Effect of the armed conflict in Santander North 1990-2012 an impact measurement

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Abstract The armed conflict in Colombia has been a scourge that has disrupted all social dimensions of the country, provoking a humanitarian drama and a high economic cost that has been lived for decades. The purpose of this article is to estimate the effects of the armed conflict on economic growth in Norte de Santander, Colombia in the period 1990-2012; the conceptual framework is the solow-swan model of economic growth and the methodology is to determine the impact of the armed conflict on the growth behavior of the gross domestic product of the Nation and the department of Norte de Santander. Using the synthetic pairing methodology method, it is possible to estimate the impact in contexts in which an aggregate unit (such as a country or department) is being treated or exposed to an intervention. The results show that if there had been no armed conflict, Norte de Santander department would have had a better economic performance. The present article has a sequence after this brief introduction, a state of the art, followed by a methodological explanation, the results and finally some general conclusions.

1. Introduction

Studies on the possible relationship between violence and the economy have not been scarce and usually very heterogeneous, this is due to: i) The global incidence of violence is high because the international community has done little to prevent it, being now the most frequent civil wars and with it its studies \textsuperscript{[1]}; ii) Violence and the economy are complex categories, violence for example manifests itself in multiple modalities, and at the same time, the economy is composed of a quite wide set of variables, making the studies of these categories atomicen depending on the modality of violence and the variables of the economy that are addressed; iii) Finally, the methodologies used to investigate these categories have been very diverse, from detailed descriptive analyses to studies of the impact of differences in differences.

Now, it is necessary to bear in mind that "the relationship between violence and economy does not escape the endogeneity controversy: economic conditions cause violence, but violence also has an effect on economic conditions" \textsuperscript{[2]}, thus, the studies that coincide with the modality of violence (internal armed conflict) and the variable of the economy (economic growth) that the authors address, may be different depending on the causality or endogeneity relationship of the categories, in it is usual: i) to study the economic determinants of the armed conflict, that is, how the behaviour of economic growth favours armed conflict; and on the other hand ii) to study how armed conflict can have effects, impacts and
incidence on economic growth; the latter is the causal relationship adopted by the authors. In that order of ideas, the present document is a brief revision of the existing literature of the phenomenon of study, compiling studies according to the relation of causality adopted by the authors through different methodologies.

History has shown that no country in the world has achieved levels of economic prosperity in the midst of internal armed conflict or civil war, war, in addition to being costly, ruins the economy and increases the risk of countries being caught up in violent conflict, delaying development and plunging them into the poverty trap known as the conflict trap. Both criminal violence and armed conflict generate destruction of human capital, physical capital and institutional deterioration [3]. Who have addressed the costs of internal armed conflict or war on economic growth they describe it as realities that submerge the territories in the club of misery [1, 4, 5]. The conflict and violence affect trade flows; generate investment uncertainty; and, finally, divert public spending towards less productive activities such as defense and security spending [6].

The objective of the present investigation, develops a model Solow-Swan modified, that takes into account the consequences of the armed conflict and the organized crime in the entrance of an economy [7]. The work uses a panel of data (unbalanced) at departmental level for Colombia in the period 1988-2009, estimating a structural equation derived from the theoretical model, the results suggest that the estimated elasticity of the logarithm of the departmental gross domestic product with respect to armed conflict and organized crime averages -0.04 and -0.36 respectively for the study period, where the estimates are similar for the 2003-2009 period of Álvaro Uribe, in relation to the 1988-2002 period, lead the authors to point out that the well-known democratic security policy did not achieve a statistically significant change in the relationship between violence, armed conflict and the results of economic growth. Under the same objective, investigating the relationship between departmental economic growth and the internal armed conflict for the period 2000-2008, estimating a structural equation derived from the theoretical model, the results suggest that the direct benefits reach the order of 0.97 points of the GDP, and indirectly of a growth of 0.8% of the gross domestic product (GDP), then the decrease of the armed conflict would imply a growth of 1.77 percentage points on the GDP that it would have when continuing with the factors of violence. The relationship between economic growth in Colombia and the internal armed conflict for the period 2000; the results found provide evidence of the impact of the internal armed conflict on long-term economic performance, and the long-term negative impact through natural capital [10].

One of the most detailed methodologies on the objective of this paper is the one executed by [11], who traces the impact of violence associated with the armed conflict on municipal economic growth in the period 1988-2008. He uses the methodology of differences in differences, an econometric technique that allows contrasting the behavior of municipal economic growth before and after a change in the growth of violence. Examine the relationship between departmental growth and the criminality found in some works for Colombia [12], verifies through a regression in the first differences, implicitly assuming that each department would have had the same growth rate in the absence of changes in the different variables of violence. The results reveal that the different manifestations of violence associated with the armed conflict, drug trafficking and common crime significantly slowed the economic growth of the departments in the 1990s.

2. Methodology
In order to determine the impact of the armed conflict on the dynamics of Norte de Santander's economic growth, the synthetic matching methodology is used, which is a method that allows the use of impact estimation in contexts where an aggregate unit (such as a department) is treated or exposed to an
intervention. It should be noted that individual comparisons are not possible, so instead of comparing this treated unit with a group of untreated units, the method uses information on the characteristics of the treated unit and the untreated units to construct a "synthetic" or artificial comparison unit, weighting each untreated unit in such a way that the synthetic comparison unit most closely resembles the treated unit [13].

The result variable is GDP growth \( Y_{it}^N \), which is assumed to be given by a factor model, Equation (1).

\[
Y_{it}^N = \delta_t + Z_i \theta_t + \lambda_t \mu_i + \varepsilon_{it},
\]

where \( \delta_t \) is an unobserved (common) time-dependent factor; \( Z_i \) is a vector \((1 \times r)\) of observed variables; \( \theta_t \) is a vector \((r \times 1)\) of unknown parameters; \( \lambda_t \) is a vector \((1 \times F)\) of unknown common factors.

Based on the foregoing, the potential synthetic controls for the impact assessment exercise will be made up of those departments that have characteristics similar to those of Norte de Santander in terms of the main variables that determine economic growth according to the model proposed by Solow: Capital, labour and population growth.

### Table 1. Variables determining economic growth.

| Variables                          | Description                                                                 | Source                                                                 |
|------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| Capital, “Formación Bruta de Kapital Fijo Productivo (FBKFP)” | This is the market value of the fixed (durable) goods acquired by the state, the use of which is destined for the productive process. | Budgetary executions. “Departamento Nacional de Planeación (DNP)” |
| Work – economically active population | The effective labor force of a territory; that is, those individuals who participate in the labor market, employed or looking for work. | Labour Market Statistics. “Departamento Administrativo Nacional de Estadística (DANE)” |
| Population growth                  | Variation of the population annually, for each department.                  | Population projections. DANE                                            |

It is important to note that the treatment or intervention in this case is defined by the presence of a high incidence of armed conflict at the departmental level, in which case the Incidence Index of armed conflict proposed by the DNP of Colombia is used. The index has five categories, measured in standard deviation ranges: low (\(<-0.5\)), medium low (between -0.5 and 0), medium (between 0 and 0.5), high (between 0.5 and 1.5) and very high (\(>1.5\)).

Taking into account the above categories, the synthetic comparison unit is constructed with those departments that presented a low or medium low conflict incidence; therefore, the potential participation of each department with a low or medium low conflict incidence within the synthetic control will be given by \( w \), Equation (2).

\[
W = (w_2, \ldots, w_{j+1}) \text{ whit } w_j \geq 0 \text{ for } j = 2, \ldots, \log N + 1 \text{ y } w_2 + \cdots + w_{j+1} = 1 \quad (3.2)
\]

After the synthetic control is constructed, the growth of the result variable is projected in such a way that the difference between the growth of the observed GDP and the growth of the synthetic GDP is the effect of the armed conflict on the economic growth. The treatment has been considered since 1999, given that it is a year in which the armed conflict in Norte de Santander worsens, which led to the fact that for the first time in the period analysed Norte de Santander passed, according to “Instituto Interamericano de Cooperación para la Agricultura (IICA)”, has been part of the group of departments with a high incidence of the conflict. It is also assumed that the armed conflict has negative effects on economic growth, as proposed by [7].
3. Results

Analyzing the evolution of IICA annually for Norte de Santander, Colombia, it is evident that 1993, 1996, 1997 and 2005 were years of medium-low incidence of the armed conflict (Figure 1); on the other hand, 1999 is the first year of the study period, in which Norte de Santander moves to the category of high incidence of the conflict.

In view of the above, Norte de Santander is a department with a medium and in some cases high incidence of conflict. Therefore, in order to compare the behavior of Norte de Santander's growth rate with a hypothetical Norte de Santander with a low incidence of conflict, a synthetic is constructed from departments with a low incidence of conflict, but with characteristics (FBKF, PEA and population growth rate) similar to Norte de Santander; according to Table 2, this synthetic is composed of 29.3% by Caldas, 23.9% by Cundinamarca and 46.8% by Quindio.

Table 2. Participation of the departments of Bajo IICA in the construction of the synthetics.

| Co_No | Unit weight | Loos: Root mean squared prediction error | Predictor Balance: | Synthetic |
|-------|-------------|----------------------------------------|--------------------|-----------|
| Atlántico | 0.0000000 | RMSPE | 0.0452793 | |
| Boyacá | 0.0000000 | | | |
| Caldas | 0.2390000 | Predictor Balance: | | |
| Caquetá | 0.0000000 | | | |
| Chocó | 0.0000000 | LFBKF 9016730.0000000 | 95144570.0000000 | 9520996000000.0000000 |
| Córdoba | 0.0000000 | POB 1114161000000.0000000 | 9529996000000.0000000 | |
| Cundinamarca | 0.2390000 | TC (1998) 0.0143271 | 0.0144828 | 0.0045249 |
| Huila | 0.0000000 | TC (1990) −0.0617099 | | |
| La Guajira | 0.0000000 | | | |
| Magdalena | 0.0000000 | | | |
| Quindío | 0.4680000 | | | |
| Risaralda | 0.0000000 | | | |
| Sucre | 0.0000000 | | | |

The results of the behavior of Norte de Santander's economic growth and of its synthetic with a low incidence of conflict Figure 1, Table 3, show that only in those years in which Norte de Santander had a high incidence of conflict is it observed that the synthetic has a higher rate of economic growth.

Figure 1. Results of Norte de Santander's economic growth and its synthetics.
Where $Y$ is the production, $A$ is the productivity, $K$ the capital, $L$ the work, $\alpha$ the participation of the capital and $1-\alpha$ the participation of the work. The equation is linearized from the use of logarithms, where $\ln$ denotes the natural logarithm of the variables used, being expressed by Equation (3).

$$\ln(y) = \ln(A) + \alpha(\ln(k)) + (1 - \alpha)\ln(L)$$  \hspace{1cm} (2)

The results Table 4, show that the model has individual and joint significance (with a significance level of 95%); and, based on the assumption of Ceteris Paribus, for each 1% increase in the FBKF, Norte de Santander's GDP grew 0.2%; likewise, increases of 1% in population growth generated increases of 9.5% in Norte de Santander's GDP growth.

Table 5 presents the results, showing that the model has individual and joint significance (with a significance level of 95%); likewise, assuming Ceteris Paribus, for each 1% increase in the FBKF, Norte de Santander's GDP grows 4.0%; likewise, increases of 1% in population growth generate increases of 148.2% in Norte de Santander's GDP growth.

Therefore, it can be seen that the effect of the growth of capital stock and population on economic growth generates a greater effect in the presence of a low incidence of conflict. For the FBKF, the
4. Conclusion
The results of the economic growth performance of Norte de Santander, Colombia, and its synthetics with a low incidence of conflict show that only in those years in which Norte de Santander had a high incidence of conflict is it observed that synthetics have a higher rate of economic growth, and that the effect of the growth of the stock of capital and population on economic growth generates a greater effect in the presence of a low incidence of conflict. Similarly, it can be said that the absence of conflicts or a conflict with lesser incidence is positive for economic growth. The way in which spaces in the territory are taken over by illegal armed groups, whose presence in the face of the prolonged absence of the State legitimizes them in the eyes of society and elevates them as a "parastate" that becomes dynamic in the logic of the armed conflict, which decimates the local and regional social fabric in the department of Norte de Santander, Colombia.

The daily reality of the population under the conditions of the armed conflict validates the social representations of the illegal armed groups in an unpremeditated acceptance of a single solution that generates more violence, with roots of social nonconformity born of palpable inequalities in the territories. Under the concept of the differentiated presence of the state in space and time, it is understandable to understand the territorial inequalities in the department of Norte de Santander, Colombia, which are reflected in economic figures.

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