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Authors

Holmes, Jennifer S
Mendizabal, Agustin Palao
De La Fuente, David Saucedo
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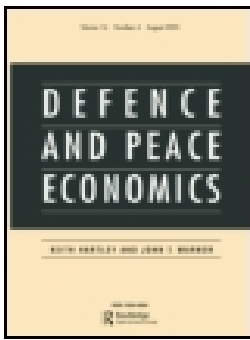
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ARTICLE



Paramilitary Violence in Colombia: A Multilevel Negative Binomial Analysis

Jennifer S. Holmes^a, Agustín Palao Mendizabal ^a, David Saucedo De La Fuente^a, Mercedes Callenes^a and Álvaro Cárdenas^b

^aPublic Policy and Political Economy Program, School of Economic, Political and Policy Sciences, University of Texas at Dallas, Richardson, Texas, USA; ^bDepartment of Computer Engineering, Jack Baskin School of Engineering, University of California, Santa Cruz, Santa Cruz, California

ABSTRACT

Although Colombia is well known for its persistent leftist guerrilla conflict, the country also suffers from paramilitary violence. This study examines the potential factors related to persistent paramilitary violence in the form of human rights violations. How has paramilitary activity, and its causes, changed over time? Why does it persist in some areas after Uribe's demobilization process but not in others? We use multilevel modeling to explore the determinants of paramilitary human rights violations. A varied range of aspects potentially associated with the paramilitary presence at the municipal level for the period 2002–2015, such as state presence, resources, greed, grievances and conflict are analyzed. The study uses information about paramilitary human rights violations from the Centro de Investigación y Educación Popular (CINEP). Results suggest that the demobilization process reduced the initial paramilitary motivation to fight against leftist guerrilla. However, other factors such as coca cultivation or ranching remained significantly related to the paramilitary activity. The analysis at the municipal level provides clear warnings for continued violence cycles threatening any undergoing or future peace processes or demobilizations and calls for a more nuanced concept of state capacity to understand paramilitary violence.

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Introduction

At the beginning of the 21st century, Colombia was described as under attack from a 'Hobbesian Trinity of narco-traffickers, guerrillas, and paramilitaries' (Nuñez 2001, 1). In the last decade and a half, however, much progress has been achieved to reduce the violence originated by these armed groups thanks to demobilizations of paramilitary groups and peace agreements with the FARC. While violence is down as a result, Feldmann and Hinojosa (2009, 45) remind us that much violence is unrelated to the original motivation. Thus, even in the best scenarios where demobilization is successful, there is still a risk of more violence, if the other drivers of conflict persist, such as lack of state presence and land conflict, especially in areas with exploitable resources. In this paper we study the factors related to paramilitary violence. This article asks why some parts of Colombia continue to be plagued by paramilitary or paramilitary-successor violence while others are not, with special attention to a multiple indicators of state presence, resources, and leftist guerrilla violence.

In recent years there has been growing interest in the sub-national analysis that has shown to be more accurate when studying violence. Given radical variation within the country, violence, as

measured by human rights violations against civilians, should be understood as a local or sub-national phenomenon rather than a national or state phenomenon (Kang 2005, Duncan 2015b, 136; Romero 2000). Colombia has more than 1100 municipalities nested within 32 mainland departments, which allow us to study paramilitary human rights violations at the municipal level from 2002 to 2015. Additionally, moving to a sub-national level analysis 'is potentially a powerful tool to understand the nature of civil war through the examination of the temporal and spatial dynamics of a conflict' (Vargas 2012, 205), especially in Colombia which has relatively high-quality data.¹

Using data from the Centro de Investigación y Educación Popular (CINEP), we conduct an analysis on the count of paramilitary human rights violations perpetrated at the municipal level. We explore several potential factors for continued paramilitary operation such as three measures of state presence, local resources, grievances, conflict, and socio-economic factors. We determine that the best specification for the study is a multilevel or hierarchical model, given that human rights violations have a nested structure (municipalities within departments). This model also allows us to control potential spatial correlations between different geographic clusters.

Our analysis shows that after the demobilization process ended in 2006, the danger of recurring paramilitary HRVs is more pronounced in less developed. After demobilization, the classic motivation of fighting leftist guerillas is no longer a driving factor of paramilitary violence. This suggests that the more politically motivated paramilitaries did demobilize. The multilevel specification separates effects at the department and municipal level. Surprisingly, African Palm does not appear to have a relationship with levels of paramilitary violence, despite the earlier findings of Richani 2007; Guerrero Baron and Mond 2001; Elhawary 2008; Escobar 2003; Goebertus 2008; Calado and Medrano 2006. Similarly, the mining and energy sector at the department level are not associated with paramilitary HRVs, challenging previous works by McNeish (2016) and CINEP (2012). Instead, our findings draw attention to other factors which may be more useful for prioritizing policy and at-risk areas for preventive government action, specifically, areas with concentrations of ranching activity, poverty, and unemployment. There are also clear warnings for development of any resource, illicit or not, without strong state presence.

This analysis is relevant for policy purposes, given the current Colombian context and the still present paramilitary activity in various forms and with multiple motivations. The rest of the paper is divided into five sections. Section 2 gives a historical background of the Colombian conflict. Section 3 describes the data and examines the explanatory variables used to study the determinants of paramilitary violence at the municipal level. Section 4 presents the model. Section 5 discusses the results, and our conclusions are discussed in Section 6.

Historical Background

Paramilitaries have generally been conceptualized in the literature as self-defense groups whose origin is associated with the fragile, or absent, state, that would normally be responsible for combatting insurgencies (Huggins 1991; Sprinzak 1995; Jentsch et al. 2015). In the case of Colombia, the government first encouraged the formation of self-defense groups out of government weakness in the 1960s, then banned them due to their violence in 1989, and finally created a demobilization peace process (2003–2006) to dismantle them.

Scholars categorize the Colombian civil war, known as *La Violencia* (1946–1966), as a critical factor in the emergence of paramilitary groups. During this period of unrest, rural landowners were encouraged to create paramilitary groups since the national government was unable to provide security throughout the countryside. Decree 3398 of 1965 and Law 48 of 1968 formalized this policy (Cubides 2001). Paramilitaries became an official part of the counterinsurgency policy in that early period, as demonstrated by the Colombian government's *Manual de Operaciones de Contraquerilla* (Pérez Pérez 1999, 266). This is the classic origin of paramilitary, self-defense or vigilante groups when governments acknowledge that they lack 'the requisite means to accomplish desired ends. Those organizations [paramilitary groups] represented a convenient way to overcome strategic mismatches' Smith ([2002]

2003). For Lair (2003), this is a decentralized conflict that has a disproportionate, prolonged impact on civilians. Thus, the Colombian paramilitary groups originated as vigilante groups in the context of a weak government presence. However, the contemporary paramilitary phenomenon has evolved. For example, as argued by Arjona (2008), the relationship of paramilitary groups with the state is ambivalent, depending on the region and political context; these groups might cooperate with the government or, in some cases, try to substitute or usurp its authority or infiltrate it.

Given that paramilitarism is a regional phenomenon, paramilitary groups have different motivations depending on the era and location. Thus, some paramilitary groups formed as vigilantes, often protecting large cattle ranches, while others as militias for drug lords or local strongmen. Given the complexity of the paramilitary phenomenon, authors as Arjona (2008) emphasize that assuming equivalence of paramilitarism with 'death squadrons' or only vigilantism can lead to misrepresentations of paramilitary motivation. Operational context must be taken into account. For instance, Gutiérrez Sanín and Barón (2005) explored how the paramilitary forces in the region of Puerto Boyacá and surrounding areas during the period 1978–2004 established a social order, which coexisted and interacted with state structures. The authors found that 'their (the paramilitaries) main enemy was a guerrilla with weak social support but strong military apparatus and traditions, so the standard paramilitary strategy of taking the water from the fish allowed for paramilitary expansion, but not for the critical undermining of the FARC' (Gutiérrez Sanín and Barón 2005, 27). This last point is critical to understanding that while the paramilitary groups legitimized their activity by combating leftist guerrilla movements, nonetheless, civilians endured the violence, which was linked to attempts to establish local control of political or economic resources. Lair (2004) documents how paramilitary groups moved to control strategic corridors, populations, and additional resources in the 1980s, transitioning from a defense to an offense posture.

The Centro Nacional de Memoria Histórica (CNMH 2017) classifies the trajectory of paramilitary groups in the post National Front era. The first stage, from 1994 to 1997 is identified as a 'reconstruction' phase in which some paramilitary groups, such as *Convivir*, were formed with government support.² This stage is consistent with the definition of militia provided by Carey et al. (2013, 250) as an organized, armed, pro-government force, which is independent from government security forces. By the end of this period, there are increasing tensions. For example, the umbrella group, the AUC (United Self Defense Groups of Colombia), formed in 1996, was pro-government, but also had motivations related to the illegal drug industry and other interests in local economic and political control, especially related to ranching. With the increase in coca cultivation in Colombia, the tension of this 'for-profit and power' motivation increased, fueling a proliferation of more criminally motivated paramilitary groups, as exemplified by Escobar's MAS (Muerte a Secuestradores) and the Esmeralderos of Puerto Boyacá.

CNMH (2017) described a second phase as an 'expansion' period from 1998 to 2005. In this time period, there are direct motivations to control economic activities, such as palm, timber, and illegal drugs, as well as secure local control (Monroy 2013, CNMH 2016; Duncan 2015b). At the same time, in many regions, paramilitary activity exhibited features of the classic definition of vigilantism (Johnston 1996), in terms of providing security guarantees. Others, as described by Grajales (2017, 30–1) is more of 'government in the midst of violence' where there is 'collaboration between the military, the local elites, and private violence.' Similarly, scholars such as Arjona (2008) highlight instances where paramilitary and other groups use their influence to benefit from public resources, such as some scandals in the provision of health care (Hussman 2011).

Third, the CNMH describes President Uribe's demobilization effort. Despite the implementation of the Justice and Peace Law of 2005, which provides reduced sentences to demobilized paramilitary militants who collaborate with the judicial system, relatively few paramilitary members or leaders have been sentenced. Human Rights Watch (2019) estimates only 5% of the 30,000 demobilized have been sentenced. Overall, these three stages describe a process of fragmentation and a clear breakdown resulting in the proliferation of small groups, referred to by some as BACRIM (Bandas Criminales). Some authors use the term BACRIM and neo-paramilitary groups interchangeably to describe these

contemporary organizations. Regardless, today there are former AUC members who have adapted their prior paramilitary experience to control local economic activities, recruit new members, and engage in criminal activity (Nussio and Howe 2016).

Regardless of changing motivations or legal context, there are significant differences, over time, of violence attributed to paramilitaries. Figure 1 shows a time series of paramilitary HRVs indicating breakpoints or significant structural changes in paramilitary activity.³ There is a steep drop in paramilitary HRVs after the 2002 ceasefire, with a structural break in 2004. There is another break in approximately late 2009. Paramilitary human rights violations are shown in Figure 1.

The number of human rights violations has decreased since 2009, but there is still a notable level of paramilitary activity. The Colombian NGO INDEPAZ characterizes them as neo-paramilitaries (INDEPAZ 2012). Others attribute it to continued activity by some, especially mid-level leaders. According to Manwaring (2013, 6), 'Hard-core AUC leaders and members did not give up and continue to fight; the various AUC units have become increasingly autonomous; and a considerable number of demobilized members are operating in an outsourcing mode as "subsidiaries," "pseudo-paramilitaries," or "gangs" (*bandas criminales*) – renting (not selling) their services to the highest bidder.'

Understanding the determinants of Colombian paramilitary violence is even more important given previous patterns of a resurgence of paramilitary activity linked to peace talks with guerrilla groups. This happened in the 1980s and 1990s when the Colombian military did not support an earlier peace process with part of the FARC (Romero 2003, 18). Chernick (1988) believed a wave of paramilitary violence emerged because these agreements were 'negotiated without the support or the participation of party leadership or of the armed forces' which led to increased support for paramilitaries among those who didn't support negotiations and or concessions to the guerrillas without full disarmament by the FARC first. This is timely, given the polarized views of the 2016 peace agreement with the FARC. This risk is added to other general challenges of the implementation of the paramilitary demobilization. Nussio and Howe (2016) examine increased paramilitary violence after the demobilization in Córdoba and blame the breakdown of protection systems, revenge, and competition for the increased violence. Daly (2016, 4) argues that patterns or remobilization or peace can be understood at the group level, in terms of recruitment geographies and information asymmetries.

Paramilitary Human Rights Violations and Explanatory Variables

We analyze Colombian paramilitary HRVs at the municipal level from 2002 to 2015. Our dependent variable, paramilitary HRVs, is an aggregate count of diverse types of human rights violations⁴ attributed to paramilitary groups by CINEP.⁵ CINEP, Centro de Investigación y Educación Popular, is a Colombian, Jesuit NGO that has been documenting the Colombia conflict since 1972. The events include killings, attacks, kidnapping, disappearances, torture, sexual violence, threats, arbitrary detention, and forced recruitment. Attacks or clashes with military or police are excluded from

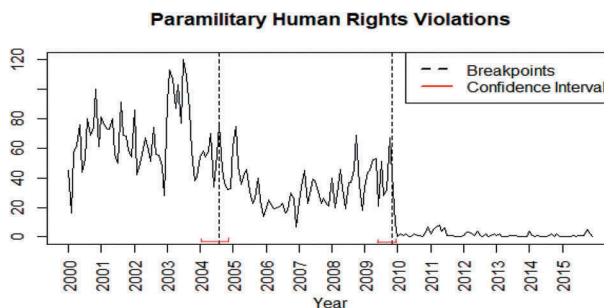


Figure 1. Source: CINEP.

this category. CINEP is a source used by Human Rights Watch, the U.S. State Department, the Immigration and Refugee Board of Canada, and others, despite some general suspicion of implicit bias in the conflict resolution field against data created by peace activists (Bouvier 2009, 7). CINEP has numerous indicators of conflict in their base de datos de actores y dinámica del conflicto, specifically their category *Violaciones al DDHH*, which includes violence that deviates from the norms of International Humanitarian Law (IHL). We exclude from CINEP's original categorization those events related to International Humanitarian Law (IHL) breaches that do not constitute a human rights violation, such as civilian dead or wounded in warlike action and perfidy according to the International Committee of the Red Cross (ICRC) and Henckaerts (2005). Similarly, we excluded all events related to threats, considering that the human rights violation has not been materialized yet. The data are coded from more than two dozen Colombian newspapers and are supplemented by primary reports from Catholic priests serving isolated areas. We have 15,624 municipal observations in our study.⁶

Figure 2 displays Colombia's paramilitary HRVs in 2002 and 2015 at the municipal level. The maps show that paramilitary violence is concentrated in the northwest and central regions of the country. In general, the number of HRVs significantly decreased over the 2002–2015 period. As pointed out by CNMH (2016, 37), after the paramilitary groups' fragmentation, the violence attributed to these groups decreased. The violence continued in some municipalities and disappeared in others. For example, Río Sucio, a municipality in Chocó department, had up to 50 human rights violations in 2002, and at the end of the analyzed period, no record of paramilitary violence was found. In the case of Barrancabermeja in the department of Santander, the HRVs remained at high levels with marginal reductions from 71 events in 2002 to 64 in 2015. This area was significant to paramilitary operations. Indeed, the CNMH (2014, 160) identified a group, the Paramilitary Army Norte de Santander (EPN), that fought to control border territories and illicit businesses in Cúcuta. Across Colombia, the north side of the country, particularly the departments of Antioquia, Chocó, Santander, and Bolívar have more violence compared to the rest of the country, consistent with Romero's earlier observations. In this period (2002–2015), Santander had the largest number of victims (1,864) followed by the departments of Antioquia (1,786), Norte de Santander (876), and Valle del Cauca (770). Particularly interesting is that most of *Nuevos Departamentos* did not report paramilitary human rights violations, suggesting that paramilitary organizations have been located across 'the major North Valley Region' (e.g. Antioquia, Bolívar, Magdalena, and Córdoba) and the Atlantic Coast (e.g. Cesar, Norte de Santander, and Santander), which are considered as consolidated and strategic territories of drug shipping routes (Tate 2001).

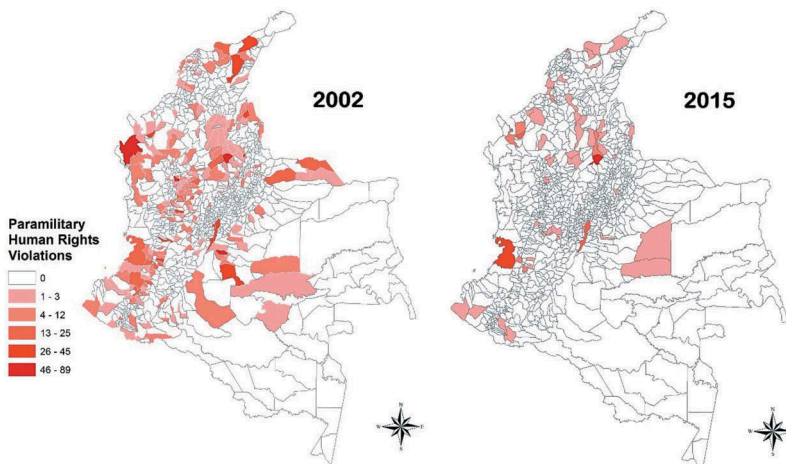


Figure 2. Paramilitary Human Rights Violations 2002 and 2015.

To understand the levels of paramilitary HRVs at the municipal level, we control for socio-economic factors, proxies for state presence, leftist guerrilla violence, and resources such as coca, palm, and cattle production. The analysis divides explanatory variables into the following broad categories, (1) state presence, (2) resources and greed, (3) conflict, and (4) grievances and other controls. We now explain the reasons for using these categories.

State Presence

Studies have found contrasting relationships between paramilitary activity and state presence. Restrepo and Muggah (2009), Cubides (2001) and Howe, Sánchez, and Contreras (2010) argue that a lack of state presence has allowed continuing paramilitary violence. Contrarily, Krakowski (2015) found more paramilitary violence in response to government confrontation in a municipal study of 2003–2009, using an index of institutional coverage to measure state presence. Faguet and Fabio (2008) showed that the government worked to reverse the longstanding trend of a lack of state presence, with decentralization reforms that provide increased funds and responsibility to local and regional authorities. Snyder and Bhavnani (2005) argue that whether or not the state is involved or providing a general level of security is more important than a simple, direct relationship between resources and conflict. Thus, it is essential to control for state presence. Our study disaggregates state presence in three indicators. First, we include the percentage of poor (*estrato 1 & 2*) that are enrolled in the public health services as a measure of state presence through the implementation of public programs. Second, we include the fiscal capacity of the local authorities to generate and collect resources, pointing to the presence of government authorities in the public administration realm, arguing that increased fiscal capacity is a proxy for more state presence. And third, we include investment in public services.

Resources and Greed

There is evidence that certain products are associated with paramilitary violence, especially coca, mining, African palm, and cattle production. Contrarily, in municipalities of the Orinoco region or the Eastern Amazon, where economic activity is limited, there is no incentive for paramilitaries to fight guerrillas or for extortion (Centro Nacional de Memoria Histórica. CNMH 2016, 234), thus little paramilitary activity exists.

According to the United Nations Office on Drugs and Crime (UNDOC), Colombia's illegal drug industry has been considered the largest and most diversified (Franz 2016). Coca and cocaine have been consistently associated with paramilitary violence. Thoumi (2002) identifies the illegal drug industry as the main obstacle to peace. According to Tate (2001), paramilitary 'groups are deeply involved in all phases of the drug trade. They tax drug production, run cocaine laboratories, protect trafficking routes and even run drugs themselves.' Paramilitary groups did not even deny the linkage. In 2000, Castaño admitted that 70% of their funds came from drugs, either through direct participation in the drug trade or through charging for protection for the narcos (Saab Bilal and Taylor 2009, 463). For a later example, the Centro Nacional de Memoria Histórica. CNMH (2014 402) found an association of paramilitary violence in Puerto Asis, Orito and La Hormiga with coca cultivation.⁷ Duncan (2015b, 94) documents paramilitary groups charging cartels fees for cocaine shipments.

Some scholars have argued that intense capital resources are positively associated with violence, especially in times of high prices (Dube and Vargas 2013, 2). Oil is the country's largest sector of FDI. Maher (2015a) found violence from right-wing paramilitaries aligned to the interests of the oil industry to facilitate FDI, particularly in Arauca, Arbelaez, Echavarría, and Gaviria (2002, 42–43) find new violence in areas 'related to the sudden development of primary products (gold, emeralds, oil, bananas, cocaine)' especially when the state is absent or weak. Gold production in Colombia has increased by over 300% since 2006 (Güiza and Aristizabal 2013). This increase, after the 2008 financial crisis, and the discovery of new mining areas in Bolívar (the largest gold mine in

Latin America), has created new opportunities for exploitation of gold by non-state armed groups, particularly, paramilitary groups.

Conflict

Given that paramilitaries cite leftist guerrilla violence as their main justification, we incorporate leftist guerrilla HRVs into our model. According to Zapata and Dario (2003, 80), 'paramilitary terrorist groups emerged in response to subversive groups and were later transformed into contemporary groups, such as the *Autodefensas Unidas de Colombia* (AUC).' This view is supported by interviews of paramilitary leaders.⁸ However, paramilitary groups not only targeted guerrillas but suspected guerrillas and their supporters. Castaño excused the killings of non-combatants as dispatching 'guerrillas dressed as peasants' (Bagley 2005).

Grievances and Other Controls

Another set of underlying factors can trigger more paramilitary violence. Inequality and unemployment can cause a surge in violence. An extensive literature has discussed the negative impact of GDP per capita on violence (e.g., Cotte Poveda 2012; Wayne and Auvinen 2002; Holmes, de Piñeres, and Curtin 2006, Kang 2016). We include departmental GDP per capita values to control for general levels of economic development. Prior violence at the municipal level can be determinant to future levels of human rights violations as a measure. Finally, we controlled for the population at the municipal level.

Descriptive Statistics and Data Description

Table 1 present the summary of the data used in the analysis. There is significant variation within the country in most of the indicators used in this analysis.

Some municipalities do not report any paramilitary violence or guerrilla violence, whereas others report between 25 to 200 attacks. The percent of poor enrolled in social security ranges from 0 to 100. These data are reported by the Ministerio de la Protección Social. Taxes collected at the local level and public investment also vary and are reported by the Departamento Nacional de Planeación. Estimates of coca cultivation are reported in hectares and are provided by SIMCI/UNODC. Coca cultivation is dispersed throughout the country, but not present in all areas. Agricultural and mining activity is similarly present in some parts of the country but not others. In this study we also include palm production from the Information and Communication Network of the Agricultural Sector of Colombia, led by the Ministerio de Agricultura y Desarrollo Rural. . The number of cows per municipality comes from Fedegan (2017) and their Inventario Nacional Bovino a Nivel Municipal. Gold production ranges from 0 to over 8,000,000 kilograms and is reported by the Unidad de Planeación Minero Energética. Barrels of oil produced varies from 0 to over 518,300, according to the Ministerio de Minas y Energía. The sectoral GDP of Mining-Energy, reported by DANE in constant 2005 billions of COP, ranges from 0 to 13,483.

Similarly, Gini and unemployment vary widely, from .44 to .62 and from 5.9% to more than 22%. GINI coefficients at the department level in Colombia did not have significant variation through the analyzed period. Both measures of grievance are only available for 24 out of the 32 departments.⁹ For prior violence, we used the mean municipal value of paramilitary HRVs from 1990 to 1999 from CINEP, which varies from 0 to 26.9. We also include CINEP's leftist guerrilla HRVs. Population values are annual estimations from the 2005 census provided by DANE. The unemployment rate is reported at the department level by DANE.

Table 1. Descriptive statistics.

	Level	Mean	Median	St. Dev.	Min	Max	N
Paramilitary Human Rights Violations							
	Mun	0.638	0	4.469	0	170	15,624
State Presence							
Proportion of poor affiliated w/public health services	Mun	0.631	0.650	0.231	0	1	15,624
Own resource generation capacity (<i>Tax receipts/Current revenue x 100%</i>)	Mun	28.312	19.305	26.101	0	100	15,624
Public Investment (<i>Investment/Total expenditures x 100%</i>)	Mun	81.404	84.800	16.018	0	100	15,624
Resources/Greed							
Coca Cultivation (<i>Hectares</i>)	Mun	70.895	0	427.99	0	14,606	15,624
Sectoral GDP of Agriculture, Fishing and Ranching (<i>Billions COP</i>)	Dept	1,562.10	1,357	1,105.01	0	4,135	15,624
Sectoral GDP of Mining, Energy and Quarries (<i>Billions COP</i>)	Dept	786.97	365	1,343.64	0	13,483	15,624
Palm production (<i>Tons</i>)	Dept	31,637.22	909	61,741.28	0	456,730	15,624
Gold production (<i>Kilograms</i>)	Mun	33,840.85	0	293,694.41	0	8,376,219	15,624
Oil production (<i>Barrels per day</i>)	Dept	19,879.60	4,447	49,687.78	0	518,292	15,624
Cattle (<i>number of heads</i>)	Mun	19,876.86	7,938	38,483.66	0	631,566	15,624
Grievances							
Unemployment Rate *	Dept	10.403	10.400	3.964	5.90	22.3	15,624
GINI Coefficient *	Dept	0.485	0.514	0.133	0.44	0.619	15,624
Conflict							
Leftist Guerrilla Human Rights Violations (CINEP)	Mun	0.244	0	1.083	0	25	15,624
Controls							
Gross Domestic Product per capita (<i>Millions COP</i>)	Dept	9.798	8.922	5.370	2.528	38.678	15,624
Population (<i>Thousands</i>)	Mun	0.040	0.013	0.246	0.0002	7.879	15,624
Prior Violence (<i>mean value 1990–1999</i>) HRV	Mun	0.700	0.000	2.163	0.000	26.900	15,624

* Unemployment and GINI coefficients are only available for 24 out of 32 departments

Model Specification and Analysis

We assess municipal and department factors that may influence the number of paramilitary HRVs. A multilevel negative binomial model is used to explore relationships at the municipal and department level. The multi-level model captures variation among municipalities and departments, and variation between levels (Gelman 2006). Moreover, given that there are concerns about potential spatial correlation, multilevel models are particularly appropriate to account for this issue (Arcaya et al. 2012; Langford et al. 1999). Since our dependent variable is a count variable, the number of paramilitary HRVs, has a highly non-normal distribution that requires the use of alternative distributions, i.e., the negative binomial distribution to account for over-dispersion.

Therefore, considering the nature of the data and since Ordinary Least Squares (OLS) regression cannot be used to analyze the paramilitary HRVs,¹⁰ a generalized linear mixed model (GLMM) has been considered. According to Tseloni (1999), 'a multilevel negative binomial regression explicitly accounts for the clustering of the units of analysis in studies which use multi-stage sampling.' In estimating the regression model, we tested the regressions residuals for spatial autocorrelation using Moran's I, finding no evidence of spatial dependence (See Table A5 in the Appendix). The GLMM specifications use the auto differencing model builder (ADBM) methodology to calculate fixed and random effects with an optimization process approach. We specified random effects for the municipal and department levels and for years to control for municipality-department-time specific factors. Random effects consider as a weighted average the within estimators and between estimators that dummy variables measure for municipalities, departments and years. We use the `glmm-adbm` package in R (Skaug et al. 2016).

Considering that some of the selected factors could show endogeneity¹¹ issues with paramilitary HRVs, we applied bivariate Granger causality tests to analyze the variables dynamics and

selected a suitable lag for predicting paramilitary violence. [Table A3](#) in the Appendix shows the granger tests estimations that support the lagged values of each variable used in the models. Ideally, future work will utilize an identification strategy to more clearly identify causation, however, data limitations prevent that in this article.

Results

By using a multilevel negative binomial analysis, this research assesses the impact of a variety of factors and economic resources on paramilitary HRVs in Colombia. [Tables 2](#) and [3](#) present four different model specifications for the periods 2002–2006 and 2007–2015 respectively. We split units of analysis into two sub-periods to detect differences in factors that account for violence in an early period and after the demobilization process as the tests for structural changes suggested. Across all models, all control variables except GDP per capita are significant in the expected direction.¹² There are more paramilitary HRVs in less developed areas, there is a positive relationship with population, and prior violence. The presence of leftist guerrilla violence is also positively associated with paramilitary violence in all models in the first period, which is expected given the historical motivation of paramilitary groups. This finding supports [Feldmann's \(2018\)](#) work pointing out that regional guerrilla presence provoked conflict with paramilitary groups who were frequently assisted by the national army.

However, over the period 2007–2015, the association with leftist guerrilla violence is no longer significant, suggesting that the more politically motivated paramilitaries did demobilize. [Nussio and Howe \(2016\)](#) found similar results in Córdoba, during the post demobilization period. In all models and periods, state presence, as measured by the percent of the poor incorporated into the public health services, is negative and significant. Tax collection capacity is significant in the 2002–2006 period in all specifications, supporting [Duncan \(2015b\)](#), drawing attention to the need to prevent paramilitary or BACRIM predation on government resources. This substantiates concerns that paramilitary groups may have benefitted from decentralization efforts. [Duncan \(2015b\)](#) documented efforts by both guerrillas and paramilitaries to gain benefits from this institutional redesign, highlighting the need for strong anti-corruption efforts. However, in the post-demobilization period, the tax collection capacity lost significance, signaling some separation between local governments and subversive groups, leaving the new illegal groups operating without local government support, in the later period, although in two specifications, it is weakly significant. Public investment is not significant.

Regarding resources and greed, coca cultivation is positively associated with paramilitary violence in all models. Models 1 and 4 include sectoral GDP of agriculture instead of breaking up the sectoral GDP into components. GDP of agriculture is insignificant. However, we have different results when we substitute GDPs by two specific industries associated with paramilitary violence, in models 2 and 3. Surprisingly, palm production is insignificant. These findings challenge a set of studies that associate African palm with paramilitary violence ([Richani 2007](#); [Guerrero Baron and Mond 2001](#); [Elhawary 2008](#); [Escobar 2003](#); [Goebertus 2008](#); [Calado and Medrano 2006](#)). It is worth noting that our palm production information is at the department level. This could contribute to the lack of significance in our models given that palm cultivation is implemented at a more local level. [Maher's \(2015b\)](#) findings showed that some of the highest levels of human rights abuses caused by paramilitaries were found in the municipalities whose main activity was palm oil production.

Cattle are significantly associated with paramilitary violence. This is not surprising, given the historical association of ranching with paramilitary groups. The ranching sector has also been associated with paramilitary violence ([Chernick 1998](#), [Álvarez 2003](#); [Rubio 2014](#)). Specifically, [Romero \(2000\)](#) analyzes thirty years in Córdoba, an agribusiness and cattle-ranching region where leftist guerrillas gained extensive control and influence in the 1980s. The Autodefensas Campesinas de Córdoba y Urabá or the Peasant Self-Defense Groups of Córdoba and Urabá (ACCU) emerged to protect the cattle industry, but they also engaged in extortion, kidnapping, and drug-trafficking activities.



Table 2. GLMM-admb negative binomial results for paramilitary HRVs (2002–2006).

	Model 1		Model 2		Model 3		Model 4	
	With sectoral GDPs (Agriculture and Mining)	Without sectoral GDPs, with Oil, Gold, Palm and Cattle productions	No Agriculture GDP, Oil, gold, and palm	Model 1 + Palm, GINI and Unemployment (24 depts)				
<i>DV: Human Rights Violations (CINEP)</i>								
Constant	-1.403 (0.721)	-1.61 (0.676)	-1.850 (0.674)	-0.108 (1.838)				
<i>State presence</i>								
Proportion of poor affiliated w/public health services	-1.356 (0.407) ***	-1.270 (0.407) **	-1.300 (0.407) **	-1.606 (0.433) ***				
Own resource generation capacity (Tax receipts/Current revenue x 100%)	0.027 (0.007) ***	0.026 (0.007) ***	0.026 (0.007) ***	0.024 (0.007) ***				
Public Investment (Investment/Total expenditures x 100%)	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.005 (0.003)				
<i>Resources/Greed</i>								
Coca Cultivation t_{-1} (Hectares)	0.023 (0.008) **	0.024 (0.009) **	0.023 (0.009) **	0.052 (0.012) ***				
Sectoral GDP of Agriculture, Fishing and Ranching t_{-1} (Billions COP)	-1.033 (0.562)			-0.891 (0.439) *				
Sectoral GDP of Mining, Energy and Quarries t_{-2} (Billions COP)	0.015 (0.152)			0.069 (0.253)				
Palm production t_{-1} (Tons)		0.025 (0.188)						
Cattle t_{-1} (Heads)		0.000005 (0.000002)						
Gold production t_{-2} (Kilograms)		-0.0129 (0.010)						
Oil production t_{-2} (Barrels per day)		0.135 (0.108)						
<i>Grievances</i>								
Unemployment Rate *	0.119 (0.029) ***	0.030 (0.007) ***	0.030 (0.007) ***	0.109 (0.030) ***				
GINI Coefficient *								
<i>Conflict</i>								
Leftist Guerrilla Human Rights Violations (CINEP) t_{-1}	0.215 (0.694)	-0.538 (0.719)	-0.055 (0.694)	-0.592 (0.844)				
<i>Controls</i>								
Gross Domestic Product per capita (Millions COP)	0.049 (0.015) **	0.051 (0.014) ***	0.050 (0.014) ***	0.042 (0.013) **				
Population (Thousands)								

(Continued)

Table 2. (Continued).

	Model 1		Model 2		Model 3		Model 4	
	With sectoral GDPs (Agriculture and Mining)	Without sectoral GDPs, with Oil, Gold, Palm and Cattle productions	No Agriculture GDP, Oil, gold, and palm	Model 1 + Palm, GINI and Unemployment (24 depts)				
<i>DV: Human Rights Violations (CINEP)</i>								
Prior Violence (mean value 1990–1999) HRV	0.183 (0.022)	0.173 (0.022)	0.173 (0.022)	0.184 (0.022)				
Negative Binomial dispersion parameter	0.2975 (0.0206)	0.2956 (0.0203)	0.2960 (0.0204)	0.2983 (0.0217)				
Random Effects Variances:								
Group = Department (intercepts)	2.948	2.411	2.511	0.8999				
Group = Department: Municipality (intercepts)	2.122	2.105	2.112	2.152				
Group = Time (intercepts)	0.405	0.396	0.4361	0.3197				
AIC	9084.6	9083.1	9084.5	8466.4				
Log-likelihood	-4527.29	-4524.54	-4526.23	-4216.22				

Significant codes: p < 0.0001 ***, p < 0.001 **, p < 0.01 *, p < 0.05 †



Table 3. GLMM-admb negative binomial results for paramilitary HRVs (2007–2015).

	Model 1		Model 2		Model 3		Model 4	
	With sectoral GDPs (Agriculture and Mining)	Without sectoral GDPs, with Oil, Gold, Palm and Cattle productions	No Agriculture GDP, Oil, gold, and palm	Model 1 + Palm, GINI and Unemployment (24 depts)				
Constant	-5.211 (0.908)	-4.880 (0.834)	-4.810 (0.826)	-5.718 (2.042)				
<i>State presence</i>								
Proportion of poor affiliated w/public health services	-1.397 (0.458)	-1.420 (0.454)	-1.420 (0.455)	-1.621 (0.474)				
Own resource generation capacity (Tax receipts/Current revenue x 100%)	0.003 (0.004)	0.002 (0.004)	0.001 (0.004)	0.004 (0.005)				
Public Investment (Investment/Total expenditures x 100%)	0.001 (0.005)	0.0005 (0.005)	0.001 (0.005)	-0.002 (0.005)				
<i>Resources/greed</i>								
Coca Cultivation t_{-1} (Hectares)	0.065 (0.013)	0.064 (0.013)	0.064 (0.013)	0.078 (0.015)				
Sectoral GDP of Agriculture, Fishing and Ranching t_{-1} (Billions COP)	0.870 (0.582)			0.041 (0.530)				
Sectoral GDP of Mining, Energy and Quarries t_{-2} (Billions COP)	-0.018 (0.079)		-0.055 (0.095)	-0.006 (0.076)				
Palm production t_{-1} (Tons)		0.089 (0.108)	0.072 (0.109)					
Cattle t_{-1} (Heads)		0.00001 (0.000002)	0.00001 (0.000001)					
Gold production t_{-2} (Kilograms)								
Oil production t_{-2} (Barrels per day)		0.005 (0.066)						
<i>Grievances</i>								
Unemployment Rate *				0.139 (0.031)				
GINI Coefficient *				0.977 (3.540)				
<i>Conflict</i>								
Leftist Guerrilla Human Rights Violations (CINEP) t_{-1}	0.043 (0.050)	0.009 (0.012)	0.009 (0.012)	0.038 (0.052)				
<i>Controls</i>								
Gross Domestic Product per capita (Millions COP)	0.243 (0.365)	0.293 (0.375)	0.235 (0.367)	0.209 (0.382)				

(Continued)

Table 3. (Continued).

	Model 1		Model 2		Model 3		Model 4	
<i>DV: Human Rights Violations (GINEP)</i>								
Population (Thousands)	0.049 (0.014)	***	Without sectoral GDPs, with Oil, Gold, Palm and Cattle productions	0.047 (0.013)	***	No Agriculture GDP, Oil, gold, and palm	0.048 (0.013)	***
Prior Violence (mean value 1990–1999) HRV	0.212 (0.024)	***		0.197 (0.021)	***		0.191 (0.024)	***
Negative Binomial dispersion parameter	0.4025 (0.0339)			0.4005 (0.0338)			0.4029 (0.0338)	
Random Effects Variances:								
Group = Department (intercepts)	3.734	1.932	Variance	3.566	1.888	Variance	3.608	1.9
Group = Department: Municipality (intercepts)	3.43	1.852	Std Dev	1.806	1.806	Std Dev	1.816	1.857
Group = Time (intercepts)	1.532	1.238		1.401	1.184		1.376	1.173
AIC	6301.2			6280.9			6279.7	6134
Log-likelihood	-3135.62			-3123.45			-3123.87	-3050.02

Significant codes: p < 0.0001 ***, p < 0.001 **, p < 0.01 *, p < 0.05 †

Colombia is not alone. This relationship is found in other countries. In a study of Central America, Williams (1986), found peasant displacement, protests, and rebellion in areas of ranching expansion.

When analyzing the mining and energy sector, it may be wise to separate oil and gold production from aggregate sectoral GDP. In general, there is no association between GDP of mining in general or gold and oil production separately, except the combined period.¹³ This finding opposes the results of McNeish (2016), who suggested that extractive activities escalate social conflict and human rights violations. Also, it contradicts Centro de Investigación y Educación Popular – CINEP (2012), who said that there is a strong correlation between an increase in violence and an increase in mineral exploitation across Colombian territory where armed groups (e.g., FARC, ELN, *Bandas Criminales* – BACRIM) control the strategic transportation corridors. One interpretation of the null finding comes from Idrobo Idrobo, Mejía, and Tribin (2014, 83), who suggests that the need for labor in illegal mining reduced the incentive to displace the local population. Rettberg and Ortiz-Riomalo (2016, 89) found that criminal bands, paramilitary and guerrillas illegally taxed small- and medium-scale mines by charging up to 50% of each mine's earnings. Idrobo et. al (2014) finds that homicide rates are higher in municipalities with gold mining, despite national declines. 'Gold is believed to be a new engine in the Colombian conflict' (Idrobo et al, 83). In these situations, paramilitaries 'offer their security model to landowners and businessmen in areas plundered by guerrillas' (Saab Bilal and Taylor 2009, 461). In that sense, we caution that our results are limited by the data, which only includes legal production. Illegal production may have very different relationships to violence.

Model 4 replicates model 1 but includes GINI and unemployment. Because of the inclusion of these two variables that are only reported for 24 departments, we lose the *nuevos departamentos* and all their municipalities. The unemployment rate is positively associated with paramilitary violence, but only on the early period (2002–2006). The demobilization process provided generous government benefits to demobilized paramilitaries, possibly explaining the lack of significance in the later period.

After analyzing the fixed effects of the different model specifications, the random effects within departments showed the highest variation in most of the cases. The crossed random effects of the municipalities nested in departments also showed a variation of their intercepts, showing how each municipality has a particular development of HRVs. Variation across years is clearly evident in all models. Variances are proportional to the length of the sub-periods, 5 and 9 years respectively.

Dispersion parameters in all models are significant, which tells us that the negative binomial is suitable for the model specification. In terms of model fit, most of the empirical literature considers the Akaike Information Criterion (AIC) as a measure of the quality of statistical analysis. The AIC measures the quality of statistical analysis. When comparing the AIC, the best model is the model with the smallest AIC value (Melliana et al. 2013). Thus, for the first period 2002–2006, the best model among the first three is Model 2 and for the second period, 2007–2015, is Model 3. Model 4 cannot be compared because the sample size is smaller and it has different degrees of freedom. For the purpose of comparison, the AIC is included in Tables 2 and 3. Briefly, at the risk of oversimplification, the AIC decreases when we use specific explanatory variables related to paramilitaries and no general variables such as sectoral GDPs.

As part of the robustness checks, first, we verify whether the multilevel model takes into account spatial autocorrelation, since Figure 2 presents evidence of clustering of violent events, meaning that spatial correlation could be present. We ran an Exploratory Spatial Data Analysis (ESDA) to observe the atomization of events which is consistent with what was found by the Centro Nacional de Memoria Histórica. CNMH (2016, 153) in the later period, where despite lower national levels of paramilitary HRVs, violence persists in specific regions. We estimated the spatial lag of paramilitary HRVs to test the effect of spatial dependence across neighboring municipalities.¹⁴

Conclusions

The multilevel analysis of paramilitary HRVs reveals policy and geographic areas that should be prioritized for government action to prevent the reemergence of paramilitary violence. We theoretically categorized the variables that represent potential causes of paramilitary conflict.¹⁵ This analysis reveals differences among municipios and departamentos that become crucial to understanding paths of paramilitary violence. First, this study provides a strong warning for countries undergoing a peace process or demobilization. Both Hayes & McAllister,(2001) and (Hayes and Ian 2001) warn of a perpetual cycle of violence that can be reignited by paramilitary violence. This pattern has been common to countries as varied as Northern Ireland and Colombia.

Moreover, paramilitary violence threatens regime legitimacy (Rosenbaum 1974; Sprinzak 1995, etc.). Despite the relative success of the government peace process with the FARC, Carey, Mitchell, and Lowe (2013) warn us that paramilitary groups raise the risk of civil war in a post-conflict Colombia. Thus, continued paramilitary violence poses a unique risk to the current peace process with the FARC. Second, areas with high levels of unemployment and poverty need extra attention and focused programs. Third, we do find a consistent association of cattle ranching with paramilitary violence. This finding is not surprising given the origin of these groups but also shows how cattle are used to signal landownership in contested areas (Dávalos et al. 2014). Further research on particular industries is necessary, given other finding, such as the Centro Nacional de Memoria Histórica. CNMH (2016, 45) which noted the association of paramilitaries with large scale agro-industrial production in general.

Finally, the need for increased state presence is even more critical today. Despite already having had a demobilization agreement and process that ended in 2006, some form of paramilitary violence persists. Although there has been progress in increasing state capacity, some parts of the country are still lawless and vulnerable to control by strongmen or various armed groups. This risk is magnified today, as the FARC demobilizes and vacates their traditional areas of control, creating new openings and voids of authority for other violent groups to fill. Despite the inflammatory effect of guerrilla violence and the cyclical relationship with paramilitary violence, Feldmann and Hinojosa (2009, 45) remind us that much violence is unrelated to the original motivation. Duncan (2015a) holds that paramilitary violence was related to their interaction with local authorities and the Army. Particularly in rural areas, the paramilitary groups were aimed to provide protection to drug cartels and substitute the government by controlling the political and economic power at the local level. Thus, even in the best scenarios in which the current FARC demobilization is successful, there is still a risk of more violence, if the other drivers of conflict persist, such as lack of state presence and land conflict, especially in areas with exploitable resources. This danger is less pronounced in oil-producing regions that have been prioritized for security. However, the general pattern persists where state presence is lacking. In Colombia, one of the major risk factors of violence is linked to the rapid development of resources and changes in land ownership. For example, coca cultivation, although somewhat geographically constrained, occurs more where the state is not strong. In the case of mining, over the full time period, we see more paramilitary activity, as this sector has boomed often in areas where land ownership is not clear or respected. In general, development in areas without clear ownership brings conflict. We also see violent expansion of palm cultivation and the use of cattle as a signal of land ownership in parts of the country with unclear titles (Dávalos et al. 2014). It is not the product itself; whether it is palm, coca, cattle or mining that raises the risk of conflict, but, consistent with Snyder and Bhavnani (2005), it is the development of these resources without a sufficiently strong state to provide order and protection. Future research should try to engage the multicausality that likely exists to explain paramilitary violence. As seen with the complex relationship between state strength with paramilitary violence, this same multicausality may exist with other factors as well.

In our study, two aspects of state capacity have contrary relationships with paramilitary violence. The inclusion of the poor in the public health services is associated with less paramilitary violence. However, the positive association of tax collection capacity with paramilitary violence is alarming. Efforts must be directed toward preventing infiltration of paramilitary or BACRIM groups in local

government in the context of decentralization efforts as new resources are spent at lower levels of government. These competing findings highlight the need for a more complex concept of state presence that does not assume homogeneity or consistent levels of professionalism or capacity. Luna and Soifer (2017), using survey data, build a three-part concept of state capacity, which includes measures of territorial control, the ability to impose taxation, and the protection of property rights. All three of these components are influential in our analysis, but not in the same direction.

Our findings complement analogous work on criminal governance and gangs in Latin America, especially as paramilitary groups or their successors evolve into more criminally oriented groups. Although localized, these groups, with their dominance in certain areas, have a major impact and can evolve into 'persistent micro level regimes' with its effect on civil life as well documented by Arias (2017). Their relationship with the state is also more complex, and not clearly for or against as with pure paramilitary or vigilante groups, but more influenced by both the limitations of the state and its actions. Similarly, Duran-Martinez (2015) advocates examining the cohesion of state security forces and the level of competition in illegal activities to understand levels of drug violence. Moncada (2013) argues that these relations are very significant for development prospects and the future level of urban violence.

Despite the mixed motivation of paramilitary groups, this study of Colombia has highlighted the importance of a comprehensive and complex treatment of the state, the danger of continued land conflict, and unemployment on increasing the risk of paramilitary violence. Future work and more data are needed at the micro level to fully illustrate the complex origin and influence of these paramilitary and their successor groups, especially as they interact with different state actors in different contexts.

Notes

1. For a micro level analysis, see Arjona A.M., Kalyvas S.N. (2012) Recruitment into Armed Groups in Colombia: A Survey of Demobilized Fighters. In: Guichaoua Y. (eds) Understanding Collective Political Violence. Conflict, Inequality and Ethnicity. Palgrave Macmillan, London.
2. *Las Cooperativas de Vigilancia y Seguridad Privada (Convivir)* were created during the government of Cesar Gaviria through the Decree Law 356 of 1994 and, later, put into operation during the government of Ernesto Samper.
3. Structural break analysis on the time series showed two main breakpoints in the year 2004 and 2010 (Figure 1). These breaks are consistent with what was found by the Centro Nacional de Memoria Histórica. CNMH (2016, 196) which established that 'for the first stage after the demobilization (2006–2010), the forced displacements made by the GAPD decreased in intensity and geographic expansion.' An optimal breakpoint is calculated under Bai & Perron (2003) algorithm and represents a shift in the time series trend that explains a potential change in the data generation processes.
4. CINEP categorizes the human rights violations based on the International Humanitarian Law. Specifically those mentioned in the Geneva Convention of 1949 and Protocol I of 1997.
5. CINEP is affiliated with the major international groups such as the Consejo Latinoamericano de Ciencias Sociales (CLACSO), Asociación Latinoamericana de Organizaciones de Promoción al Desarrollo A.C. (ALOP), International Land Coalition (ILC), International Coalition for the Responsibility to Protect (ICRtoP), Red de Centros Sociales de la Compañía de Jesús en América Latina (CPAL), Plataforma DHESCA, and the Global Ignatian Advocacy Network (GIAN). Nationally, they are affiliated with the Corporación de Desarrollo y Paz de Magdalena Medio (CDPMM), Corporación de Desarrollo y Paz del Oriente Antioqueño (PRODEPAZ), Corporación de Desarrollo y Paz del Piedemonte Llanero (CORDEPAZ), Corporación Viva La Ciudadanía, and Red Nacional de Programas Regionales de Desarrollo y Paz (<http://www.cinep.org.co/Home2/institucion/nosotros.html>).
6. Gutiérrez Sanín and Wood (2017) emphasize the importance of patterns of violence. Accordingly, from our CINEP data, we identified the most common forms human rights violations in this period: killings, threats to groups of individuals, threats to individuals, collective displacement, and intentional injuries to civilians. Nonetheless, we removed three categories related to attacks on a military target or perfidy and six categories related to individual or collective threats.

7. Author translation '... , la presencia paramilitar en Puerto Asís, Orito y la Hormiga coincidía con un mayor cultivo de uso ilícito de coca, así que después de la desmovilización del Bloque Sur Putumayo se mantuvo activa una parte de esta estructura, ligada a la economía del narcotráfico en la región.'
8. Carlos Castaño et al. Letter to US Ambassador Anne Patterson 26 October 2001. (2001) 'Nuestra Organización, las Autodefensas Unidas de Colombia, nació de la unión de disímiles grupos con intereses igualmente diversos, pero siempre orientados a la legítima defensa de la vida y los bienes de los ciudadanos ante la evidente insuficiencia y falta de voluntad política del Estado colombiano para combatir a los grupos de guerrillas marxistas' Author translation. See also Carlos Castaño, 'Quien sabe para dónde vamos' (12 November 2001 Dipom 2001) 'Recuerdo que hace muchos años, cuando iniciaba mi lucha antisubversiva, solo pensaba en ejecutar guerrilleros, y a decir verdad, poco o nada me preocupaba de otra cosa. No tenía nada más en que pensar, ese era mi mundo, desconocía el otro, mi ignorancia era absoluta.' Author translation. Accessed at www.colombialibre.org in 2006. Accessed at www.colombialibre.org in 2006.
9. New departments (*nuevos departamentos*) created in 1991 do not report unemployment and GINI coefficients. These departments are sparsely populated and they represent about 5% of the total population (Dirección de Metodología y Producción Estadística – DIMPE 2013, 2). In addition, GINI coefficients for 2006 and 2007 were not reported by DANE because of problems with the survey. We used basic linear interpolation to impute values for those missing years.
10. Notwithstanding, a confirmatory analysis of non-normality used OLS panel fixed effects model to check if OLS assumptions do not fit with the data nature. Panel estimates and residual tests to check for serial correlation and cross-sectional dependence showed in [Table A4](#) of the Appendix confirmed suspected OLS violations.
11. To support the direction of the relationship between leftist guerrilla and paramilitary violence, we used a Granger test on the time series of the number of violent events of these two antagonist groups. Results of Granger causality for the conflict variable are shown in [Table A1](#) of the Appendix.
12. The magnitudes of the coefficients that come from a GLMM negative binomial can be interpreted as Incidence Rate Ratios (IRR) if they are exponentiated. We decided to report the logarithmic results to keep the interpretation of results easy to understand. Given that our dependent variable, the Human Rights Violations, is positive and discrete, we prefer to leave the practical significance in terms of 'negative relationship' (when $IRR < 1$) or 'positive relationship' (when $IRR > 1$) to interpret factors that may produce an additional human rights violations compared to factors that might not produce an extra event.
13. See [Table A7](#) in the Appendix.
14. We run a GLMM model that includes the spatial lag of human right violations. The results are shown in [Table A6](#) in the Appendix. As it is shown the spatial lag is not significant, meaning that the model accounted for the spatial autocorrelation and confirmed with the residual tests.
15. Previous diagnostics on each category revealed singular dynamics and low levels of correlation. Each variable within categories has a unique contribution to the paramilitary activity. Correlation tests of significance are provided in [Table A2](#) of the Appendix.

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ORCID

Agustin Palao Mendizabal  <http://orcid.org/0000-0003-3117-0080>

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Appendix

Table A1. Granger causality for human rights violations (guerrilla, paramilitary & government).

Variable Lags Specification						
Lags (Months)	Log – Determinant	Chi-Square	P-Value	AIC	BIC	HQ
1	17.06	-	-	17.22	17.47	17.32
2	16.90	21.28	0.01	17.19	17.63	17.37
3	16.72	24.64	0.00	17.13	17.75	17.39
4	16.59	16.73	0.05	17.13	17.94	17.46
5	16.21	48.05	0.00	16.88	17.87	17.28
6	16.07	17.67	0.04	16.86	18.04	17.34
7	16.03	4.74	0.86	16.95	18.31	17.50
8	15.91	14.41	0.11	16.96	18.50	17.58
9	15.85	7.49	0.59	17.02	18.75	17.72
10	15.78	7.49	0.59	17.07	18.99	17.85
11	15.69	9.75	0.37	17.11	19.21	17.97
12	15.45	25.70	0.00	17.00	19.28	17.93
13	15.39	6.92	0.65	17.05	19.53	18.06
14	15.20	19.21	0.02	16.99	19.65	18.07
15	15.14	5.64	0.77	17.06	19.90	18.21
16	14.99	14.48	0.11	17.03	20.06	18.26
17	14.90	7.67	0.57	17.07	20.29	18.38
18	14.82	7.68	0.57	17.11	20.51	18.49
19	14.72	8.12	0.52	17.14	20.73	18.60
20	14.56	13.77	0.13	17.10	20.87	18.63
21	14.44	9.11	0.43	17.11	21.07	18.72
22	14.29	12.10	0.21	17.08	21.22	18.76
23	13.98	22.56	0.01	16.90	21.23	18.66
24	13.80	13.11	0.16	16.84	21.35	18.67

Granger Causality Test (lag selected = 12)		
Causal Directions	F-statistic	P-Value
Paramilitary-> Guerrilla	1.436	0.158
Government -> Guerrilla	1.078	0.384
Guerrilla -> Paramilitary	4.426	0.000
Government -> Paramilitary	0.699	0.750
Guerrilla -> Government	1.863	0.045
Paramilitary -> Government	1.309	0.221



Table A2. Causes of paramilitary violence correlation coefficients.

State Presence Correlation Matrix						
	Proportion of poor affiliated w/public health services	Own resource generation capacity	Oil production	Gold production	Public Investment	
Proportion of poor affiliated w/public health services	1					
Own resource generation capacity	-0.16	1				
Public Investment	0.39	0.18	1			
Resources/Greed Correlation Matrix						
	GDP of Agriculture	GDP of Mining	Palm production	Gold production	Oil production	Cattle
Coca Cultivation	1					
GDP of Agriculture	-0.13	1				
GDP of Mining	-0.03	0.03				
Palm production	0.01	-0.08	1			
Gold production	0.05	0.07	-0.05	1		
Oil production	-0.004	-0.02	0.56	-0.02	1	
Cattle	0.04	-0.08	0.16	0.04	0.21	1
Grievances Correlation Matrix						
	Unemployment Rate	GINI Coeff	GINI Coeff			
Unemployment Rate	1					
GINI Coeff	0.71	1				
Controls Correlation Matrix						
	GDP per Cap	Population	Prior Violence			
GDP per Cap	1					
Population	0.03	1				
Prior Violence	0.03	0.25	1			

Table A3. Granger causality tests.

	Granger Causality Resources/Greed							Granger Causality Test				
	Lag	Log – Deter	Chi-Square	P-value	AIC	BIC	HQ			F-statistic	P-value	
Paramilitary & Coca Cultivation	1	30.09	0.00	0.00	31.18	31.40	31.04	Coca	-> Paramilitary	6.45	0.03	
	2	29.42	4.01	0.40	31.24	31.60	31.01	Paramilitary	-> Coca	0.16	0.70	
	3	27.55	7.49	0.11	30.09	30.60	29.77					
Paramilitary & GDP Agriculture	1	23.47	0.00	0.00	24.56	24.78	24.42	GDP Agric.	-> Paramilitary	9.72	0.01	
	2	23.23	1.46	0.83	25.05	25.41	24.82	Paramilitary	-> GDP Agric.	0.16	0.70	
	3	22.84	1.56	0.82	25.38	25.89	25.06					
Paramilitary & Mining	1	24.99	0.00	0.00	26.08	26.30	25.94	GDP Min.	-> Paramilitary	5.26	0.07	
	2	24.25	4.44	0.35	26.06	26.43	25.84	Paramilitary	-> GDP Min.	0.42	0.75	
	3	23.08	4.66	0.32	25.63	26.13	25.31					
Paramilitary & Cattle	1	35.64	0.00	0.00	36.73	36.94	36.59	Cattle	-> Paramilitary	23.30	0.00	
	2	35.51	0.79	0.94	37.32	37.69	37.10	Paramilitary	-> Cattle	0.10	0.75	
	3	34.94	2.25	0.69	37.49	38.00	37.17					
Paramilitary & Oil	1	41.13	0.00	0.00	42.22	42.44	42.08	Oil	-> Paramilitary	0.45	0.52	
	2	40.20	5.55	0.23	42.02	42.38	41.79	Paramilitary	-> Oil	1.09	0.32	
	3	37.91	9.15	0.06	40.46	40.97	40.14					
Paramilitary & Gold	1	43.18	0.00	0.00	44.27	44.49	44.13	Gold	-> Paramilitary	2.55	0.19	
	2	42.23	5.72	0.22	44.04	44.41	43.82	Paramilitary	-> Gold	3.05	0.15	
	3	40.30	7.72	0.10	42.84	43.35	42.52					
Paramilitary & Palm	1	36.50	0.00	0.00	37.59	37.81	37.45	Palm	-> Paramilitary	6.05	0.06	
	2	36.00	3.00	0.56	37.82	38.18	37.59	Paramilitary	-> Palm	0.24	0.87	
	3	34.54	5.84	0.21	37.09	37.59	36.77					

Table A4. OLS fixed effects balanced panel.

Oneway (individual) effect	Within Model			
Municipalities	Years	Number of Observations		
1116	14	15,624		
Residuals				
Min.	1st Qu.	Median	3rd Qu.	Max.
-59.3	-0.464	-0.0389	0.207	137.00
Coefficients				
Percentage of poor affiliated w/public health services	-1.16,802 (0.237)	***		
Coca cultivation (<i>Hectares</i>)	0.0393092 (0.008)	***		
Sectoral GDP of Agriculture, Fishing and Ranching (<i>Billions COP</i>)	0.2,089,256 (0.340)			
Sectoral GDP of Mining, Energy and Quarries (<i>Billions COP</i>)	-0.0107423 (0.040)			
Palm production (<i>Tons</i>)				
Gold production (<i>Kilograms</i>)				
Oil production (<i>barrels per day</i>)				
Cattle (<i>Heads</i>)				
Unemployment rate *				
GINI Coefficient *				
Leftist Guerrilla HR Violations (CINEP)*	0.4,920,215 (0.034)			
Gross Domestic Product per capita (<i>Millions COP</i>)	-1.1,753,781 (0.178)			
Population (Thousands)	-2.6,695,649 (0.089)			
$p \leq 0.001^{***}$ $p \leq 0.01^{**}$ $p \leq 0.05^*$				
Total Sum of Squares:	243,430			
Residual Sum of Squares:	220,010			
R-Squared:	0.09621			
Adj. R-Squared:	0.02628			
F-statistic:	220.522 on 7 and 14,501 DF, p-value: < 2.22e-16			
Breusch-Pagan LM test for cross-sectional dependence in panels				
P-Value:			2.2E-16	
Alternative Hypothesis: Cross-Sectional Dependence				
Pesaran CD test for cross-sectional dependence in panels				
P-Value:			2.2E-16	
Alternative Hypothesis: Cross-Sectional Dependence				
Breusch-Godfrey/Wooldridge test for serial correlation in panel models				
P-Value:			2.2E-16	
Alternative Hypothesis: Serial Correlation in Idiosyncratic Errors				

Table A5. Moran's I test for spatial autocorrelation of the models' residuals.

	Model 1	Model 2	Model 3	Model 4
	With sectoral GDPs (Agriculture and Mining)	Without sectoral GDPs, with oil, palm and cattle productions	No Agriculture GDP, oil, gold and palm	Model 1 + Palm, GINI & Unemployment (24 depts)
Observed	-0.00033	0.00022	0.00016	-0.00022
Expected	-0.00008	-0.00008	-0.00008	-0.00009
S.D	-0.00025	0.00029	0.00025	0.00028
P-Value	0.32	0.30	0.34	0.64
<i>Research Hypothesis: Spatial autocorrelation</i>				

Table A6. GLMM model with spatial lag.

	Model Spatial Lag	
	With sectoral GDPs (Agriculture and Mining)	
<i>DV: Human Rights Violations (CINEP)</i>		
Constant	-2.456 (0.639)	***
HRV Spatial Lag	0.014 (0.013)	
State presence		
Proportion of poor affiliated w/public health services	-0.694 (0.265)	**
Own resource generation capacity (<i>Tax receipts/Current revenue x 100%</i>)	0.008 (0.003)	
Public Investment (<i>Investment/Total expenditures x 100%</i>)	-0.0006 (0.002)	
Resources/Greed		
Coca Cultivation _{t-1} (<i>Hectares</i>)	0.038 (0.007)	***
Sectoral GDP of Agriculture, Fishing and Ranching _{t-1} (<i>Billions COP</i>)	-0.526 (0.357)	
Sectoral GDP of Mining, Energy and Quarries _{t-2} (<i>Billions COP</i>)	0.092 (0.044)	*
Palm production _{t-1} (<i>Tons</i>)		
Conflict		
Leftist Guerrilla Human Rights Violations (CINEP) _{t-1}	0.094 (0.024)	***
Controls		
Gross Domestic Product per capita (<i>Millions COP</i>)	-0.408 (0.223)	o
Population (<i>Thousands</i>)	0.067 (0.014)	***
Prior Violence (<i>mean value 1990–1999</i>) HRV	0.203 (0.018)	***
Negative Binomial dispersion parameter		0.2624 (0.0106)
Random Effects Variances:		
Group = Department (intercepts)	Variance	Std Dev
Group = Department: Municipality (intercepts)	4.195	2.048
Group = Time (intercepts)	2.409	1.552
	1.417	1.190
AIC		18,680.4
Log-likelihood		-9324.19

Significant codes: p < 0.0001 ***, p < 0.001 **, p < 0.01 *, p < 0.05 o, p > 0.05 "



Table A7. GLMM-admb negative binomial results for paramilitary HRVs (2002–2015).

	Model 1		Model 2		Model 3		Model 4	
	With sectoral GDPs (Agriculture and Mining)	Without sectoral GDPs, with Oil, Gold, Palm and Cattle productions	No Agriculture GDP, Oil, gold, and palm	Model 1 + Palm, GINI and Unemployment (24 depts)				
<i>DV: Human Rights Violations (CINEP)</i>								
Constant	-2.452 (0.639)	-2.720 (0.597)	-2.810 (0.595)	-0.077 (1.019)				
<i>State presence</i>								
Proportion of poor affiliated w/public health services	** -0.698 (0.265)	* -0.638 (0.261)	*	*** -1.028 (0.272)				
Own resource generation capacity (Tax receipts/Current revenue x 100%)	** 0.008 (0.003)	** 0.0085 (0.003)	**	** 0.0098 (0.003)				
Public Investment (Investment/Total expenditures x 100%)	-0.0006 (0.002)	-0.0007 (0.002)	-0.0006 (0.002)	-0.0029 (0.002)				
<i>Resources/greed</i>								
Coca Cultivation t_{-1} (Hectares)	*** 0.038 (0.007)	*** 0.039 (0.007)	*** 0.039 (0.007)	*** 0.058 (0.009)				
Sectoral GDP of Agriculture, Fishing and Ranching t_{-1} (Billions COP)	-0.516 (0.357)			* -0.729 (0.287)				
Sectoral GDP of Mining, Energy and Quarries t_{-2} (Billions COP)	* 0.092 (0.044)			0.015 (0.051)				
Palm production t_{-1} (Tons)		-0.0175 (0.0656)						
Cattle t_{-1} (Heads)		0.000006 (0.000001)						
Gold production t_{-2} (Kilograms)		-0.0008 (0.004)						
Oil production t_{-2} (Barrels per day)		0.0753 (0.033)						
<i>Grievances</i>								
Unemployment Rate *				*** 0.095 (0.016)				
GINI Coefficient *				** -4.592 (1.686)				
<i>Conflict</i>								
Leftist Guerrilla Human Rights Violations (CINEP) t_{-1}	*** 0.093 (0.024)	*** 0.023 (0.0058)	*** 0.023 (0.0058)	*** 0.088 (0.024)				
<i>Controls</i>								
Gross Domestic Product per capita (Millions COP)	o -0.405 (0.223)	* -0.544 (0.250)	o -0.470 (0.245)	o -0.157 (0.248)				

(Continued)

Table A7. (Continued).

	Model 1	Model 2	Model 3	Model 4
<i>DV: Human Rights Violations (CINEP)</i>				
Population (Thousands)	0.067 (0.014) ***	Without sectoral GDPs, with Oil, Gold, Palm and Cattle productions 0.065 (0.013) ***	No Agriculture GDP, Oil, gold, and palm 0.065 (0.013) ***	Model 1 + Palm, GINI and Unemployment (24 depts) 0.043 (0.010) ***
Prior Violence (mean value 1990–1999) HRV	0.203 (0.018) ***	0.191 (0.018) ***	0.190 (0.018) ***	0.204 (0.018) ***
Negative Binomial dispersion parameter	0.2621 (0.0106)	0.2611 (0.0106)	0.2609 (0.0105)	0.2715 (0.0113)
Random Effects Variances:				
Group = Department (intercepts)	4.188	3.512	3.485	3.854
Group = Department: Municipality (intercepts)	2.405	2.324	2.324	2.397
Group = Time (intercepts)	1.421	1.42	1.454	1.151
AIC	18,679.5	18,670.7	18,670.8	17,737.2
Log-likelihood	-9324.75	-9318.34	-9319.42	-8851.58