

# Colombian Regions and Armed Conflict: A Socio-economic Study in a Center-periphery Model 2000-2017<sup>\*\*\*</sup>

[*English Version*]

Regiones colombianas y conflicto armado: estudio socioeconómico en un modelo de centro y periferia años 2000-2017

Regiões colombianas e conflito armado: estudo socioeconômico em um modelo de centro e periferia anos 2000-2017

*Received February 19, 2021. Accepted June 10, 2021.*

María-Elvira Arboleda-Castro<sup>\*\*\*</sup>

<https://orcid.org/0000-0001-7765-7607>

Colombia

Andrea Pavas-Llano<sup>\*\*\*\*</sup>

<https://orcid.org/0000-0001-7765-7607>

Colombia

Sebastián Hidalgo-Dager<sup>\*\*\*\*\*</sup>

<https://orcid.org/0000-0001-7765-7607>

Colombia

› To cite this article:

Arboleda-Castro, María-Elvira;  
Pavas-Llanos, Andrea; Hidalgo-  
Dager, Sebastián. (2021). Colombian  
Regions and Armed Conflict:  
A Socio-economic Study in a  
Center-periphery Model 2000-2017.  
*Ánfora*, 28(51), 143-162.

<https://doi.org/10.30854/anfv28.n51.2021.799>

Universidad Autónoma de  
Manizales. L-ISSN 0121-6538.

E-ISSN 2248-6941.

CC BY-NC-SA 4.0

## Abstract

**Objective:** to analyze the effect of the Colombian armed conflict on economic growth through variables that were identified in 12 departments divided into two groups based on the center-periphery model.

---

\* This article is associated with the research "Armed conflict and economic growth in Colombia," by departments based on a central-periphery model for 2000 to 2017 in the Universidad de Icesi in Cali, Colombia.

\*\* This research was not funded and does not have any conflict of interests.

\*\*\* Economist and Corporate Marketing Specialist. Master of Economics. Professor. Member of the Economics, Public Policies and Quantum Methods Research Group. Icesi. E-mail: [marearboleda2011@hotmail.com](mailto:marearboleda2011@hotmail.com)

\*\*\*\* Economist and international negotiator from Icesi University. Email: [pavasllanost@gmail.com](mailto:pavasllanost@gmail.com)

\*\*\*\*\* Economist and international negotiator from Icesi University. Email: [sebastian-.21@hotmail.com](mailto:sebastian-.21@hotmail.com)

**Methodology:** aims at demonstrating the relationship between economic growth and the scourge of conflict through macroeconomics – GDP (Gross Domestic Product) and GDP per capita (Gross Domestic Product per person) – economics (birth rate, labor market) and violence (war actions, homicides, kidnappings). A multiple linear regression was conducted to understand the functional relationship between the dependent (GDP) and independent constants contained in the model. Observing which variables are those that affect the behavior of GDP, as the same conditions will be maintained in the rest of the variables, was possible. **Results:** whether or not a relationship exists between the armed conflict in Colombia and departmental economic growth was explained, that is, the significant variables and those that have the coefficients and the p-value, (probability of statistical value), found by Stata. The variables of the model were found, the number of observations (Obs), the average (Mean), the standard deviation (SD), the minimum value (Min) and maximum value (Max). **Conclusions:** this study demonstrated the relationship between the armed conflict and the economic growth of those departments located in the periphery, those that have the greatest conflict presence and evidence of State neglect. As expected, the results of the model were significant despite the fact that certain explanatory variables did not show the expected sign-value, therefore they were neither included in the analysis of public policies nor in the conclusions. For those that did show the expected sign-value, the respective analyses were made in order to provide solutions that lead to a reduction of the armed conflict in all its dimensions and its direct impact on the behavior of the departmental GDP.

**Keywords:** Economic growth; Armed conflict; Departments of the Center; Departments of the Periphery.

## Resumen

**Objetivo:** analizar el efecto que tiene el conflicto armado colombiano dentro del crecimiento económico a través de variables que se identificaron en doce departamentos de Colombia divididos en dos grupos a partir del modelo centro – periferia. **Metodología:** se busca demostrar la relación entre el crecimiento económico y el flagelo del conflicto a través de variables macroeconómicas – PIB (Producto Interno Bruto) y PIB per cápita (Producto Interno Bruto por persona)–, económicas (natalidad, mercado laboral) y violencia (acciones bélicas, homicidios, secuestros). Se optó por correr una regresión lineal múltiple para entender la relación funcional entre las constantes dependientes (PIB) y las independientes que contiene el modelo, donde se pudo observar qué variables son las que realmente afectan el comportamiento del PIB dado que se

mantendrán las mismas condiciones en el resto de las variables. **Resultados:** se explicó si hay o no relación entre el conflicto armado en Colombia y el crecimiento económico departamental, es decir, se explicaron cuáles son las variables significativas y cuáles tienen los coeficientes y el valor  $p$ , (probabilidad del valor estadístico), los cuales son arrojados por Stata automáticamente. Se pudo encontrar las variables del modelo, el número de observaciones (Obs), el promedio (Mean), la desviación estándar (Std. Dev.), el valor mínimo (Min) y el valor máximo (Max). **Conclusiones:** con el estudio se logró evidenciar la relación del conflicto armado con el crecimiento económico de aquellos departamentos que pertenecen a la periferia, estos son los que tienen mayor presencia del conflicto y evidencia de abandono estatal. Como era de esperarse, el resultado arrojado por el modelo fue significativo a pesar de que ciertas variables explicativas no tuvieron el signo esperado, por lo que se optó por no incluirlas en el análisis de políticas públicas y no concluir sobre ellas. Para aquellas que sí tuvieron el signo esperado, se hicieron los respectivos análisis con el objetivo de brindar soluciones que lleven a una reducción del conflicto armado en todas sus dimensiones y su afectación directa en el comportamiento del PIB departamental.

**Palabras-Clave:** Crecimiento económico; Conflicto armado; Departamentos del centro; Departamentos de la periferia.

## Resumo

**Objetivo:** analisar o efeito que o conflito armado colombiano tem sobre o crescimento econômico por meio de variáveis que foram identificadas em doze departamentos colombianos divididos em dois grupos com base no modelo centro-periferia. **Metodologia:** busca demonstrar a relação entre o crescimento econômico e o flagelo do conflito por meio de variáveis macroeconômicas — PIB (Produto Interno Bruto) e PIB per capita (Produto Interno Bruto por pessoa)—, econômico (taxa de natalidade, mercado de trabalho) e violência (ações militares, homicídios, sequestros). Decidiu-se fazer uma regressão linear múltipla para entender a relação funcional entre as constantes dependentes (PIB) e as constantes independentes contidas no modelo, onde foi possível observar quais variáveis são as que realmente afetam o comportamento do PIB desde o as mesmas condições serão mantidas no resto das variáveis. **Resultados:** foi explicado se existe ou não relação entre o conflito armado na Colômbia e o crescimento econômico departamental, ou seja, foi explicado quais são as variáveis significativas e quais têm os coeficientes e o valor  $p$ , (probabilidade do valor estatístico), que são divulgados pelo Stata automaticamente. Foi possível encontrar as variáveis do modelo, o número de observações (Obs), a média (Média), o desvio padrão

(Std. Dev.), O valor mínimo (Min) e o valor máximo (Max). **Conclusões:** com o estudo, foi possível mostrar a relação do conflito armado com o crescimento econômico dos departamentos que pertencem à periferia, estes são os que apresentam maior presença do conflito e evidências de abandono do Estado. Como esperado, o resultado produzido pelo modelo foi significativo apesar de certas variáveis explicativas não terem o sinal esperado, por isso optou-se por não incluí-las na análise das políticas públicas e não concluir sobre elas. Para aqueles que tiveram o sinal esperado, as respectivas análises foram realizadas a fim de fornecer soluções que levem a uma redução do conflito armado em todas as suas dimensões e seu impacto direto no comportamento do PIB departamental.

**Palavras-chave:** Crescimento econômico; Conflito armado; Departamentos do centro; Departamentos da periferia.

## Introduction

Colombia has suffered a wave of violence for more than 50 years. This has brought several social, political and economic consequences to the country and has lost international credibility from the economic perspective.

Colombia has been considered a violent region, driving away foreign investors. Outlawed groups have invaded territories, caused displacement and have based their source of resources mainly on the cultivation of illicit products. This has left thousands of people homeless and without sustenance; it has mainly affected peasants and indigenous people with a great impact on national agriculture. This situation caused a lack of private investment in regions with the greatest presence of armed conflict due to fear of violation or loss of money.

The inhabitants of the territories with the greatest presence of conflict are the ones that have been affected both economically and socially the most, as stated by the International Committee of the Red Cross: "The civilian population of regions affected by the armed clashes in Colombia continues to be exposed to acts of violence such as homicides, direct attacks, kidnappings and forced recruitments" (2010). The departments that have been most observed and are involved in the conflict are those on the so-called periphery.

This study focused on researching the existing relationship between economic growth and the armed conflict in Colombia. For this research, 12 strategic Colombian departments were chosen. They were divided into two groups: the first grouped by high level or presence of confrontations and a low socioeconomic level, and the second with an opposite characteristic in order to demonstrate whether the armed conflict affects departmental economic growth. The analysis was carried out with figures from the years 2000 to 2017, in this way, establishing a relationship between the armed divergence in Colombia and the departmental economic growth was possible.

In addition, the effect that certain variables of confrontation have on economic growth were analyzed in the 12 departments divided into two groups based on the center-periphery model. Accordingly, literature by authors who have previously linked economic growth with the armed conflict was reviewed to determine the variables that should be included in the econometric model and their behavior, in order to identify the appropriate variables to build a structured database that allowed for analysis and development of the econometric model. It showed the impact of the armed conflict in Colombia on the growth of departmental GDP with the center-periphery model. Thus, public policy recommendations

were developed to enhance economic growth in the departments that have a greater presence of the armed struggle.

Several phases of the research were conducted: in the phase one, the revision of a theory of the economic growth and its relationship with the armed conflict in Colombia, research studies previously carried out by Colombian authors were reviewed and a solid theoretical framework was built with all relevant research related to the subject in order to investigate the aforementioned incidences in depth and to choose the right variables to be able to make the appropriate public policy recommendations. In the second phase, the figures of the variables chosen for research were collected, these were taken from two sources or governmental institutions: The National Administrative Department of Statistics (DANE – Spanish acronym) and Centro Nacional de Memoria Histórica.<sup>1</sup> Then, a unique database was developed to house the variants necessary for the development of the research in an organized and concise way. In the third phase, the building of the model was carried out based on alternatives from the database. The test was conducted different times and yielded the same results, the significance of the pilot test and the variables was verified for not finding econometric problems. In the fourth phase, the model results and their relationship with the economic theory developed by the authors taken as a source in the theoretical framework were analyzed. Finally, the relevant conclusions and public policy recommendations were made.

For the development of the research in its fifth phase, a review of the literature corresponding to the subject was made. Theorists such as Gary Becker (1968) cite a relationship between violence and the economy, as the author explains in *Crime and Punishment: An Economic Approach*, explains the origin of individuals' illegal behavior. For Becker there is a rational process in the choice of an individual with respect to committing a crime or not. The main variables are the net benefit of committing the crime and the probability of being discovered, in which case he will assume the costs of being punished. This rational process is modeled as the maximization of utility under uncertainty, in which individuals take action. This is why it makes sense, as Pablo Querubín (2003) states that: "Armed actors tend to be located in rich regions where there are resources to prey on (e.g. illicit crops) but it does not imply that the conflict generates greater growth." This reflection is in line with what Jesus Antonio Bejarano (1997) stated, where he shows that between 1985 and 1995 the guerrillas went from having a presence in 13% of the municipalities of commercial agriculture in 1985 to being at 71% in 1995. Meanwhile, in the secondary cities,

---

1. Colombian governmental agency attached to the Administrative Department for Social Prosperity.

the guerrillas went from being present in 13% in 1985 to 85% in 1995 (p.13). [Author translation]

That is to say, insurgents are not located in areas of little economic activity but, on the contrary, in areas where economic activity is greater and more prosperous.

All these groups in their beginnings had as a common component being sponsored by regional elites, and, in some cases, the participation of members of the official Armed Forces. Between 1994 and 1997, a unification process of all these illegal armed groups was conceived. The United Self-Defense Forces of Colombia (AUC) was created, a unified movement under a single command: the General Staff made up of leaders of regional groups.

The characteristics of Colombia's municipalities have changed over time. At first, illegal groups ventured into colonized regions, far from the country's economic centers, where a relationship could be established between poverty, state absence and guerrilla presence (Pizarro, 2004). However, from the eighties of the last century, the location of the guerrilla foci changed, and they were found in strategic regions with abundant natural resources and great economic potential.

According to Daniel Pécaut (1987), the years of violence cannot be understood without taking into account the popular mobilization in the cities between 1944 and 1948. In this sense, the rural outrage and the training of guerrilla groups are part of the process of mainly urban social struggles that then move to the countryside. For Pécaut (1987) the roughness in Colombia in the twentieth century is the result of forms of traditional political domination. Although rural aspects are important in this research, as it is in the countryside where the conflict takes place, it is not in it that its causes should be sought.

Colombian literature has also studied the relationship between economic growth and violence in depth. Regarding this topic, Astrid Martínez (2001) states: "Econometric studies conclude that there is a causal relationship in both directions between GDP growth and the presence of armed conflicts being stronger in the direction of low growth as a cause of conflict" (p.10). [Author translation]

Meisel Roca (2001) also has found a fairly strong relationship between these two variables, he has developed several studies on economic growth in Colombia, but mainly based on studying the territories separately in order to better understand and explain the national situation as a result of the internal problems of each department. The author argues in his text *Regions, Cities and Economic Growth in Colombia*, that the convergence of a territory can be studied from the departmental GDP. The analysis of territories separately is also defended by Luis Armando Galvis, and Meisel Roca (2000) in a report for the Center for Economic Research of the Colombian Caribbean. They affirm

that studying the regional economic dynamics helps to better understand the national economic course.

Ricardo Rocha and Alejandro Vivas (1998), in their text *Regional Growth in Colombia: Does Inequality Persist?*, study whether or not there is convergence between the different departments of the country. For their explanation they use what they call “socio-political instability”: an explanation of how manifestations of violence translate into “fewer incentives for investment and growth” (Rocha, Vivas, 1998, p.10). [Author translation]. In this idea a reference to the Italian economist Roberto Perotti (1995) could be found. He argues that: “higher rates of crime and manifestations of social violence [...] affect the business climate and expectations favorable to savings-investment processes. (p.10)”. [Author translation].

Finally, another Colombian author who has undertaken studying the relationship between economic growth and violence in Querubín (2003) in his paper “Departmental Growth and Criminal Violence in Colombia,” after making estimates by the differences in differences method, found evidence of the negative impact that violence has on the growth of departmental GDP. In addition, those findings revealed that “those departments that experienced an acceleration in their different manifestations of violence experienced a significant slowdown in total GDP per capita.” (p.8). [Author translation]

## Methodology

Since the relationship between economic growth and the armed conflict in Colombia was sought to be shown, macroeconomic variables (GDP, GDP per capita), economic (birth rate, labor market) and violence (war actions, homicides, kidnappings) were chosen. They show the way in which the growth and the incidence of armed conflict behave.

To perform a better analysis, previous studies were taken into account and the research was carried out without variables in some departments of the country in order to measure more clearly the direction of departmental growth. A center-periphery model and 12 jurisdictions were chosen as the object of study. These jurisdictions were divided into two groups. They were chosen to conduct the analysis due to the economic behavior and the presence of armed violence that they present throughout history. The districts that are part of



so-called center are those that present a greater economic development, population growth and better living conditions. This group contains: Cundinamarca, Santander, Antioquia, Valle del Cauca and Atlántico.

The regions that belong to periphery are the ones that have the greatest presence of the armed conflict and have been the most affected. The armed conflict has impacted their economic performance and also show lower figures in growth rates. This group contains: Chocó, Cauca, Nariño, Guajira, Amazonas, Putumayo and Caquetá.

However, to show the relationship between departmental economic growth and the armed conflict in Colombia, a multiple linear regression was chosen, as it allows for understanding the functional relationship between the dependent variable (GDP) and the different independent variables in the model to be able to analyze what the causes of the changes in the dependent variable may be. Implementing this type of model to establish the proposed analysis was important, as it will be possible to observe which variables are the ones that affect the behavior of GDP, given that the same conditions will be kept in the rest of the variables.

In relation to this, the following model will be studied:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon$$

As the object of study is to see the behavior of the departmental GDP, “Y” will be the Gross Domestic Product,  $\beta_0$  is the constant of the model, and from  $\beta_1$  to  $\beta_n$  different model estimators that correspond to each explanatory variable, which are the reflection of the variation in “Y.” Likewise, the different “X” variables refer to explicative variables, that is, homicides, war actions, kidnappings, GDP per capita, birth rate and the ones related to labor market. Lastly, “ $\varepsilon$ ” is the error term, that “collects all the factors that affect ‘Y’ that are not expressed in ‘X’ or in any other independent variable” (Serrano, 2012).

It is important to mention that the data found for each of the variables for each department were assigned in the same database as a matter of practicality when generating multiple linear regression. This database is characterized by “time series,” as the same variables are collected over time, 17 years (2000 - 2017) for this case.

## Variable Analysis

The variables are divided into three groups:

1. Economic variables GDP, GDP per capita, working-age population, rate overall participation, employment rate and unemployment rate.
2. Experiences variables homicides, war actions, kidnappings
3. Demographic variables birth rate

**Table 1.** Descriptive Summary of the Variables

Variable	Description	Source
Homicides	Numbers of deaths caused by homicides / murders.	National Center for Historical Memory
War actions	Numbers of war actions caused by insurgent groups	National Center for Historical Memory
Kidnappings	Number of individuals deprived of liberty by insurgent groups.	National Center for Historical Memory
GDP	Measure the total production of a country.	National Administrative Department of Statistics
GDP per capita	Relationship between the rent level of a country and its inhabitants	National Administrative Department of Statistics
Birth rate	Number of births in a territory relative to population	National Administrative Department of Statistics
Working age population	Formed by people in urban areas for 12 years and in rural areas for 10 years.	National Administrative Department of Statistics
Global participation rate	The percentage ratio between the economically active population and the working age population. This indicator shows the pressure of the working age population on market labor	National Administrative Department of Statistics
Participation rate	The percentage ratio between employed people (EP) and the working age population.	National Administrative Department of Statistics
Unemployment rate	The percentage ratio between people seeking employment and the working age population. (WAP)	National Administrative Department of Statistics

This section identified the behavior of the variables that could potentially affect the economic growth of 12 departments studied between 2000 and 2017.

As a result of the figures collected in the database, with regard to the war actions, it was possible to show that in the first four years the department of Antioquia presented an increasing trend and a peak that reached a maximum of 450 incidences, with the other departments the figures fluctuated between 0 and 200 incidences. From 2004, the number of aggressive actions perpetrated in Antioquia decreased down to the average for the other departments. In contrast, since 2004, an increase of aggressive behavior has been noted in the departments of Cauca and Nariño.

Homicides again show the same tendency as war actions: Between 2000 and 2005, Antioquia showed a high peak reaching four figures compared to the other departments that remain between one and three figures. Since 2006, Antioquia's data have been in line with an average of the other regions and an increase in Cauca.

In terms of the number of kidnappings by department, Antioquia exhibits the highest number of people kidnapped in most of the years of interest for this study. Nariño also shows peaks in some years, but the figures are much lower than those of the previous region. Compared to the economic, violence and demographic variables previously stated, the figures are much lower for the number of kidnappings per year in each department.

The Gross Domestic Product (GDP) was taken at current prices with a base year at 2005 and the figures in the database are given in billions of COP. The departments with the highest figures during the period under study are as follows: Antioquia, Valle del Cauca, Cundinamarca, Atlántico and Santander respectively, showing a larger GDP than the other departments in contrast with: Chocó, Amazonas, Putumayo and Cauca that show a smaller GDP in almost all the years under this study.

Per capita income (GDP per capita) is expressed in current prices based on 2005. The departments with the highest number of this indicator over the years under study are: Santander and Valle del Cauca respectively, while Chocó shows a lower level. Putumayo, Caquetá and Nariño exhibit a similar GDP per capita for most of the years.

The birth rate is given by the number of live births per department of origin. The database shows a higher number of births in the departments of Antioquia, Valle del Cauca and Atlántico with respect to the other departments. Chocó and Amazonas show a lower number of births.

In regard to labor market variables, the following were taken into account: the working-age population, the overall labor force participation rate and the employment and unemployment rates. The latter presents similar values for most departments, except for Guajira, Caquetá and Chocó which show a much

lower unemployment rate than the rest of the departments. The employment rate fluctuates between 40% and 60% for all departments in the years under study.

## Results

The results obtained from the model explain whether there is a relationship between the armed conflict in Colombia and the economic growth per departments, i.e., which variables are significant and which are not by taking into account the coefficients and the “p” value, automatically obtained by Stata. Table 2 shows the general statistics on the different variables of the model, in particular, the number of observations (Obs.), the average (Mean) and the standard deviation (SD) The minimum value (MV) and maximum value (Vmax).

**Table 2.** Summary of Statistics of the Variables

Variable	Obs	Mean	SD	MV	VMax
GDP	216	19104.4	24795.29	163	122647
War actions	216	52.56019	77.29085	0	450
Homicides	216	202.0509	551.9147	0	4367
Kidnappings	216	42.69907	106.1778	0	906
GDP per capita	216	8334782	5511729	1639445	3.18e+07
Birth rate	216	25930.55	24732.34	963	103153
Working age population	216	75.26037	4.612165	62.32623	81.92722
GPR	216	61.662	6.059611	44.89596	71.67332
Employment rate	216	53.73066	6.119138	39.306695	65.75614
Unemployment rate	216	11.43018	3.145492	5.872795	22.29372

The coefficient of determination or  $R^2$  of the model is 0.8657 (R-squared in Table 3), i.e., the model is reliable and the appropriateness-of-fit measure is high:

The closer its value is to one, the better the model fits to the variable the authors are intending to explain. Conversely, the closer to zero, the less adjusted the model will be and, therefore, the less reliable". (Lopez, n.d.).

**Table 3.** Regression Results with STATA

Source	SS	df	MS
Model	1.1443e+11	9	1.2714e+10
Residual	1.7757e+10	206	86200164.7
Total	1.3218e+11	215	614806495

  

Number of Obs.	=	216
F (9, 206)	=	147.9
Prob > F	=	0.0000
R-squared	=	0.8657
Adj R squared	=	0.8598
Root MSE	=	9284.4

PIB	Coeff.	SD. Err	t	P	95% CI	
War actions	27.69333	11.21868	2.47	0.014	5.575176	49.81148
Homicides	-22.50267	4.278757	-5.26	0.000	-30.93844	-14.0669
Kidnappings	51.92424	21.59548	2.40	0.017	9.347734	94.50074
GDP per capita	-0020446	.0001814	11.27	0.000	.0016871	.0024022
Birth rate	.805384	.0431346	18.67	0.000	.7203421	.8904259
Working age	-423.3088	251.949	-1.68	0.094	-920.0381	73.42042
Population GPR	657.6898	275.5548	2.39	0.018	114.4207	1200.959
Employment rate	-580.8819	337.823	-1.72	0.087	-12.46.916	85.15192
Unemployment rate	-883.9398	422.891	-2.09	0.038	-1717.689	-50.19043
Cons	14671.35	16079.97	0.91	0.363	-17031.07	46373.77

Like the  $R^2$ , the  $R^2$  adjusted (Adj R-squared in Table 3) yielded a number close to one, which means that the independent variables have a high degree of intensity or effectiveness in explaining the dependent inconstant, which for this case, is departmental GDP. Finally, the F statistic (Prob > F in Table 3) is significant (0.0000), with a confidence level of 99%. “The F test is used to evaluate the explanatory capacity of a group of independent variables over the diversification of the dependent variable.” (Sanjuán, n.d.). In other words, the independent variables included in this model do have the capacity to explain the variation of the dependent variable.

According to Table 3, the relationship between GDP (per department) and war actions is significant and with a significance level of 5%. However, for the model used in this study, it does not comply with the sign-value suggested by economic logic (if the number of war actions increases, so does GDP), therefore, it will not be taken into account when drawing the conclusions and assessing public policies. Most of the authors examined here agree that this is a variable of great impact on departmental economic growth which is demonstrated in our regression, as it was significant. For example, in the studies of Gustavo

Hernández, Norberto Rojas and Mauricio Santa María (2013), this variable was significant and with the expected sign-value, in addition to showing that if “terrorist events were reduced by half, average economic growth would be of 0.4 percentage points” (Hernández, Rojas, Santa María, 2013, p.3). [Author translation]

GDP and homicides have a significant relationship and a significance level of 1%. Having the expected sign-value and being a LIN-LIN interpretation model (natural logarithms were not used), it is understood that if the homicide rate increases (which is measured per 100,000 inhabitants, see Annex), the departmental GDP will decrease by 22.50267 billion pesos. The situation with “kidnappings” equals “war actions”: it is statistically significant at a 5% significance level, but the sign-value is not consistent with economic theory.

GDP per capita in relation to departmental GDP shows a significant result at a level of 1%. This means that, if there is an increase in one-unit in GDP per capita, the departmental GDP will increase by 0.0020446 billion pesos. The importance of including this variable lay in observing the inequalities within the country’s regions, which supports the explanation of why certain areas are more affected by the conflict than others. The “birth rate” has the same characteristics, i.e., an increase of one-unit per birth rate will cause a growth of the departmental GDP by 0.805384 billion pesos.

“Unemployment rate” is the last variable for drawing conclusions because it is statistically significant and the sign-value of the regression was as expected. Its GDP’s relationship is at a 95% confidence level. The result provided by Stata indicates that, if there is an increase of one percentage point in this rate, the departmental GDP will decrease by 883.9398 billion pesos. The following section will present the conclusions by taking into account this and the other variables that allowed for identifying an economic logic.

Finally, the other three variables related to the labor market (working age population, overall labor force participation rate, and employment rate) are significant at the 10%, 5% and 10% levels respectively, but meaningless when interpreted. The first and second variables show that when more people are available to work, departmental GDP will fall. And, the third instance, if there are more people working, our dependent variable will decrease which is not logical in economic terms.

## Conclusions

This study allowed for demonstrating the relationship between the armed conflict and the economic growth of those peripheral departmental locations, which show the greatest presence of the conflict and evidence of state neglect. As expected, the results of the model were significant despite the fact that certain explanatory variables did not show the expected sign-value, therefore they were neither included in the analysis of public policies nor in the conclusions. For those that did show the expected sign-value, the respective analyses were made with the aim of providing solutions that lead to decrease the armed conflict in all its dimensions and its direct impact on the behavior of the departmental GDP.

Results also exhibited, from the database variable gathering, the gap in terms of economic level and therefore development among the center and peripheral departments. The difference in the figures is quite wide. Private investment and state aid lag behind in the regions of Cauca, Chochó, Nariño, La Guajira, Amazonas, Caquetá and Putumayo. These territories also lag behind in infrastructure, health, education, labor conditions, among other areas when compared to the central areas. Proof of this is the concentration of the population, i.e., in the central jurisdictions there is much more population than in the periphery, which is explained to the extent that the inhabitants of the periphery migrate in search of better life and job opportunities.

Another important factor in the development of economic growth in the country is the signing of the peace agreement between the FARC guerrilla<sup>2</sup> and the Colombian National Government in September 2016. This is an event that marked the course of the armed conflict in the country. Upon signing the peace agreement, the illegal armed group committed to the disarmament and demobilization of its troops, as the figures evidence in the database. Beginning 2016, the figures in the violence variables (homicides, war actions and kidnappings) decreased drastically, reaching zero in some departments. This shows that the initial implementation of the agreement was indeed having the expected effect, at least until 2017 which is the last year taken into account in this study.

Previously, a series of public policies for the improvement of economic growth which aimed at minimizing the gap between the departments of the center and the periphery, improving living conditions and helping the economic growth of the regions. The costs generated by the Colombian armed conflict are very high, whether they are regarded from the economic perspective with

---

2. Revolutionary Armed Forces of Colombia (Fuerzas Armadas Revolucionarias de Colombia).

the damage to infrastructure such as pipelines or roads, or from the social perspective as human losses, forced displacements, and emotional implications, etc. Therefore, the policies recommended here need to be applied correctly and effectively.

As an illustration of the need to implement adequate public policies, the negotiation process between the government of Juan Manuel Santos and the FARC is mentioned, as well as the downward trend in homicides that reached the lowest rate in the last 42 years and the importance of applying policies related to this aspect.

Among the public policy recommendations, a greater military deployment is suggested in order for the community to trust and to act against any type of crime when the police force is not sufficient, because the police often do not have the necessary resources or personnel to deal with this scourge.

The presence of the security forces can be carried out in regions where the number of drug-related homicides is currently higher. "Drug-related homicides" are understood as those committed by groups active in the armed conflict. This measure is important to perform because:

from 2018, disputes over control of illicit activities have led to a rise in the homicide rate from groups such as El Clan del Golfo, Los Caparros, ELN, EPL and FARC dissidents (Castilla, September 26, 2020).

On the other hand, there is the birth rate, which has historically played an important role in the evaluation of growth policies by countries. According to Franklin D. Roosevelt's request to include everything that covered the economy in the GDP, an increase in population will generate the same impact on this economic indicator because if:

a nation's GDP is the output per person multiplied by the number of people and if the number of things each worker produces changes, so does the GDP. And it is the same with the number of inhabitants. If the population grows very fast, so will GDP (Lynn, 2014).

This is not intended to encourage Colombians to have large numbers of children; on the contrary, responsible household reproduction should be fostered by applying policies to prevent teenage pregnancies or unwanted pregnancies that go against economic objectives. That is to say, to apply measures that allow an increase in the population that will belong to the active and employed population in the future. This is not an absurd idea, as countries such as Spain seek possible policies to foster birth rate due to its decrease during three consecutive



years. Mechanisms such as increasing maternity and paternity leave or better tax treatment for families (as is done in Germany and France) would help to achieve this goal. The above mentioned must be applied by the State with total effectiveness in conjunction with actions focused on education, housing, employment and others; otherwise, undesired results will be achieved.

Another aspect to take into account is public policies focused on improving GDP per capita. This can be based on the study “Growing with Productivity: an Agenda for the Andean Region” by the Inter-American Development Bank (2010) (“Creciendo con Productividad: una agenda para la Región Andina”) which states that, in order to improve the indicator in question, microenterprise conditions and financial deepening must be improved, and informal employment levels must be reduced as well. In summary, these three aspects can be optimized as follows: improve tax rates for small businesses, as “business dwarfism” is being generated; revise labor regulations by focusing on “those aspects that make formal hiring rigid and costly and affect the efficient allocation of resources and productivity” (Fundación Compartir, 2018), and achieve this through a strengthening of financial markets. All this will reduce the low productivity environment, thereby increasing GDP per capita.

Finally, according to former Finance Minister Oscar Iván Zuluaga, the unemployment rate is high in Colombia because of four main reasons: low educational level of the labor force, low productivity, informality and labor inflexibility. The last three aspects have already been mentioned in the recommendations made for GDP per capita, leaving only the low level of education of the labor force. This aspect can be improved through the following: turning knowledge into competencies, fostering innovation in schools and universities, developing skills to identify sources of knowledge and developing new skills. However, the first step, on the part of the State, must be the increase of the percentage of public spending allocated to education (currently 4.5%), which is only above countries such as Nicaragua, Peru, El Salvador, Paraguay, Guatemala and Haiti.

## References

- Becker, G. (1968). Crime and Punishment: An Economic Approach. *Journal Economy*, 33, 263-154.
- Bejarano, J. A. (1997). *Inseguridad, violencia y actividad económica*. Universidad Nacional de Colombia.
- Castilla, C. E. (September 26, 2020). Un viaje al pasado del narcotráfico para entender la violencia de hoy. *El Tiempo*. <https://www.eltiempo.com/justicia/conflicto-y-narcotrafico/recorrido-por-el-narcotrafico-los-homicidios-y-la-violencia-del-pasado-y-del-presente-540013>
- Comité internacional de la Cruz Roja. (2010). *Colombia: consecuencias humanitarias del conflicto armado en Colombia*. <https://www.icrc.org/es/doc/resources/documents/report/colombia-report-intro-220410.htm#:~:text=22%2D04%2D2010%20Informe,huir%20y%20abandonar%20sus%20pertenencias>
- Fundación Compartir. (July 5, 2018). *Mejorar diseño de políticas públicas, impulsar crecimiento, y productividad: BID*. <https://fundacioncompartir.org/noticias/mejorar-diseno-de-politicas-publicas-impulsar-crecimiento-productividad-bid>
- García-Rocha R; Vivas Benítez, A. (1998). *Crecimiento Regional en Colombia ¿Persiste la Desigualdad?* Fundación Konrad Adenauer

- Galvis, L. A.; Meisel- Roca, A. (2000). *El crecimiento económico de las ciudades colombianas y sus determinantes, 1973-1998*. Centro de Investigaciones Económicas del Caribe Colombiano.
- Hernández, G.; Rojas, N.; Santa María, M. (2013). *Crecimiento económico y Conflicto Armado en Colombia*. Departamento Nacional de Planeación.
- López, J. F. (s.f.). *Coficiente de determinación (R cuadrado)*. Economipedia. <https://economipedia.com/definiciones/r-cuadrado-coeficiente-determinacion.html#:~:text=El%20coeficiente%20de%20determinaci%C3%B3n%20tambi%C3%A9n,la%20variable%20que%20pretender%20explicar.&text=Cuanto%20m%C3%A1s%20cerca%20de%201,variable%20que%20estam>
- Lynn, M. (August 11, 2014). Si la población cambia, el PIB pierde sentido. *ElEconomista*. <https://www.eleconomista.es/firmas/noticias/6002654/08/14/Si-la-poblacion-cambia-el-PIB-pierde-sentido.html>
- Martínez Ortiz, A. (2001). *Economía, crimen y conflicto*. Ediciones Antropos Ltda.
- Meisel Roca, A. (2001). *Regiones, ciudades y crecimiento en Colombia*. Banco de la República.
- Perotti, R. (1995). *Growth, Income Distribution, and Democracy: What the Data Say*. Columbia University
- Pécaut, D. (1987). De las violencias a la violencia en pasado y presente de la violencia en Colombia. *Orden y violencia*, 2, 364-485

- Pizarro, E. (2004). *Una Democracia Asediada. Balance y Perspectivas del Conflicto Armado en Colombia*. Nuevo mundo.
- Querubín, P. (2003). *Crecimiento departamental y violencia criminal en Colombia*. Universidad de los Andes.
- Sanjuán, F. J. (s.f.). *Estadístico F*. Economipedia. <https://economipedia.com/definiciones/estadistico-f.html#:~:text=El%20estad%C3%ADstico%20F%20es%20un,variaci%C3%B3n%20de%20la%20variable%20dependiente.&text=Este%20test%20es%20de%20uso,para%20realizar%20contrastes%20de%20hip%C3%B3tesis>
- Serrano, A. (26 de junio de 2012). Técnicas de análisis I: la regresión simple. *Ciencia Económica*. . <http://www.cienciaeconomica.com/2012/06/tecnicas-de-analisis-i-la-regresion.html>