

Impact of the peace negotiations in Colombia on real GDP, 2013–2019

Fernando Martín Mayoral and Carlos Andrés Rivera Lasso

Received: 26/09/2023
Accepted: 09/10/2024

Abstract

The peace negotiations between the Revolutionary Armed Forces of Colombia –People’s Army and the Government of Colombia, which began in late 2012 and concluded with the signing of the Final Agreement for Ending the Conflict and Building a Stable and Lasting Peace in 2016, sought to bring an end to decades of violence, loss of life, destruction of infrastructure and social fragmentation. This study uses the synthetic control method proposed by Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010) to assess the impact of the Agreement on Colombia’s real per capita GDP growth, taking into account economic, demographic and institutional factors. The main findings indicate that Colombia has registered higher growth rates than its synthetic counterpart since 2013, reflecting a shift in the expectations of economic agents from the outset of the peace process.

Keywords

Peace agreements, armed conflicts, economic growth, gross domestic product, Colombia

JEL classification

CO1, N4, O1, O5

Authors

Fernando Martín Mayoral is a Research Professor and PhD Coordinator in the Department of Economics, the Environment and Territory of the Latin American Faculty of Social Sciences (FLACSO) Ecuador. He holds a PhD in economics from the University of Salamanca (Spain). Email: fmartin@flacso.edu.ec.

Carlos Andrés Rivera Lasso holds a master’s degree in development economics from the Latin American Faculty of Social Sciences (FLACSO) Ecuador. Email: carlos.rivera.lasso@outlook.com.

I. Introduction

The effects of armed conflict are multidimensional and can negatively impact production and economic growth, both directly and indirectly. Among other factors, these impacts stem from the destruction of physical capital, dissaving, capital outflow (Collier, 1999; Glick and Taylor, 2010), increased uncertainty caused by political instability (Alesina and others, 1996; Poinot, 2003; Imai and Weinstein, 2000), and the reallocation of public resources towards conflict-related expenditures, which are often unproductive, coupled with the loss of life and rising levels of crime (Granada, Restrepo and Tobón García, 2009; Lim and others, 2022; Díaz Gómez, 2015). Measuring the true effects of armed conflict on economic activity is challenging given this wide range of factors (Gates and others, 2012).

A number of studies have documented the marked deterioration in Colombia's economic growth resulting from the armed conflict that began in 1960 (Rubio, 1997; Echeverry, Salazar and Navas, 2000; Gómez, 2001). These factors include the prolonged duration of the conflict and agents' limited capacity to adapt to the resulting conditions, with direct consequences for gross physical capital formation, productivity growth, the accumulation of human capital and erosion of social capital, all within a context of uncertainty.

The armed conflict has directly affected institutions associated with economic freedom, such as security institutions, which led to an allocation of 5% of GDP to security and justice and the prioritization of efforts against drug trafficking (Rubio, 1997). The conflict has also compelled the government to redirect significant resources towards military spending and other unproductive activities, generating negative social outcomes such as increased inequality and the forced displacement of the population (Querubín Borrero, 2003; Álvarez and Rettger, 2008; Echandía-Castilla and Cabrera-Nossa, 2019).

In late 2012, the administration of Juan Manuel Santos began initial discussions with the Revolutionary Armed Forces of Colombia–People's Army (FARC-EP), culminating in the signing of a peace agreement in 2016 that marked the end of over 60 years of internal armed conflict. During the years of negotiation leading up to the agreement, a series of economic and social policies were implemented to restore normal economic activity as swiftly as possible, starting with the recovery of physical and non-physical capital (Brandon, 2018). In 2015, however, the Government of Colombia faced a complex policy environment shaped by a number of political and economic challenges: regional elections, tax reform efforts, a widening fiscal deficit and challenging legal and constitutional reform negotiations (ECLAC, 2016; Wills-Otero and Hoyos, 2016; Quintero Serna, 2017; Fajardo-Heyward, 2018).

In the reconstruction period following the 2016 peace accord, priority was placed on addressing the root causes of conflict through actions linked to controlling violence and reparations for societal harms in order to prevent renewed hostilities (Collier, Hoeffler and Söderbom, 2008; Hoeffler, Ijaz and Von Billerbeck, 2010). The peace agreement provided a critical opportunity to return to a path of economic growth, as it ensured macroeconomic stability, reducing the direct and indirect costs associated with violence and improving the functioning of institutions. According to the National Planning Department (DNP, 2015), GDP could have grown by up to 5.9% in the years following the peace agreement thanks to higher investment and savings rates. The Ministry of Finance and Public Credit (2017) projected annual investment of 0.7% of GDP over a 15-year period as a result of the comprehensive rural reform agenda.

However, some studies suggest that the political uncertainty that arose in the aftermath of the peace agreement may have hampered the country's economic growth. This uncertainty may have been affected by political instability, resulting in lower investment levels (Alesina and others, 1996; Poinot, 2003; Posada Duque, 2010). Such findings underscore that the economic and social consequences of armed conflict are not automatically resolved with the cessation of hostilities. Post-conflict policies should consider both the context and the stakeholders involved, and should target these groups in order to achieve a lasting peace (Lindsay, Gündüz and Subedi, 2009; Sakalasuriya,

Haigh and Amaratunga, 2018). It is also important to recognize that peace may entail short-term economic costs, such as a contraction in GDP, an increase in public spending and losses of capital, given the need to prioritize stability and social policies designed to prevent a relapse into conflict (Collier, 1999; Hoeffler and Reynal-Querol, 2003; Ruiz Díaz, Galeano Raquejo and Gil Mateus, 2015; Millán Celis and Jiménez Quitian, 2017).

This study seeks to measure the impact of the 2012–2019 peace process between the Colombian Government and FARC-EP on real per capita GDP growth. As it is not possible to observe the country's economic trajectory in the absence of the peace process, the synthetic control method was employed (Abadie y Gardeazabal, 2003; Abadie, Diamond and Hainmueller, 2010). This method makes it possible to create a “synthetic Colombia” based on a set of comparable countries and predictive variables that simulates what the country's performance would have been without the peace agreement. The article is divided into five sections in addition to this introduction. The following sections review the historical context of the armed conflict, analyse its effects on the economy, examine the methodologies applied to study these effects, present the findings obtained with the synthetic control method and offer final conclusions.

II. Historical context of the armed conflict in Colombia

Colombia has faced recurrent social crises and violence since gaining independence from Spain (Ramírez and Guedán, 2005). The nineteenth century was marked by clashes between conservatives and liberals, culminating in the Thousand Days' War, which claimed over 100,000 lives between 1899 and 1902 (Ríos Sierra, 2019). A weak State (Oquist, 1978) and the absence of agrarian reforms (Gilhodés, 1974; LeGrand, 1988; Ríos Sierra, 2017) exacerbated political tensions throughout the twentieth century. The assassination of Jorge Eliécer Gaitán in 1948 unleashed a wave of violence in Bogotá that soon spread nationwide, resulting in the largest armed mobilization of rural populations (Hobsbawm, 1974, p. 264, cited in Pizarro, 1991) and the deaths of over 200,000 people (Guzmán Campos, Borda and Umaña Luna, 1962; Ríos Sierra, 2019).

In the mid-1950s, the National Front and conservative and liberal parties signed a pact in Spain (Benidorm in 1956 and Sitges in 1957) as a proposed transition towards democracy, establishing the alternation of these two parties in government. However, this arrangement excluded other political forces (Moreno-Parra, 2018). Starting in 1958, opposition movements emerged both within and outside the National Front, including Movimiento Revolucionario Liberal, Movimiento Obrero Independiente y Revolucionario, Alianza Nacional Popular and FARC-EP, which were initially formed as self-defence groups in response to the neglect and poverty affecting rural communities (Archila Neira, 1996).

The Ejército de Liberación Nacional, Ejército Popular de Liberación and Movimiento 19 de Abril were formed in 1965, 1966 and 1973, respectively, with an anti-imperialist democratic discourse. The 1980s saw the emergence of State-sponsored paramilitary groups to counter guerilla movements. From 1980 onward, drug trafficking became a financing mechanism for the various armed groups, strengthening them and further aggravating the domestic conflict (Cárdenas, 2001). Seeking a political resolution to the conflict, the Belisario Betancur administration (1982–1986) initiated the first ceasefire and truce agreement in 1984, which was signed by the main guerrilla forces and gave rise to the leftist political movement of FARC-EP, known as Unión Patriótica. However, the various guerillas regrouped in 1987, prompting the suspension of dialogue between the parties (Granada, Restrepo and Tobón García, 2009).

The Andrés Pastrana administration (1998–2002) failed to reach a peace agreement with FARC-EP, which expanded both in size and territorial scope to reach 70 active fronts with 17,000 combatants (Ríos Sierra, 2019). Under President Álvaro Uribe (2002–2010), the State weakened FARC-EP through a

security policy backed by the United States, which contributed over US\$ 10 billion under Plan Colombia: Plan for Peace, Prosperity and the Strengthening of the State. While the policy succeeded in weakening the guerrilla group, it also entailed significant military and economic losses for the country (Garzón Triana, 2011). The structural causes of the conflict remained unresolved and every attempt at peace had failed to address underlying issues. Seeking a way out of the armed conflict, the government of Juan Manuel Santos (2010–2018) initiated confidential talks with FARC-EP in 2010 to minimize media interference (Cruz Rodríguez, 2015). The two parties began formal negotiations in Havana in 2012 (Calderón Rojas, 2016). In 2013, agreements were reached on comprehensive rural reform, along with the opening of democratic space to include the political participation of guerrilla groups; in 2014, an agreement was reached to solve the illicit drug problem; and in 2015, the Comprehensive System of Truth, Justice, Reparation and Non-Repetition was established (Castrillón-Torres and Cadavid-Ramírez, 2018).

On 24 November 2016, the Colombian Government and FARC-EP signed the Final Agreement for Ending the Conflict and Building a Stable and Lasting Peace, structured around six key points: (i) comprehensive rural reform; (ii) political participation and a democratic opportunity to build peace; (iii) bilateral and definitive ceasefire and cessation of hostilities and laying down of arms, reincorporation of FARC-EP into civilian life, and security guarantees and the fight against criminal organizations responsible for homicides and massacres or who attack human rights advocates; (iv) solution to the illicit drugs problem; (v) victims (Comprehensive System of Truth, Justice, Reparation and Non-Repetition) and (vi) implementation and verification mechanisms. This process marked a milestone for the country, as the initial partial agreements generated trust among the population and economic actors, which in turn fostered a favourable climate for investment and growth. However, it also posed major challenges in terms of development, reparations and justice for the more than 8 million victims of the conflict.

III. Effects of the armed conflict on Colombia's economy

Various schools of thought concur that economic growth depends on investment in physical capital and technical progress. However, while some authors argue that these factors are exogenously determined (Harrod, 1939; Domar, 1946; Solow, 1956; Swan, 1956; Mankiw, Romer and Weil, 1992), others attribute technical progress to endogenous factors such as the accumulation of knowledge within countries (Romer, 1991), improvements in human capital (Uzawa, 1965; Lucas, 1988), the investment decisions made by economic agents (Romer, 1990), public expenditure and taxes (Barro, 1990) and the degree of trade openness (Grossman and Helpman, 1990; Young, 1991). In addition, foreign direct investment plays a critical role in developing economies that lack the capacity to finance capital formation and has a positive impact on GDP, employment, production and knowledge transfer (Li and Liu, 2005; Jiménez Giraldo and Rendón Obando, 2012). All these factors are strongly impacted by the instability and uncertainty generated by armed conflict.

Other studies have highlighted the importance of institutions as determinants of economic growth (Dosi, 1988; Freeman and Pérez, 1988; Nelson and Winter, 1992; Boyer, 1993; Zysman, 1994). Institutions regulate interactions among economic agents and contribute to technological progress by driving progress in innovation, education, physical capital formation and the protection of private ownership (Nelson and Sampat, 2001; Bandeira, 2008; Galindo Martín, 2010). Evidence has shown that institutions affect economic growth by establishing social rules and norms that ensure the proper functioning of markets through respect for private rights, civil liberties, impartial judicial processes and personal autonomy without State interference (Axialá Pastó and Fabro Esteban, 2011; Morales Sánchez, 2015; Carballo and Fracchia, 2016). Therefore, building strong institutions is essential to achieve sustainable economic growth (Vallejos and Domínguez, 2013; Fernández-Torres, Ramajo-Hernández and Díaz-Casero, 2019).

IV. Methodologies used to study the effects of armed conflict on the Colombian economy

Various methodologies have been used to assess the impact of armed conflict on economic growth. Using Tobit regressions based on a gravity model of international trade, Blomberg and Mody (2005) find that violence had a negative effect on trade and investment in World Trade Organization member countries in the period 1981–1998. Bodea and Elbadawi (2008) apply the generalized method of moments and identify a negative impact of organized political violence on economic growth in a sample of 68 developing and developed countries between 1970 and 1990. Diallo (2018) uses ordinary least squares and instrumental variable regressions based on Barro's (1990) endogenous growth model for a sample of 77 developing countries between 2008 and 2012. The analysis shows an inverse relationship between economic growth and the internal violence index developed by Feindouno, Goujon and Wagner (2016).

In the case of Colombia, Cárdenas (2001) analyses the effects of armed conflict on economic growth using the time series methodology of Ben-David and Papell (1998) and finds that drug trafficking and internal armed conflict have had a negative impact on the country's productivity and growth rate. Querubín Borrero (2003), employing linear regression and difference-in-differences methods, concludes that violence and its various forms (crime, armed conflict, drug trafficking) have hindered economic growth in Colombia's departments. Using a three-stage least squares method based on a variation of the Mankiw, Romer and Weil (1992) growth model, Vargas (2003) shows the adverse effects of internal armed conflict on per capita GDP. Carranza Romero, Dueñas Herrera and González Espitia (2011), employing a univariate and multivariate time series analysis, find a bidirectional causal relationship between homicides and economic activity. The Johansen multivariate cointegration method used by Molina and Hurtado Rendón (2012) indicates that violence —as measured by the homicide rate— has a long-term negative impact on economic growth in Colombia. Gil León and Uribe Peñaranda (2017) estimate an expanded Solow (1956) growth model including variables for violence and crime through ordinary least squares. The results indicate that the rise in kidnappings negatively affects the annual GDP growth rate.

Concerning the effects of reduced violence in Colombia, Querubín Borrero (2003) calculates that every 1% reduction in violence would generate annual real GDP growth of 0.06%. According to Santa María Salamanca, Rojas Delgadillo and Hernández Díaz (2013, cited in Ríos Sierra, 2020) this effect is over 2% of GDP. Betancur, Libos and Ortiz (2020) estimate that the peace process will contribute an average of 0.17–0.28 percentage points per year to the country's economic growth between 2017 and 2031. Under this scenario, the demobilization of FARC-EP would contribute 0.05–0.16 percentage points per year to GDP growth over a 10-year period, while contributions provided through the Investment Fund for Peace would boost growth by an average of 0.12 percentage points per year, thanks to increased funding in more productive sectors.

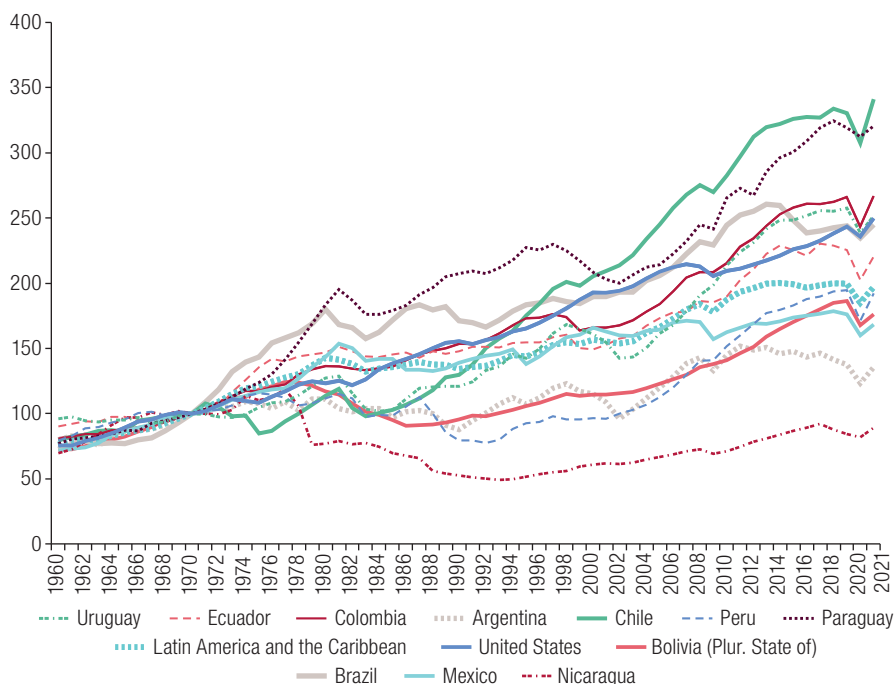
1. Economic effects of the armed conflict in Colombia

Figure 1 presents the changes in Colombia's standardized per capita GDP (1970 = 100) compared with selected countries in the Americas¹ and the average for Latin America and the Caribbean. Colombia maintained a growth trajectory similar to the regional average and that of the United States until 1986. From that year onward, a divergent trend emerged: while average growth for Latin America and the Caribbean stagnated, Colombia continued to grow at a pace comparable to that of the United States

¹ Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Nicaragua, Paraguay, Peru, the Plurinational State of Bolivia, the United States and Uruguay.

until 1998. Between 1998 and 2010, Colombia experienced a period of relatively slower growth, after which growth accelerated, surpassing both the regional and United States averages. This upward trend continued until the outbreak of the coronavirus disease (COVID-19) pandemic in 2020, when per capita GDP contracted sharply.

Figure 1
Latin America (selected countries) and United States: annual changes
in standardized per capita GDP, 1960–2021
(Index: 1970 = 100 at constant prices)



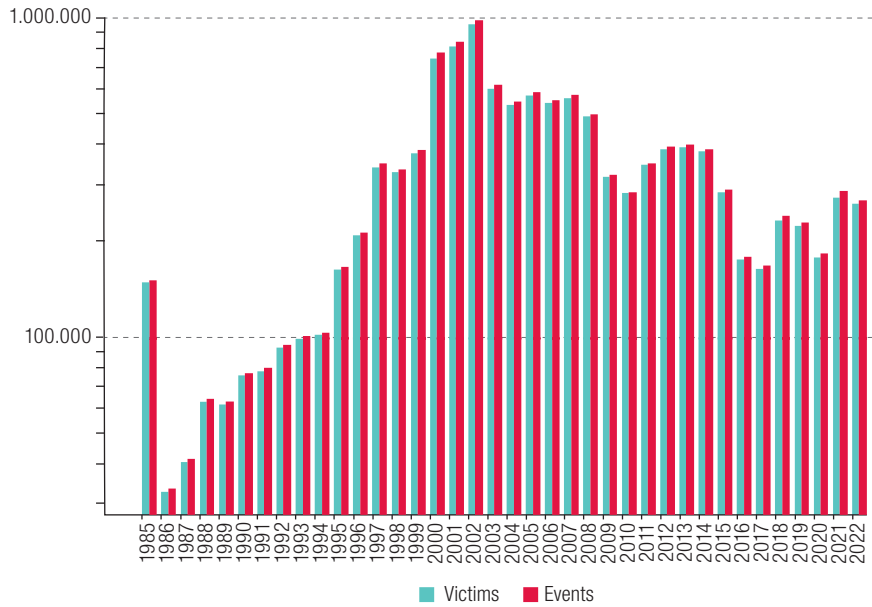
Source: World Bank, "GDP per capita (constant 2015 US\$)" [online] <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD>.

The change in per capita GDP appears to be related to the number of victims of the armed conflict. According to data from the Central Register of Victims up to 31 January 2023, the number of victims stood at 9.423 million people, of which 8.391 million were forcibly displaced and 1.278 million were killed.

Figure 2 shows the number of victims and the events resulting from the armed conflict. Both the number of victims and events associated with the armed conflict increased significantly starting in 1995, peaking in 2002. This trend may explain the relative decline in per capita GDP during that period. Beginning in 2014, the number of victims and events decreased markedly, coinciding with the country's stronger economic growth.

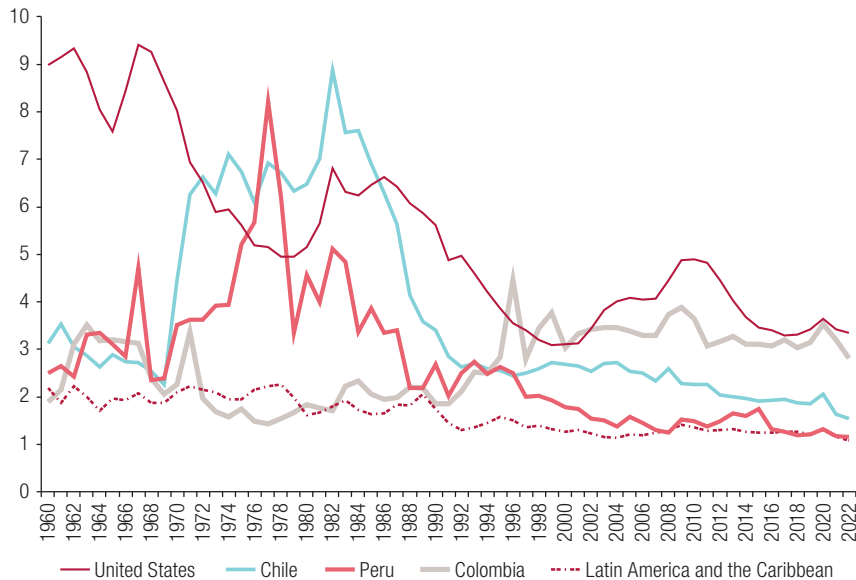
Figure 3 shows how military spending in Colombia expanded considerably from 1990 onward in response to increased hostilities of the armed conflict, reaching a peak of 4.5% of GDP in 1996 and then stabilizing at around 3.5%. The country's current military spending is comparable to that of the United States and well above the regional average for Latin America and the Caribbean (1.13%). Despite the peace negotiations and signing of the Agreement, the government's military spending remains unchanged.

Figure 2
Colombia: victims and events associated with the armed conflict, 1985–2022
(Number)



Source: Victims' Unit, "Publicación de datos abiertos" [online] <https://www.unidadvictimas.gov.co/publicacion-de-datos-abiertos/>.
Note: "Victims" refers to persons affected by a victimizing act at the local level; "events" refer to the occurrence of such acts in a given place (municipality) and on a specific date.

Figure 3
Colombia and selected countries: military spending, 1960–2022
(Percentages of GDP)



Source: World Bank, "World Bank Open Data" [online] <https://data.worldbank.org/>.

V. Results obtained using the synthetic control method

The empirical studies reviewed in the previous section identify a negative effect of violence on economic growth. However, they do not provide a clear picture of how Colombia's economy would have evolved in the absence of the peace process. Colombia's particular situation makes it difficult to find an economic unit of comparison (counterfactual) with similar socioeconomic characteristics. However, when considering the broader group of countries in the region, Colombia shares economic, institutional and social characteristics with several of them.

In order to assess the effect of the peace agreements between Colombia and FARC-EP in 2013–2016 (the intervention), we applied the synthetic control method developed by Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010). The method's primary objective is to construct a synthetic unit that serves as a counterfactual and accurately reflects the trajectory that the treated unit would have followed had the intervention not occurred (Kaul and others, 2017). The "synthetic Colombia" unit is constructed through a linear combination of untreated units (Mok León, 2018) as a weighted average (Abadie, Diamond and Hainmueller, 2011) based on their similarity to the unit of study (Bouttell and others, 2018).

Following the methodology of Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010), we consider $J+1$ units, $j = 1, 2, 3, \dots, j+1$ over t time periods ($t = 1, 2, 3, \dots, T$), where $j = 1$ refers to the treated unit (Colombia). The units $j = 2, \dots, J+1$ form the control group made up of countries in the sample that did not undergo the intervention, referred to as the "donor group", which is used to construct the "synthetic Colombia" unit. The intervention occurs in period T_{0+1} , so $t_0 = 1, \dots, T_0$ represents the pre-intervention periods, corresponding to the years preceding the signing of the 2016 peace agreement. The start of official negotiations in 2012 through to the signing of the peace agreement in 2016 marks the post-intervention period, $t_1 = T_{0+1}, \dots, T$, such that $t = t_0 + t_1$.

As in Abadie, Diamond and Hainmueller (2011), we define two possible outcomes for the variable of interest: Y_{1t} is the observed per capita GDP of Colombia (at constant 2010 prices), the unit that received the intervention (peace process negotiations); and Y_{1t}^N is the counterfactual, representing what Colombia's real per capita GDP would have been in the absence of the intervention. Unlike the former, the latter is not observed for the treated unit during the post-intervention period. The goal is to estimate the marginal effect of the treatment (α_{1t_1}) on Colombia's real per capita GDP in the post-intervention period (t_1) using information provided by the donor group, which is defined as:

$$\alpha_{1t_1} = Y_{1t_1} - Y_{1t_1}^N \quad (1)$$

Y_{1t}^N is created by taking a weighted average of the control group of countries that did not receive the treatment (donors) and whose observed characteristics (per capita GDP and other relevant variables) most closely resemble those of Colombia during the pre-treatment period. To do this, a set of observable predictor variables (Z_j) that influence the outcome variable prior to the intervention must be selected.

The weights assigned to the untreated units to construct the synthetic unit are collected in a weight vector $W = (w_2, \dots, w_{j+1})'$, where w_j is the weight for each donor country, such that $w_j \geq 0$ and $\sum_{j=2}^{J+1} w_j = 1$. Each vector W represents a specific weighted average of control units and thus forms a potential synthetic control unit (Abadie, Diamond and Hainmueller, 2011). Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010) propose finding a W such that $\sum_{j=2}^{J+1} w_j Y_{jt} = Y_{1t}$

for all $\sum_{j=2}^{J+1} w_j Z_{jt} = Z_{1t}$ during the pre-treatment period. In this way, the estimates of $\sum_{j=2}^{J+1} w_j Y_{jt}$ for the post-treatment period $t \geq T_0$ will be a valid estimate of Y_{1t}^N , from which the marginal effect of treatment in the subsequent years can be calculated (Rosado-Anastacio, 2018). Therefore, the estimated impact would be:

$$\hat{a}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j Y_{jt}, \quad t \geq T_0 \quad (2)$$

According to Abadie, Diamond and Hainmueller (2010), \hat{a}_{1t} is an unbiased estimator of α_{1t} .

There are various ways to select the weight vector. Abadie, Diamond and Hainmueller (2015) choose an optimal weight vector (W^*) that minimizes the difference between the observed pre-intervention characteristics of Colombia (X_1) and the untreated units ($X_0 W^*$). That is: $\text{Min} \| X_1 - X_0 W^* \|_V = \sqrt{(X_1 - X_0 W^*)' V (X_1 - X_0 W^*)}$. Here, X_1 is a $k \times 1$ vector of pre-treatment characteristics for Colombia (the treated unit) and X_0 is a $k \times j$ matrix with the same characteristics for the untreated units that make up the synthetic unit. Lastly, V is a symmetric, positive semi-definite $k \times k$ diagonal matrix that allows different weights to be assigned to the variables X_0 and X_1 depending on their predictive power for the outcome (the off-diagonal elements are zero). An optimal V should be selected so that its weights minimize the root mean squared prediction error of the synthetic control estimator in the pre-treatment period (Kaul and others, 2017). In this way, the synthetic control method is capable of accurately replicating the characteristics of the treated unit when $X_1 = X_0 W^*$. Abadie, Diamond and Hainmueller (2010) select V using a regression-based method that assigns equal weights.

It is also necessary to control for various explanatory factors. The model for estimating Y_{1t}^N can be expressed as follows:

$$Y_{1t}^N = \delta_t + \theta_t Z_j + \lambda_t \mu_j + \varepsilon_{jt} \quad (3)$$

where δ_t is a time factor that is invariant across countries; Z_j is a vector of observable covariates in the pre-treatment period for each of the $j + 1$ countries, known as matching variables;² θ_t is a vector of unknown parameters; λ_t is a vector of unobserved common factors that vary over time (such as cycles or trends); μ_j is a vector of unobserved country-specific characteristics; and ε_{jt} is a random error term with a mean of zero.

In this way, the synthetic group obtained approximates the outcomes of the treated region before the intervention and serves as a control after the treatment is applied. The difference in outcomes between the treated unit and its synthetic control counterpart reveals the policy's effectiveness (McClelland and Gault, 2017). Abadie and Vives-i-Bastida (2022) further stress that achieving a good pre-treatment fit is essential for synthetic control estimators to perform well. However, this alone is not sufficient, as the model may still suffer from overfitting when the donor group is too large, unobserved factors are present or the pre-treatment period is too short.

To ensure that the results obtained represent a causal effect, Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010 and 2015) recommend conducting placebo tests to determine whether the gap observed in Colombia could have been caused by factors other than the peace negotiations between 2013 and 2016. This involves applying the treatment to randomly selected

² Hahn and Shi (2017, as cited in McClelland and Gault, 2017) recommend having a relatively large number of predictors compared to the number of donor countries, as this improves the selection of the weights assigned to each country in the synthetic control model, even though it runs counter to analysts' typical concerns regarding degrees of freedom.

donor units to assess whether the estimated effect is smaller than that observed in Colombia (Abadie, Diamond and Hainmueller, 2010). Abadie, Diamond and Hainmueller (2015) suggest comparing the difference in the p-value of the synthetic control estimator's root mean squared prediction error before and after the intervention for the treated unit and each placebo unit. If the treatment has an effect, the post-treatment error for Colombia should be larger relative to its pre-treatment value, while the placebo units should not exhibit a substantial increase in error after the treatment.

1. Data

The variable selected to assess the economic impact of Colombia's 2012–2016 peace process is the logarithm of per capita GDP at constant 2010 prices. The explanatory variables with the greatest predictive power for the outcome variable in the treated unit should be selected (Abadie, Diamond and Hainmueller, 2015), as they also determine the selection of donor regions and the weights used to form the synthetic group. The period chosen for the analysis is 1995–2019.³

The selected predictors largely align with those used in the literature mentioned earlier to measure the effects of Colombia's armed conflict (Vargas, 2003; Querubín Borrero, 2003; Sánchez Torres and Díaz Escobar, 2005; Chirinos, 2007; Gates and others, 2012; Gil León and Uribe Peñaranda, 2017). The economic factors considered include investment in physical and human capital (primary and secondary school enrolment rates), trade openness (imports plus exports as a percentage of GDP), industrial output as a share of GDP, inflation rate, foreign direct investment inflows and military spending as a share of GDP. Two demographic variables, obtained from the World Bank, are also included: population growth and mortality rate. In addition, two variables representing institutional quality are considered: checks and balances (“checks”) and government stability (“stabs”), both sourced from the Database of Political Institutions developed by the Inter-American Development Bank (IDB, 2020). The first indicator measures government credibility (Keefer, 2007), with values ranging from 1 (low credibility) to 5 (high credibility). The second measures the percentage of “veto players” who leave the government in a given year. Ultimately, the latter variable was excluded given its adverse effect on the fit of the synthetic control model.

The “synthetic country” was constructed from a group of Latin American countries with similar characteristics in some of the control variables and that had not undergone a process similar to Colombia's in 2013–2016: Argentina, Brazil, Chile, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the Plurinational State of Bolivia and Uruguay.

To ensure a good model fit, McClelland and Gault (2017) recommend including the lagged dependent variable (the outcome variable) among the regressors because it absorbs the effect of any predictor variables included or omitted from the model. Abadie, Diamond and Hainmueller (2010) use three specific years of the outcome variable as lags. Other authors, such as Mok León (2018), O'Neill and others (2016) and Kreif and others (2016), use all lags of the dependent variable as predictors. However, Kaul and others (2017) demonstrate that including all lagged values of the outcome variable before treatment is not advisable because it renders all other predictors (covariates) irrelevant, resulting in a biased estimator. Instead, they suggest using an average of the outcome across all pre-treatment years or the value from the last pre-treatment year. Ferman, Pinto and Possebom (2020) similarly advise against including all lags of the outcome variable when the synthetic control unit needs to balance a specific set of covariates. McClelland and Gault (2017) recommend selecting a small number of lags that reflect the pre-treatment trend of the outcome variable. Furthermore,

³ Data from 2020 onward were excluded to avoid any bias generated by the impact of the COVID-19 pandemic.

McClelland and Gault (2017) and Bonander (2018) recommend including results from different model specifications to select the one that minimizes the root mean squared prediction error of the synthetic control estimator in the pre-treatment period.

Following these recommendations, various sensitivity tests are then performed with different model specifications. The aim is to check for differences in the pre-treatment fit (root mean squared prediction error of the synthetic control estimator) and select the model with the lowest error.⁴

The first aspect to consider is the year selected for treatment. Although the peace agreement was signed in 2016, important commitments were made between 2012 and 2015 (Calderón Rojas, 2016). Different models were estimated for these years, with the lowest prediction error found in 2013, indicating that the peace negotiations had a positive impact on real per capita GDP from the outset by enhancing economic agents' confidence in the viability of the process.

Next, various specifications of the synthetic control model are analysed, incorporating different lags for both the dependent variables and covariates, as recommended by Bonander (2018) and Ferman, Pinto and Possebom (2020). The lowest root mean squared prediction error of the synthetic control estimator (0.0109193) is obtained by including all lags of the dependent variable up to 2012 and excluding covariates. Including the remaining predictors increases the error (0.0114789), which demonstrates the minimal impact that the other covariates have on the outcome variable, thus corroborating the findings of Kaul and others (2017).⁵ Among the alternative specifications, the lowest root mean squared prediction error of the synthetic control estimator is obtained using matching based on five-year intervals from 1995 to 2010, along with the year 2012. In contrast, the specification that included only covariates and excluded lags of the outcome variable produces a higher error, reinforcing the guidance of McClelland and Gault (2017) to include lags of that variable. A similar increase in error occurs when lags are structured in five-year intervals and one pre-treatment variable is randomly omitted. Based on these results, all subsequent analyses will use the specification that includes five-year lags of the outcome variable (1995–2010), the year 2012 and the full set of covariates.

Table 1 presents the weights assigned to each donor country in the “synthetic Colombia” unit, based on the minimization of the squared error. The system assigns weights to five countries.

Table 1
Weights of countries comprising the “synthetic Colombia” unit

Unit	Unit weight
Argentina, Bolivia (Plurinational State of), Chile, Dominican Republic, Guatemala, Mexico, Nicaragua, Panama, El Salvador, Uruguay	0
Honduras	0.04
Brazil	0.088
Peru	0.183
Paraguay	0.266
Ecuador	0.423

Source: Prepared by the authors.

Table 2 presents the values of the predictor variables for real per capita GDP for Colombia (column 1), the corresponding synthetic counterpart (column 2) and the percentage similarity between the two (column 3). Columns 4 and 5 show, respectively, the simple (unweighted) average of the donor group and the percentage similarity with Colombia.

⁴ For the synthetic control method estimation, the “synth” Stata statistical package, developed by Abadie, Diamond and Hainmueller (2015), was used. The “nested” option was employed to create the weight matrix that makes it possible to minimize the root mean squared prediction error of the synthetic control estimator (Abadie, Diamond and Hainmueller, 2010).

⁵ Since the work of Islam (1995), growth models have often used regressor data in five-year intervals.

Table 2

Comparison of predictors of average pre-intervention economic growth between Colombia, “synthetic Colombia” and the unweighted donor group

Variable	Colombia	“Synthetic Colombia”	Percentage synthetic control model/Colombia	Average of control countries	Average synthetic control model/Colombia (Percentages)
<i>IPIBpc(1995)</i>	8.335745	8.32397	100	8.305922	100
<i>IPIBpc(2000)</i>	8.29501	8.298157	100	8.388889	99
<i>IPIBpc(2005)</i>	8.400076	8.408705	100	8.469287	99
<i>IPIBpc(2010)</i>	8.558248	8.571558	100	8.621749	99
<i>IPIBpc(2012)</i>	8.642467	8.639261	100	8.687569	99
<i>FBK</i>	20.47394	21.88805	94	22.32291	92
<i>Industry/GDP</i>	29.55137	31.87236	93	27.51741	107
<i>Mortality rate</i>	5.196167	5.476039	95	6.177907	84
<i>Population growth</i>	1.445254	1.56128	93	1.367605	106
<i>Primary school enrolment</i>	119.1628	113.7988	105	109.7265	109
<i>Secondary school enrolment</i>	82.77796	71.84343	109	77.08553	107
<i>Inflation</i>	10.08567	7.202676	140	7.331686	138
<i>FDI inflows/GDP</i>	3.321019	2.226504	149	3.692775	90
<i>Military spending/GDP</i>	3.410736	1.770442	193	1.261664	27
<i>Checks</i>	3.777778	3.789278	100	3.490667	108

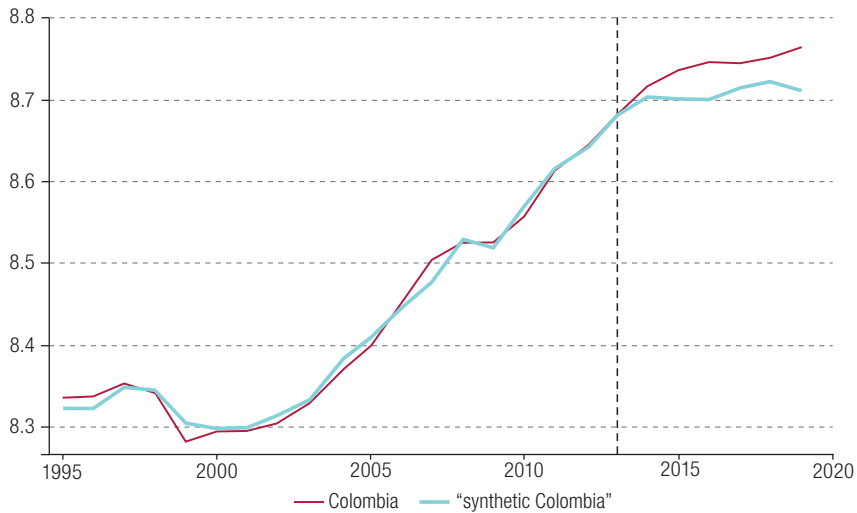
Source: Prepared by the authors.

The results indicate a high degree of alignment between the synthetic control model and Colombia across most variables. However, Colombia shows substantially higher values for three variables (inflation, FDI inflows as a percentage of GDP and military expenditure as a percentage of GDP) relative to its synthetic counterpart. Despite this difference, these variables were retained in the analysis as their exclusion worsened model fit. Compared to the values calculated for the donor group without weighting criteria, the synthetic control model yields a significantly better overall fit, confirming the added value of this approach.

Figure 4 illustrates how the synthetic control group closely replicates the trajectory of Colombia’s real per capita GDP throughout most of the pre-intervention period. From 2013 onward, however, the real per capita GDP of Colombia begins to diverge significantly from that of its synthetic counterpart. While the synthetic donor group exhibits stagnation in real per capita GDP, Colombia shows sustained growth through to 2019. This result indicates that the peace negotiations initiated officially in late 2012 and culminating in the signing of the Agreement in September 2016 have a positive impact on Colombia’s real per capita GDP starting in 2013. Figure 5 supports this result, showing that the gap in real per capita GDP between Colombia and its synthetic control remain close to zero until 2013. From that year onward, the gap widens substantially, reflecting the onset of the peace negotiation process.

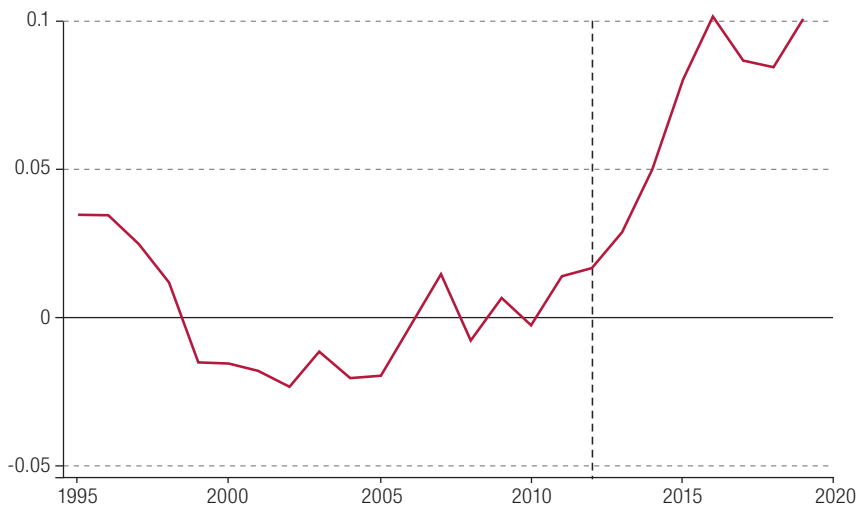
A robustness analysis is then conducted, employing placebo tests following the methodology proposed by Abadie, Diamond and Hainmueller (2010 and 2015). This entails estimating the same model for all untreated units within the synthetic group —excluding Colombia— while assuming that they were treated in 2013. If the distribution of placebo effects is comparable in magnitude to that of Colombia, the observed effect may plausibly be attributed to chance (Galiani and Quistorff, 2017). To avoid issues of poor fit for some countries during the pre-intervention period, Galiani and Quistorff (2017) recommend calculating standardized p-values (*Pvals_std*), in which the original p-values are weighted by the quality of the pre-intervention fit. This value provides a measure of the likelihood that the estimated effect for Colombia occurred by chance and offers insight into the adequacy of the model’s fit during the pre-intervention period.

Figure 4
Colombia: real per capita GDP and its synthetic counterpart, 1995–2019
(Logarithms)



Source: Prepared by the authors.

Figure 5
Colombia and “synthetic Colombia”: gap in real per capita GDP, 1995–2019
(Logarithms)



Source: Prepared by the authors.

Table 3 presents the inference results. The “estimate” column quantifies the effect depicted in figure 5 for the post-treatment period (2013–2019). The p-value indicates the proportion of control units that exhibit an effect at least as large as that of the treated unit. In 2013, this value exceeds 50%. With regard to the standardized p-values, the results are low throughout the post-treatment period. The highest value is observed in 2013 (0.267), a year that marked the beginning of the peace talks that would eventually lead to the 2016 agreement. From 2015 onward, the standardized p-values approach zero. This finding is consistent with expectations, as the effects of policies aimed at fostering stability typically take time to reach their potential.

Table 3
Colombia: inference of real per capita GDP, post-treatment period

Year	Estimate	p-value	Pvals_std
2013	0.0361569	0.533	0.267
2014	0.0578107	0.400	0.133
2015	0.0866418	0.400	0.067
2016	0.1071765	0.267	0.000
2017	0.0931482	0.400	0.000
2018	0.0896696	0.400	0.067
2019	0.1054311	0.400	0.000

Source: Prepared by the authors using the `synth_runner` command from `Synth_Runner` package, described in S. Galiani and B. Quistorff, "The `synth_runner` package: utilities to automate synthetic control estimation using `synth`", *The Stata Journal*, vol. 17, No. 4, December 2017.

VI. Conclusions

The aim of this study has been to analyse the effect of the peace negotiations during the period 2012–2016 on Colombia's real per capita GDP. There are differing views regarding the effects following the signing of the peace agreement. Authors such as Collier (1999), Hoeffler and Reynal-Querol (2003), Ruiz Díaz, Galeano Raquejo and Gil Mateus (2015) and Millán Celis and Jiménez Quitian (2017) argue that, at least in the short term, the effects of peace have been negative for the country's economic growth owing to the lack of institutional and societal adaptation in the post-conflict period. Persistent uncertainty related to political instability may also dampen investment decisions (Alesina and others, 1996; Poinso, 2003; Posada Duque, 2010). These studies employ traditional methods based on linear regressions or impact evaluation techniques, which do not allow a precise estimation of what Colombia's economic growth trajectory would have been had the peace process not taken place.

The outcomes of this process depend on the design and implementation of policies during and after the negotiations, which should aim to address the factors that led to the armed conflict in Colombia, reduce violence and provide reparations for the wrongs inflicted on society (Collier, Hoeffler and Söderbom, 2008; Hoeffler, Ijaz and Von Billerbeck, 2010). Such actions should also consider the context and dynamics of the actors involved, with the ultimate goal of achieving a sustainable and stable peace from both economic and social perspectives (Sakalasuriya, Haigh and Amaratunga, 2018).

In Colombia, throughout the negotiation period preceding the peace agreement (2012–2016), institutional, social and economic policies were consolidated with the shared objective of mitigating the root causes of the conflict. These were related to the abandonment and poverty of rural areas, as well as the political exclusion of social groups owing to the long-standing institutional dominance of the conservative and liberal parties. This period of reconstruction aimed to restore the normal and effective functioning of the economy as quickly as possible, which started with the restoration of physical and non-physical capital (Brandon, 2018) and culminated in the signing of the 2016 peace accord.

The use of the synthetic control method enabled us to identify the positive effects of Colombia's peace negotiations, the objective of which was to implement a series of measures designed to prevent a resurgence of violence. The process began to bear fruit in 2013, with the approval of thorough rural reform and reparations for victims of the conflict. These initial agreements gradually fostered a sense of public trust that the process was on the right track, thereby generating a positive impact on real per capita GDP. The reduction in violence from 2014 onward, coupled with the prioritization of social spending, reintegration of combatants into civil and political life and recovery of infrastructure, helped widen the gap with the synthetic counterpart, a trend that appears to be consolidated with the 2016 agreement. In the 2016–2019 period, Colombia had a positive annual GDP growth rate of 9.19%

according to data from the World Bank (n.d.) (expressed in dollars at 2010 prices), while growth was not observed in its synthetic counterpart. Improved conditions for investors stemming from reduced destruction of physical and human capital, lower crime rates and greater political stability (Bernal Zepeda and Castillo Ponce, 2012; Jiménez Giraldo and Rendón Obando, 2012) encouraged new investments and greater trade openness.

These findings illustrate that the Colombian peace negotiations involved dynamic institutional transformations from the outset, which must be sustained over time to ensure the long-term success of the process. In addition, the results indicate that the benefits of peace became apparent in subsequent years, as policies promoting social inclusion, development and sustainability were implemented and began to show significant progress. This explains how, from the early stages of a credible peace process, the improved climate of certainty prompted economic agents to adjust their expectations in a more positive direction.

Bibliography

- Abadie, A., A. Diamond and J. Hainmueller (2015), “Comparative politics and the synthetic control method”, *American Journal of Political Science*, vol. 59, No. 2, April.
- _____(2011), “Synth: an R package for synthetic control methods in comparative case studies”, *Journal of Statistical Software*, vol. 42, No. 13.
- _____(2010), “Synthetic control methods for comparative case studies: estimating the effect of California’s Tobacco Control Program”, *Journal of the American Statistical Association*, vol. 105, No. 490.
- Abadie, A. and J. Gardeazabal (2003), “The economic costs of conflict: a case study of the Basque Country”, *The American Economic Review*, vol. 93, No. 1.
- Abadie, A. and J. Vives-i-Bastida (2022), “Synthetic controls in action”, *Papers*, No. 203.06279, arXiv.
- Alesina, A. and others (1996), “Political instability and economic growth”, *Journal of Economic Growth*, vol. 1, No. 2.
- Álvarez, S. and A. Rettberg (2008), “Cuantificando los efectos económicos del conflicto: una exploración de los costos y los estudios sobre los costos del conflicto armado colombiano”, *Colombia Internacional*, No. 67.
- Archila Neira, M. (1996), “¿Utopía armada? Oposición política y movimientos sociales durante el Frente Nacional”, *Revista Controversia*, No. 168.
- Axialá Pastó, J. and G. Fabro Esteban (2011), “Calidad institucional y crecimiento económico: nuevos avances y evidencia”, *Ekonomiaz: Revista Vasca de Economía*, No. 77.
- Bandeira, P. (2008), “La relación entre las instituciones y el desarrollo económico de las naciones”, *MPRA Paper*, No. 13371, Munich Personal RePEc Archive.
- Barro, R. J. (1991), “Economic growth in a cross section of countries”, *The Quarterly Journal of Economics*, vol. 106, No. 2, May.
- _____(1990), “Government spending in a simple model of endogenous growth”, *Journal of Political Economy*, vol. 98, No. 5, part 2, October.
- Ben-David, D. and D. H. Papell (1998), “Slowdowns and meltdowns: postwar growth evidence from 74 countries”, *The Review of Economics and Statistics*, vol. 80, No. 4, November.
- Bernal Zepeda, M. and R. A. Castillo Ponce (2012), “Efecto de la delincuencia sobre la inversión extranjera directa en México”, *Comercio Exterior*, vol. 62, No. 3, May–June.
- Betancur, J. S., S. Libos and M. Ortiz (2020), “Beneficios económicos del Acuerdo de Paz en Colombia”, *Coyuntura Económica: Investigación Económica y Social*, vol. 50, December.
- Blomberg, S. B. and A. Mody (2005), “How severely does violence deter international investment?”, *Claremont Colleges Working Papers*, No. 2005-01, Claremont McKenna College.
- Bodea, C. and I. A. Elbadawi (2008), “Political violence and economic growth”, *Policy Research Working Paper*, No. 4692, Washington, D.C., World Bank.
- Bonander, C. (2018), “Compared with what? Estimating the effects of injury prevention policies using the synthetic control method”, *Injury Prevention*, vol. 24, suppl. 1, June.

- Bouttell, J. and others (2018), "Synthetic control methodology as a tool for evaluating population-level health interventions", *Journal of Epidemiology and Community Health*, vol. 72, No. 8.
- Boyer, R. (1993), "Labour institutions and economic growth: a survey and a "regulationist" approach", *Labour*, vol. 7, No. 1, March.
- Brandon, J. D. (2018), "Challenges to economic growth in post-conflict environments", master's thesis, University of Barcelona.
- Calderón Rojas, J. (2016), "Etapas del conflicto armado en Colombia: hacia el posconflicto", *Latinoamérica: Revista de Estudios Latinoamericanos*, No. 62, January–June.
- Carballo, I. E. and E. L. Fracchia (2016), "Instituciones y economía: una hoja de ruta posible para su comprensión", *Filosofía de la Economía*, vol. 5.
- Cárdenas, M. (2001), "Economic growth in Colombia: a reversal of 'fortune'?", *CID Working Paper*, No. 83, Cambridge, Center for International Development (CID), Harvard University.
- Carranza Romero, J. E., X. Dueñas Herrera and C. G. González Espitia (2011), "Análisis empírico de la relación entre la actividad económica y la violencia homicida en Colombia", *Estudios Gerenciales*, vol. 27, No. 119, April–June.
- Castrillón-Torres, G. A. and H. J. Cadavid-Ramírez (2018), "Proceso de paz entre gobierno colombiano y las FARC-EP: camino hacia la reincorporación de combatientes", *Entramado*, vol. 14, No. 2.
- Chirinos, R. (2007), "Determinantes del crecimiento económico: una revisión de la literatura existente y estimaciones para el período 1960-2000", *Documentos de Trabajo*, No. 2007-013, Central Reserve Bank of Peru.
- Collier, P. (1999), "On the economic consequences of civil war", *Oxford Economic Papers*, vol. 51, No. 1, Symposium on Trade, Technology, and Growth, January.
- Collier, P., A. Hoeffler and M. Söderbom (2008), "Post-conflict risks", *Journal of Peace Research*, vol. 45, No. 4, July.
- Cruz Rodríguez, E. (2015), "El éxito relativo de la política de paz en Colombia", *Revista San Gregorio*, No. 9.
- Diallo, I. A. (2018), "How internal violence lowers economic growth: a theoretical and empirical study", *MPRA Paper*, No. 88285, Munich Personal RePEc Archive.
- Díaz Gómez, J. F. (2015), "Impacto del accionar de las bandas criminales emergentes Bacrim en el crecimiento económico del departamento de Cundinamarca en el periodo 2006-2012", University of La Salle.
- DNP (National Planning Department) (2015), "Dividendo económico de la paz permitiría un crecimiento adicional de 1,1% a 1,9%: DNP", 9 December [online] <https://2022.dnp.gov.co/Paginas/Dividendo-econ%C3%B3mico-de-la-paz-permitir%C3%ADa-un-crecimiento-adicional-de-1,1-a-1,9-DNP-.aspx>.
- Domar, E. D. (1946), "Capital expansion, rate of growth, and employment", *The Econometric Society*, vol. 14, No. 2, April.
- Dosi, G. (1988), "Sources, procedures, and microeconomic effects of innovation", *Journal of Economic Literature*, vol. 26, No. 3, September.
- Echandía-Castilla, C. and I. Cabrera-Nossa (2019), "La Fuerza Alternativa Revolucionaria del Común en las elecciones legislativas de 2018 (Catatumbo-Colombia)", *FORUM: Revista Departamento de Ciencia Política*, vol. 16, July–December.
- Echeverry, J. C., N. Salazar and V. Navas (2000), "¿Nos parecemos al resto del mundo?: el conflicto colombiano en el contexto internacional", *Planeación y Desarrollo*, vol. 31, July–December.
- ECLAC (Economic Commission for Latin America and the Caribbean) (2016), *Preliminary Overview of the Economies of Latin America and the Caribbean, 2015* (LC/G.2655-P), Santiago.
- Fajardo-Heyward, P. (2018), "Colombia 2017: entre la implementación y la incertidumbre", *Revista de Ciencia Política*, vol. 38, No. 2, August.
- Feindouno, S., M. Goujon and L. Wagner (2016), "Internal violence index: a composite and quantitative measure of internal violence and crime in developing countries", *Working Paper-Development Policies*, No. 151, Fondation pour les études et recherches sur le développement international (FERDI).
- Ferman, B., C. Pinto and V. Possebom (2020), "Cherry picking with synthetic controls", *Journal of Policy Analysis and Management*, vol. 39, No. 2.
- Fernández-Torres, Y., J. Ramajo-Hernández and J. C. Díaz-Casero (2019), "Instituciones y volatilidad del crecimiento económico: una aproximación a América Latina y el Caribe", *Cuadernos de Economía*, vol. 38, No. 76, January.
- Freeman, C. and C. Pérez (1988), "Structural crises of adjustment, business cycles and investment behaviour", *Technical Change and Economic Theory*, G. Dosi and others (eds.), London, Pinter Publishers.

- Galiani, S. and B. Quistorff (2017), “The synth_runner package: utilities to automate synthetic control estimation using synth”, *The Stata Journal*, vol. 17, No. 4, December.
- Galindo Martín, M. Á. (2010), “Instituciones y crecimiento económico”, *Boletín Económico de ICE*, No. 2992, July.
- Garzón Triana, L. M. (2011), “Análisis de los tres principales objetivos estratégicos de la política de seguridad democrática: consolidación del control estatal del territorio, confianza inversionista y cohesión social (2002-2010)”, graduate thesis, University of Rosario.
- Gates, S. and others (2012), “Development consequences of armed conflict”, *World Development*, vol. 40, No. 9, September.
- Gil León, J. M. and W. A. Uribe Peñaranda (2017), “Violencia y crecimiento económico: un análisis empírico para Colombia”, *Económicas CUC*, vol. 38, No. 1.
- Gilhodés, P. (1974), *Las luchas agrarias en Colombia*, Bogotá, La Carreta.
- Glick, R. and A. M. Taylor (2010), “Collateral damage: trade disruption and the economic impact of war”, *The Review of Economics and Statistics*, vol. 92, No. 1, February.
- Gómez, C. M. (2001), “Economía y violencia en Colombia”, *Quorum: Revista de Pensamiento Iberoamericano*, vol. 2.
- Granada, S., J. A. Restrepo and A. Tobón García (2009), “Neoparamilitarismo en Colombia: una herramienta conceptual para la interpretación de dinámicas recientes del conflicto armado colombiano”, *Guerra y violencias en Colombia: herramientas e interpretaciones*, J. A. Restrepo and D. Aponte (eds.), Bogotá, Pontifical University Javeriana.
- Grossman, G. M. and E. Helpman (1990), “Comparative advantage and long-run growth”, *The American Economic Review*, vol. 80, No. 4, September.
- Guzmán Campos, G., O. F. Borda and E. Umaña Luna (1962), *La violencia en Colombia*, Bogotá, Tercer Mundo.
- Hahn, J. and R. Shi (2017), “Synthetic control and inference”, *Econometrics*, vol. 5, No. 4, November.
- Harrod, R. F. (1939), “An essay in dynamic theory”, *The Economic Journal*, vol. 49, No. 193, March.
- Hobsbawm, E. J. (1974), “La anatomía de ‘la violencia’ en Colombia”, *Rebeldes primitivos: estudio sobre las formas arcaicas de los movimientos sociales en los siglos XIX y XX*, Barcelona, Ariel.
- Hoeffler, A. and M. Reynal-Querol (2003), “Measuring the costs of conflict” [online] <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=7b9962f557886cb8c17496933a9e5b9a1d5b1a11>.
- Hoeffler, A., S. S. Ijaz and S. von Billerbeck (2010), *Post-Conflict Recovery and Peacebuilding*, Washington, D.C., World Bank.
- IDB (Inter-American Development Bank) (2020), Database of Political Institutions [online] <https://www.iadb.org/es/recursos-de-conocimiento/investigacion-en-el-bid/conjuntos-de-datos/base-de-datos-de-instituciones>.
- Imai, K. and J. Weinstein (2000), “Measuring the economic impact of civil war”, *CID Working Paper*, No. 51, Center for International Development (CID), Harvard University.
- Islam, N. (1995), “Growth empirics: a panel data approach”, *The Quarterly Journal of Economics*, vol. 110, No. 4, November.
- Jiménez Giraldo, D. E. and H. Rendón Obando (2012), “Determinantes y efectos de la inversión extranjera directa: revisión de literatura”, *Ensayos de Economía*, vol. 22, No. 41, July–December.
- Kaul, A. and others (2017), “Synthetic control methods: never use all pre-intervention outcomes together with covariates”, *MPRA Paper*, No. 83790, Munich Personal RePEc Archive.
- Keefer, P. (2007), “Beyond legal origin and checks and balances: political credibility, citizen information and financial sector development”, *World Bank Policy Research Working Paper*, No. 4154, Washington, D.C., World Bank.
- Kreif, N. and others (2016), “Examination of the synthetic control method for evaluating health policies with multiple treated units”, *Health Economics*, vol. 25, No. 12, December.
- LeGrand, C. (1988), *Colonización y protesta campesina en Colombia (1850-1950)*, Bogotá, National University of Colombia.
- Li, X. and X. Liu (2005), “Foreign direct investment and economic growth: an increasingly endogenous relationship”, *World Development*, vol. 33, No. 3, March.
- Lim, W. M. and others (2022), “What is at stake in a war? A prospective evaluation of the Ukraine and Russia conflict for business and society”, *Global Business and Organizational Excellence*, vol. 41, No. 6, September–October.
- Lindsay, A., C. Gündüz and D. B. Subedi (2009), *What role for business in “post-conflict” economic recovery? Perspectives from Nepal*, London, International Alert.

- Lucas, R. E., Jr. (1988), "On the mechanics of economic development", *Journal of Monetary Economics*, vol. 22, No. 1, July.
- Mankiw, G., D. Romer and D. Weil (1992), "A contribution to the empirics of economic growth", *The Quarterly Journal of Economics*, vol. 107, No. 2, May.
- McClelland, R. and S. Gault (2017), *The Synthetic Control Method as a Tool to Understand State Policy*, Urban Institute.
- Millán Celis, M. F. and I. F. Jiménez Quitian (2017), "Economía y paz: Colombia en un escenario de posconflicto", *PLOUTOS*, vol. 7, No. 1.
- Ministry of Finance and Public Credit (2017), *Marco fiscal de mediano plazo 2017*, Bogotá.
- Mok León, L. (2018), "Metodología de control sintético: aplicación a Cuba", *Cuba: Investigación Económica*, vol. 1.
- Molina, L. A. and Á. Hurtado Rendón (2012), "Inestabilidad institucional, evidencia para Colombia: la violencia y el crecimiento económico en el periodo 1950-2010", *Working Papers*, No. 12-11, Center for Research in Economics and Finance (CIEF).
- Morales Sánchez, M. A. (2015), "Los aportes conceptuales y explicativos de la economía institucional al estudio del desarrollo económico", *Análisis Económico*, vol. XXX, No. 75.
- Moreno-Parra, H. A. (2018), "Colombia: entre pactos de élites y transiciones democráticas", *Entramado*, vol. 14, No. 1.
- Nelson, R. and B. Sampat (2001), "Las instituciones como factor que regula el desempeño económico", *Revista de Economía Institucional*, vol. 3, No. 5.
- Nelson, R. and S. G. Winter (1992), "An evolutionary theory of economic change", *Resources, Firms, and Strategies: A Reader in the Resource-based Perspective*, N. J. Foss (ed.), New York, Oxford University Press.
- O'Neill, S. and others (2016), "Estimating causal effects: considering three alternatives to difference-in-differences estimation", *Health Services and Outcomes Research Methodology*, vol. 16, May.
- Oquist, P. (1978), *Violence, Conflict, and Politics in Colombia*, Academic Press.
- Pizarro, E. (1991), *Las FARC (1949-1966): de la autodefensa a la combinación de todas las formas de lucha*, Tercer Mundo Editores.
- Poinsot, F. (2003), "La inestabilidad política, la incertidumbre y el crecimiento económico", Argentine Association of Political Economy [online] <https://bd.aaep.org.ar/anales/works/works2003/Poinsot.pdf>.
- Posada Duque, H. M. (2010), "Incertidumbre macroeconómica e inversión real en Colombia", *Sociedad y Economía*, No. 18.
- Querubín Borrero, P. (2003), "Crecimiento departamental y violencia criminal en Colombia", *Documento CEDE*, No. 2003-12, University of the Andes.
- Quintero Serna, L. M. (2017), "La reforma tributaria en Colombia 2016, pros y contras según los contenidos de los medios de comunicación escritos", undergraduate thesis, Libre University.
- Ramírez, R. and M. Guedán (2005), *Colombia: ¿la guerra de nunca acabar?*, Madrid, Trama Editorial.
- Ríos Sierra, J. (2020), "Consideraciones sobre el dividendo de la paz en Colombia tras el acuerdo con las FARC-EP", *América Latina Hoy*, vol. 84.
- _____(2019), *Breve historia del conflicto armado en Colombia*, Los Libros de la Catarata.
- _____(2017), "El Acuerdo de paz entre el Gobierno colombiano y las FARC: o cuando una paz imperfecta es mejor que una guerra perfecta", *Araucaria: Revista Iberoamericana de Filosofía, Política, Humanidades y Relaciones Internacionales*, vol. 19, No. 38.
- Romer, P. M. (1991), "El cambio tecnológico endógeno", *El Trimestre Económico*, vol. 58, No. 231-3, July–September.
- Rosado-Anastacio, J. A. (2018), "Usando el método de control sintético para analizar la efectividad del Protocolo de Kioto para reducir las emisiones de CO₂, CH₄ y N₂O en España", *Revista de Economía del Rosario*, vol. 21, No. 2.
- Rubio, M. (1997), "Los costos de la violencia en Colombia". *Documento de Trabajo*, No. 11, Programme on Security, Justice and Violence Studies, University of the Andes.
- Ruiz Díaz, M. I., J. S. Galeano Raquejo and E. O. Gil Mateus (2015), "Posconflicto colombiano y sus efectos económicos", *Revista CIFE*, vol. 17, No. 27, July–December.
- Sakalauriya, M. M., R. P. Haigh and D. Amaratunga (2018), "A conceptual framework to analyse consequences of post conflict reconstruction interventions", *Procedia Engineering*, vol. 212.
- Sánchez Torres, F. J. and A. M. Díaz Escobar (2005), "Los efectos del conflicto armado en el desarrollo social colombiano, 1990-2002", *Documento CEDE*, No. 2005-58, University of the Andes.

- Santa María Salamanca, M., N. Rojas Delgadillo and G. Hernández Díaz (2013), "Crecimiento económico y conflicto armado en Colombia", *Archivos de Economía*, No. 400, National Planning Department (DNP).
- Solow, R. M. (1956), "A contribution to the theory of economic growth", *The Quarterly Journal of Economics*, vol. 70, No. 1, February.
- Swan, T. W. (1956), "Economic growth and capital accumulation", *Economic Record*, vol. 32, No. 2, November.
- Uzawa, H. (1965), "Optimum technical change in an aggregative model of economic growth", *International Economic Review*, vol. 6, No. 1, January.
- Vallejos, R. and D. Domínguez (2013), "Aspectos institucionales que limitan el crecimiento económico en Latinoamérica", Latin American Studies Centre (CESLA) [online] https://www.cesla.com/pdfs/PREMIO_ENSAYO_04_2013.pdf.
- Vargas, J. F. (2003), "Conflicto interno y crecimiento económico en Colombia", master's thesis, University of the Andes.
- Wills-Otero, L. and C. A. Hoyos (2016), "Colombia in 2015: peace, regional elections and the relations between branches of power" *Revista de Ciencia Política*, vol. 36, No. 1.
- World Bank (n.d.), "GDP growth (annual %)" [online] <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=CO>.
- Young, A. (1991), "Learning by doing and the dynamic effects of international trade", *The Quarterly Journal of Economics*, vol. 106, No. 2, May.
- Zysman, J. (1994), "How institutions create historically rooted trajectories of growth", *Industrial and Corporate Change*, vol. 3, No. 1, January.