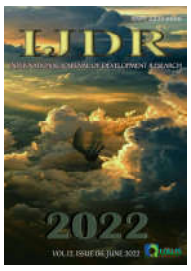

RESEARCH ARTICLE OPEN ACCESS

CONNECTION BETWEEN CORRUPTION AND HOMICIDE RATE: AN EMPIRICAL EVALUATIONFROM LATIN AMERICA

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ABSTRACT

This article investigates the impacts of corruption on total homicide rates and considers random-effect, fixed-effect, and pooled panel data models. The approach shows the impact of the Corruption Perception Index (CPI) proposed by the website "Transparency International" on homicide rates in Latin American countries in the period 2010-2018. In this context, the contribution of this research is to evaluate the impact of corruption on homicide rates, as it is an approach little explored in the literature. Based on different empirical models, the results support the hypothesis that acts of corruption affect homicide rates, even controlling the results for other variables associated with socioeconomic aspects. In a way, there is empirical evidence that the greater the presence of corruption in society, the higher the homicide rate.

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INTRODUCTION

21st century society is witnessing several revolutions that affect numerous sectors of human daily life. Technological evolutions soon become obsolete, and today's certainties need reformulations in a short period of time. In this sense, the improvement of human capital is an essential factor to promote investments in human talent and material resources. Thus, public policies are necessary to maximize the generation and use of these factors effectively and efficiently. However, the use of public policies to minimize the factors that inhibit the growth and development of countries and regions is increasingly demanded. Among the numerous obstacles, homicides, and corruption demand urgent solutions. Homicides produce sadness and difficulties for the victimized families, harming the development of ideas and the social and economic development of society. According to Alves et al. (2017), improving the population's quality of life is an objective of governments whose actions are directly related to economic development, a concrete factor observed in several developed countries. The well-being of families and society requires respect for life.

Basically, it requires successful public security policies so that citizens can develop their social role in harmony and tranquility, in a scenario free of violence. Moraes and Chaves (2020) suggest that public policies aimed at eliminating, or even reducing, violence need to focus on reducing the vulnerabilities of families and society, in addition to significant investments in quality education. However, the cases of violence that have already been identified require the construction of models that point out causes, consequences, solutions and, fundamentally, policies that eliminate or reduce the occurrence of crimes. The research by Andrade-Barbosa et al. (2013) points out that the investigation of crimes by external causes is an essential factor to know the dynamics and trends of this type of crime, as well as the effects of public policies implemented, especially regarding homicides. In addition, corruption is another evil that plagues society. There are numerous damages to the community, which impact education, health, public safety, business development and growth, and other public and private sectors. Rodrigues, Gomes and Teixeira (2020) suggest that a scenario affected by corruption leads to effects that inhibit constitutional applicability, causing damage to society. In this way, corruption negatively impacts economic development and thus, effective public policies are essential to combat this evil. This research discusses the impacts of corruption on total homicide rates in

the period 2010-2018, considering panel data with fixed effect, random effect and pooled for 28 Latin American countries. The dependent variable in this study is the total homicide rate and, among the explanatory variables, the Corruption Perception Index (CPI) proposed by Transparency International is the variable of interest. In this sense, the contribution of this article is due to the investigation into the connection between corruption and homicide, as it is a topic that has been little explored in the literature. The objective of the research is to analyze whether corruption induces increases in the total homicide rate, considering the period analyzed and the empirical models evaluated. The study is divided into five sections. After this brief introduction, we present the literature review in section 2, followed by the third section regarding methodological aspects. Section 4 shows the analysis of the empirical results, followed by final remarks.

LITERATURE REVISION

The literature review covers the first topic on corruption and the second on homicides. The two topics are analyzed separately, as there is little literature on the connection between homicide and corruption.

Corruption: Corruption generates harmful effects in all sectors of society, producing obstacles to the realization of fundamental rights, human development, and economic growth, above all creating distrust for the population, investors, entrepreneurs and all other productive sectors. According to Blanchet and Azoia (2017), corruption produces a scenario of disbelief regarding the realization of rights, especially in the population that lives in a more fragile situation and needs State actions. According to Kurtenbach and Nolte (2017), although Latin America is a pioneer in intergovernmental of anti-corruption treaties, this type of crime is still rooted in the region. However, Chainey, Croci and Rodriguez Forero (2021) suggest that the control of corruption and the effectiveness of State actions can promote the reduction of the homicide rate, a significant fact and observed in a study for Latin American countries. Leal and Moraes (2018) point out that one of the main purposes of the State is to guarantee the exercise of fundamental rights, especially those that demand spending and investments, as they can be interrupted due to the diversion of funds to fuel corruption, directly affecting the effectiveness of those rights. These deviations jeopardize the efficiency of sectoral policies, especially health, education, security, and social actions. According to Lopes and Toyoshima (2013) health and education services suffer negatively from the impacts of corruption and this evil needs to be widely fought to enhance the quality of resource management in these areas. Corruption is a global problem that requires robust actions, with the participation of the whole society to find diversified strategies that build democratic, broad and effective solutions. Fraiha (2014) argues that media credibility, interest in politics and an education level higher enhance the perception of corruption. Enikolopov, Petrova and Sonin (2018) argue that social media can improve the quality of governance, even in locations that have limited political competition and various levels of corruption.

According to Zhang, Cao, and Vaughn (2009), democracy promotes human development, strengthening social support for the well-being of society and, consequently, reduces the level of corruption in a country. Moraes, Santos, and Torrecillas (2014) suggest that the application of investments that provide improvements in the quality of democracy can produce effects in reducing the degree of corruption in political and social institutions. Gomes and Oliveira (2018) highlight that the concept of sustainable development has been evolving in recent years, expanding the field of action, and reaching other parts of society in a multidisciplinary way, thus collaborating as a new instrument to fight corruption. Nasreen et al. (2016), using time series data in the period 1980-2013 for a study in Pakistan, point out the direct impact on environmental degradation, in the long term, caused by the combined effect of corruption and income inequality. According to Golden and Mahdavi (2015), the evaluation of the costs of corruption is interesting for academic studies and, additionally, can be important to promote the reduction of this type of crime. Tanzi (1998) argues that fighting corruption can be costly and can still be dependent on state reforms and if these are not carried out, problems may continue even if other actions are taken. However, reducing the costs of fighting corruption are necessary to improve growth and development indicators, fostering credibility with the population. Silva, Santos, and Ribeiro (2019) argue that the reduction of inequality can be achieved with the control of corruption, that is, the reduction of non-collective interests. According to Lambsdorff (2007) corruption can impact and be impacted by scenarios with low GDP, income inequality and high crime rates. Lučić, Radišić and Dobromirov (2016), studying the causality between corruption and the level of GDP, suggest the existence of a period of 6 to 10 years for changes in Gross Domestic Product to produce impacts on levels of corruption and vice versa. Ildirar and Iscan (2015) add that corruption has harmful effects on the quality of public services offered by governments, especially those demanded by the poorest population. According to Randrianantenaina and Kaisy (2021), in a study that analyzes corruption in Madagascar, the reduction in public spending on basic social services is the main vector of transmission between corruption and income inequality. Stokhof (2018) suggests a direct relationship between corruption and income inequality and, in addition, the impact of this first variable on the second seems to happen to a lesser extent due to increases of government spending, based on panel data for 19 countries in the period 1984-2012. Table 1 shows the CPI (Corruption Perception Index) of Latin American countries in 2020 and the position of each according to the level of perception of corruption in the public sector, considering 180 countries/territories worldwide.

Table 1. Country with the respective CPI and its position according to the index

Country	CPI	Ranking
Argentina	42	78
Bahamas	63	30
Barbados	64	29
Bolivia	31	124
Brazil	38	94
Chile	67	25
Colombia	39	92
Costa Rica	57	42
Cuba	47	63
Dominican Republic	55	48
El Salvador	36	104
Ecuador	39	92
Guatemala	25	149
Guyana	41	83
Honduras	24	157
Jamaica	44	69
Mexico	31	124
Nicaragua	22	159
Panama	35	111
Paraguay	28	137
Peru	38	94
Dominican Republic	28	137
Saint Lucia	56	45
Suriname	38	94
Trinidad and Tobago	40	86
Uruguay	71	21
Venezuela	15	176

Source: Table prepared by the authors, data from Transparency International (2020)

Homicides: Cases of violence are reported daily in the various media and produce insecurity and concern for the population. Pequeno (2016) argues that visibility and measurability are characteristics acquired by violence due to global disclosure. Paula (2010) points out that urban violence occurs in different social spaces. However, Miguel (2015) points out the reduced amount of space for promoting debates on violence with a policy-related approach. Fortunato (2009) argues that violence has great impact on the morbidity and mortality of populations, thus representing a relevant public health problem. Crime has severe impacts on human development, economic growth, and the well-being of society as a whole. The scenarios of instability and uncertainty created by criminal actions require immediate

strategies and solutions, in fact, lives and talents are lost and families suffer from these losses. Therefore, the investigation into the motivation and dynamics of the occurrence of crimes is an important factor to clarify crimes and carry out arrests. Analyzing the rationality in the execution of the crime is also an essential factor to be considered, because according to Becker (1968), the author of the crime performs an analysis of the costs and benefits to decide on the commission of the criminal action. The model proposed by the author considers the following expressions:

Based on Becker (1968),$H_i = H_i\,(O_i)$, (1)

such that $H'_i = \frac{\delta H_i}{\delta O_i} > 0$ (2)

where $H_i$represents the damage for the*i-th*infringing activity and O_i, the level of this activity.

The construction of the model considers the belief that various members of society are affected by the losses of crime, which produces motivation to restrict criminal activity. According to Becker (1968), the level of criminal activity tends to increase the amount of damage and of social value of the offender's gain, that is:

$G = G(0)$ (3)

and $G' = \frac{\delta G}{\delta O} > 0$ (4)

Additionally, with the practice of an additional criminal action, D (0) = H (0) - G (0) represents the damage to society. Furthermore, the offender's marginal gain decrease, while the marginal social loss increase. We also have that, $D" = H" - G" > 0$, where G represents the offender's gain and D, the social damage. Notice that the greater the specialization of services and equipment intended to combat crimes, the greater the effectiveness and efficiency in solving crimes and arresting offenders. In this way, the following functions are stated:

$C = C(A)$ (5)

and,

$C' = \frac{\delta C}{\delta A} > 0$ (6)

where, C represents the State Costs and,

$A = f(m, r, c)$, (7)

It is important to emphasize that police rigging policies are necessary for the success of actions to combat crime. Sachsida, Mendonça and Moreira (2015) highlight the Brazilian states that were successful in reducing homicide rates and that implemented, within the list of strategies, the number of police officers. Nery and Nadanovsky (2020) add that to reduce crimes of serious potential, specifically homicides, there is a need to produce joint action strategies between civil society and the State, among them, the reduction of impunity. Pickering (2010) argues that factors that lead the criminal to commit the crime are not unique and differences can be evidenced in the profile of the actions and the perpetrators of the crime. Mendonça, Loureiro and Sachsida (2003) illustrate that criminals convicted of more serious crimes in relation to violence present motivational differences when compared to prisoners convicted of other crimes. In addition, it is essential to adopt policies that promote the collective well-being of society, offering quality education and reducing social and economic inequalities so that there is a healthy environment and good neighborhoods that contribute to the development of being. The work by Loureiro et al. (2009) cites that the probability of committing a violent crime by a person who has been raised in an environment guided by good neighbors is lower. In this sense, it is necessary to develop policies that contribute to the growth of the school scenario, the stage for reflections and solutions to the problems that arise in society. According to Szadkoski (2010), the school is a microstructural mirror of the crises faced by the social environment. Using fixed-effect panel data, Furqan, and Mahmood (2020) found that education and the homicide rate have an inverse relationship and add that education is a contributing factor to the formation of a more ethical being, who avoids illegal activities. Still according to the authors, the homicide rate has an inverse relationship with GDP per capita and a direct relationship with unemployment. Goha, Kaliappan and Ishak, (2018), based on a dynamic panel (GMM), show a direct relationship in the association between crime and income inequality and, in addition, the model proposed by Loureiro, Moreira and Ellery (2017) points to results significant and a positive relationship between Gini coefficient and homicide rate. Hart (2015) argues that although income inequality, democracy and organized crime are important factors in determining some variations in homicide rates, they are not successful in explaining the patterns of this occurrence across countries. The study by Ervilha and Lima (2019) uses fixed-effect panel data to analyze the determinants of crime in municipalities in Minas Gerais, Brazil, and observe that gaps in the labor market can exacerbate crime in the state. Moreno and Saucedo (2020), based on panel data for 32 states in Mexico in the period 2010-2016, find an inverse relationship between crime and employment in the studied locations, especially for micro and small companies. Regateiro et al. (2021) assess crime in the state of Pará in the period 2017-2019 and find that a huge number of municipalities in Pará have low crime rates. However, those that are highlighted in the ranking with the highest rates show a reduction in occupancy rates for work, in addition to precarious conditions of basic sanitation.

Shahid (2020) uses panel data for the period 1995-2016 for 16 Latin American countries and finds that employment generation policies and controls on weapons and alcohol consumption, within other possibilities, are actions that can prevent the youth involvement in violent crime. Oberwittler (2019) argues that an economic system with characteristics of social injustice, generating poverty and income inequality, and also with reduced governmental legitimacy, among others, is an important factor in producing impacts on homicide rates. Baier (2015), considering a scenario that facilitates corruption, shows a positive and significant impact of this variable on homicide rates, based on a study carried out in Mexico, in the period 1930-1990. Lakhani and Willman (2014) study the pattern of crime and violence in Papua New Guinea and the analysis of available data suggests that crime is more concentrated in urban areas, where property crimes with the use of violence prevail, while in rural areas are more associated with interpersonal conflicts. Da Mata et al. (2007), research homicides in 123 Brazilian cities between 1970 and 2000, find that local homicide rates negatively affect city growth rates. Maertens and Anstey (2007) add that property crime data are less reliable for research when compared to homicide rates, due to the variability of reporting rates that occur between jurisdictions and in terms of time. Berg and Carranza (2015), in a study on crime prevention in Honduras, show that although there is an interaction of several factors that increase the risks of violent crimes, drug consumption, the presence of firearms and inaccessibility to high school impact in unemployment, poverty and urbanization that, consequently, favor the creation of scenarios conducive to the emergence of violence.

METHODOLOGY

Kauark, Manhães and Medeiros (2010) argue that quantifiable analysis that uses statistical resources and techniques, including regression analysis, characterizes quantitative research, which in this study uses the inductive method to approach the subject. According to Marconi and Lakatos (2017), this method is more comprehensive in approaching phenomena, as it seeks to arrive at general laws and theories based on findings. The objective of the research is descriptive and according to Gil (2008), the description of the characteristic of a phenomenon or the determination of the relations between the studied variables represents the main objective of this type of study. This section is divided into two subsections. Subsection 3.1 presents the

sources and definitions of the data used in this research and section 3.2 shows the econometric model considered.

Data base: In this work, we are interested in analyzing the impact of Corruption Perception Indices (CPI), proposed by Transparency International, on total homicide rates, using an analysis with panel data with fixed, random, and pooled effects, for the period 2010-2018, in Latin American countries, with the variables indicated in Table 2 and listed in the econometric model presented in subsection 3.2.

According to Wooldridge (2011), the classic panel data approach is to verify whether or not the individual component (α) is correlated with some regressor. In the first case, the model must be estimated through the application of an estimator called fixed effect. In the second case, the most appropriate is to estimate the model by random effect. To verify which of the two hypotheses is the best one, the Hausman test is used. Still based on Wooldridge (2011), the estimation ofH_{it}depends on the assumptions that are made about the intercept, the angular coefficients, and the error term, u_{it}.

Table 2. Sources and definitions of adopted data

Variable*(Nickname)*	Period	Source	Description	Expected sign
Total homicide rate *(Homicide)*	2010-2018	UNODC -United Nations Office on Drugs and Crime)	"Number of unlawful deaths inflicted on a person with the intent to cause death or serious injury, expressed per 100,000 people".	
Corruption Perception Index *(CPI)*	2010-2018	Transparency International	Produced since 1995 by Transparency International, the CPI assesses 180 countries and territories and assigns them grades on a scale between 0 (when the country is perceived as highly corrupt) and 100 (when the country is perceived as having very integrity.	Negative
Young people aged between 15 and 29 who do not study or work *(Young).*	2010-2018	UNDP - United Nations Development Program.	Percentage of people in the 15-24 age group who do not work, study, or follow any training.	Positive
Unemployment rate*(Unemployment)*	2010-2018	UNDP/ILO-ILOSTAT	Percentage of the workforce population aged 15 and over who are not in paid or self-employed activity but are available to work and who have taken steps to seek gainful or self-employment.	Positive
Electricity consumption per capita (*Electricity)*	2010-2018	UNDP	Electricity consumption per capita of each country	Positive
urbanization rate (U*rbanization)*	2010-2018	UNDP	Population residing in areas classified as urban according to the criteria used by each country.	Positive
Human inequality coefficient *(Inequality)*	2010-2018	UNDP	Average inequality in the three basic dimensions of human development. Source: Calculated as the arithmetic mean of the values in inequality in life expectancy, inequality in education and inequality in income.	Positive

Source: Prepared by the authors

The construction method addresses panel data with random effect, fixed effect and pooled. According to Gujarati (2019), the models used to study entities belonging to the same set, over time, are called panel data regression models. According to the author, when assuming that for everyone, the individual specific coefficient B1i is fixed in time, then there is a fixed effect. The random effect is characterized if this coefficient is a random variable with a mean value of B1. Hausman (1978) describes the definition of the test to verify which of the two models, fixed effect, or random effect, is the most appropriate and, according to the author, when accepting the null hypothesis, the random effect is the most indicated and, in case of rejection, the fixed effect is the most suitable. Fávero and Belfiore (2021) add that the pooled model is a more simplified estimation of a longitudinal regression model, which considers the database as a huge cross-section in the merged form, that is, stacked, making use of Ordinary Least Squares.

Econometric models: The econometric model addressed in this study relates the total homicide rate (dependent variable) with the explanatory variables, in which the main variable of interest is the corruption perception index, seeking to verify if, possibly, corruption impacts the rates of total homicide. The total homicide equation from panel data has the following form:

$$H_{it} = \beta x_{it} + \gamma_t + v_{it}, \ \ para\ i = 1, \dots, 28; t = 1, \dots, 9$$

where$H_{it}$is the total homicide rate of the *i-th* country in period t, whose matrix contains an intercept, x_{it} represents the vector of explanatory variables,$v_{it}$is the random term and$\gamma_t$aims to capture specific effects over time.According to the methodology for panel data, we also have that$v_{it} = \alpha_i + u_{it}$, where$\alpha$is a stochastic term proper to the units. Substituting, we have:

$$H_{it} = \ \beta x_{it} + \gamma_t + \alpha_i + u_{it}, para\ i = 1, \dots, 28; t = 1, \dots, 9$$

Thus,i represents the *i-th* cross-sectional unit and t the *t-th* period. If each cross-sectional unit has the same number of time series observations, then this panel is called a balanced panel.

In this study we are considering the model:

$H_{it} = f(x_1,x_2,x_3,x_4,x_5, x_6)$
H_{it} = *Total homicide rate.*
x_1 = *Corruption perception index.*
x_2 = *Human inequality coefficient.*
x_3 = *Percentage of young people (15 to 24 years old) who neither study nor work.*
x_4 = *Urbanization rate.*
x_5 = *Electricity consumption per capita.*
x_6 = *Unemployment rate.*

The data are used for the construction of an econometric study in several models, considering the total homicide rate as the dependent variable and the other variables, indicated in table 2, represent the explanatory variables. Table 3 shows the descriptive statistics of the variables.As for Table 3, a large variance for the electrical energy variable can be highlighted, as well as since a degree of corruption on average relatively high (21.543).

Analysis of empirical results

The empirical results are presented in different econometric models, which focus on the explanatory variable of interest in this research, that is, the corruption perception index. The estimates presented show random effects, fixed effects and pooled, that are based on an analysis of panel data for the period 2010-2018, considering Latin American countries. The empirical results are revealed in tables 4 and 5, with the respective comments. Table 4 shows empirical models based on fixed and random effects with only 3 explanatory variables: corruption index (CPI), an indicator of inequality and an indicator of the contingent of young people who neither study nor work. Except for model 1, the other models present the estimated coefficients of the variable of interest, CPI, with a negative sign and with marginally significant estimated coefficients at the level of 10%. the estimated coefficients of all explanatory variables show the expected signs.

Table 3. Descriptive statistics of variables, period 2010-2018

Variable	Mean	Median	Standard deviation	Variance	Minimum	Maximum
Homicide	21,543	15,100	18,226	332,188	2,460	105,230
CPI	39,869	36,000	15,896	252,680	7,000	78,000
Unemployment	7,334	6,700	4,442	19,727	1,700	24,100
Inequality	22,383	21,900	5,899	34,799	12,700	40,500
Energy	1905,65	1498,295	1457,062	2123029,7	20,860	8117,470
Young	22,906	21,800	6,534	42,693	10,000	42,300
Urbanization	66,277	68,050	18,910	357,585	18,400	95,300

Source: Prepared by the authors

Table 4. Determinants of the total homicide rate. Panel Data – Fixed Effect and Random Effect 2010-2018, Models 1 to 6

Variables	Model 1: Fixed effect (FE)	Model 2: Random effect (RE)	Model 3: Fixed effect (FE)	Model 4: Random effect (RE)	Model 5: Fixed effect (FE)	Model 6: Random effect (RE)
CPI	-0,155	-0,178*	-0,322*	-0,267*	-0,306*	-0,250*
	(0,110)	(0,097)	(0,170)	(0,139)	(0,169)	(0,135)
Inequality	_	_	0,580**	0,456*	0,642**	0,535**
			(0,267)	(0,251)	(0,269)	(0,250)
Young	_	_	_	_	0,624	0,829***
					(0,420)	(0,320)
C	27,740***	28,260***	21,561**	22,418**	5,394	0,878
	(4,445)	(5,067)	(9,502)	(9,474)	(14,426)	(12,498)

Source: Prepared by the authors. In parentheses are standard errors. Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%. Model1 (FE): 224 observations, Prob >F=0,000, Model 2(RE): 224observations. Model 3 (FE): 198 observations, Prob >F=0,000. Model 4 (RE): 198 observations. Model 5 (FE): 198 observations, Prob >F=0,000. Model 6 (RE): 198 observations.

Table 5. Determinants of the total homicide rate. Panel data – fixed effect, random effect and pooled, 2010-2018, models 7 to 13

Variables	Model 7: Fixed effect (FE)	Model 8: Random effect (RE)	Model 9: Fixed effect (FE)	Model 10: Random effect (RE)	Model 11: Fixed effect (FE)	Model 12: Random effect (RE)	Model 13: *pooled*
CPI	-0,257	-0,250*	-0,300*	-0,325**	-0,304*	-0,302**	-0,236**
	(0,170)	(0,135)	(0,170)	(0,136)	(0,170)	(0,136)	(0,105)
Inequality	0,325	0,552**	0,455	0,735***	0,453	0,741***	0,622**
	(0,315)	(0,261)	(0,307)	(0,267)	(0,307)	(0,266)	(0,277)
Young	0,547	0,891**	0,456	0,790**	0,693	1,127***	2,684***
	(0,418)	(0,354)	(0,426)	(0,355)	(0,476)	(0,405)	(0,297)
Urbanization	-0,920*	0,057	-0,982**	-0,0031	-0,980**	0,001	0,404***
	(0,484)	(0,171)	(0,460)	(0,173)	(0,460)	(0,169)	(0,092)
Energy	_	_	0,002	0,0027*	0,002	0,003**	0,001
			(0,002)	(0,001)	(0,002)	(0,001)	(0,001)
Unemployment	_	_	_	_	-0,668	-0,815	-2,073***
					(0,600)	(0,511)	(0,394)
C	74,634*	-4,724	75,708**	-5,027	74,212**	-8,889	-59,17***
	(39,107)	(20,453)	(37,289)	(20,606)	(37,277)	(20,407)	(14,637)

Source: Prepared by the authors. In parentheses are standard errors. Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%. Model 7 (FE): 198 observations, Prob >F=0,000, Model 8 (RE): 198 observations. Model 9 (FE): 155 observations, Prob >F=0,000. Model 10(RE): 155 observations. Model 11 (FE): 155 observations Prob >F=0,000. Model 12(RE): 155 observations. Model 13(*pooled*): 155 observations.

Table 5 presented below shows estimates with fixed, random, and pooled effects. As a robustness test, three more control variables are added: urbanization rate, per capita electricity consumption and unemployment rate.The results show that the empirical coefficients estimated for the variable CPI present negative and statistically significant signs at 5% and 10%, except for model 7, considering that the results are controlled by the other control variables.

Considering models 11 (FE), 12 (RE) and 13 (Pooled) presented in Table 5, which present all control variables, it can be inferred that:

i. The Hausman test accepts the null hypothesis with a chi-square statistic of 9.86 with 6 degrees of freedom and probability 0.1309. In this context, the random model is the most suitable.
ii. The estimated coefficients of the Corruption Perception Index (CPI) variable are statistically significant, andthe coefficients are negative as expected. Hence, the higher the corruption perception index, that is, the less corrupt the scenario, the lower the total homicide rates.
iii. The estimated coefficients of human inequality (Inequality) are significant according to model 12 and 13 and has the expected positive sign. Thus, increases in the coefficient of human inequality produce increases in total homicide rates.
iv. The variable that represents the percentage of young people aged between 15 and 24 years old, who neither study nor work, shows that the estimated coefficients is statistically significant and has the expected positive sign, according to models 12 and 13. Thus, it shows a direct relationship between the two variables.
v. The estimated coefficient of the variable related to electricity consumption is positive and statistically significant, according to model 12. However, the estimated coefficients of unemployment rates and urbanization rates are not statistically significant regarding to model 12, i.e., the random effect model.
vi. Finally, the analysis of the variable of interest, the corruption perception index, proposed by Transparency International, attests, in the analyzed models, to the hypothesis assumed in this study. Thus, it appears that corruption is a phenomenon that contributes to the increase in the total homicide rate.

FINAL CONSIDERATIONS

Corruption can be considered a type of non-violent crime, however it produces indignation in society and its impacts can have effects on other types of crimes, including violent ones. Homicides take lives, potential talents whose absence reduces the production and stock of ideas. Furthermore, they produce sadness and anguish in the

victimized families, reduce the workforce of companies and, fundamentally, harm the course of development of society and the nation. This study tests the hypothesis that corruption impacts total homicide rates, in the sense that the more corruption is present, the higher the homicide rates. In this research, the variables, coefficient of human inequality, percentage of young people in the age group from 15 to 24 years old who are not in school or at work are significant and presents the expected signals. The variable urbanization rate and the unemployment rate are not significant when considering the random effect model. Finally, the explanatory variable of interest confirms the hypothesis raised, as it shows empirical evidence that a scenario affected by corruption produces increases in the total homicide rate. This result shows a contribution to the topic discussed here, since it is a topic that has been little explored in the literature that associates corruption with homicide rates. This study does not exhaust the subject, however it makes an important contribution to the Economics of Crime literature, as it uses the variable corruption, non-violent crime, to explain another type of crime, that is, homicide, a type of violent crime. In addition, it fills a gap in the literature by proposing this study with panel data analysis with fixed, random, and pooled effects, comparing indices that measure corruption and homicides. It is added the suggestion of the elaboration of new empirical models that contribute to reinforce the hypothesis confirmed here and solve the gaps evidenced in this research.

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