Political Polarization and Violence: Evidence from a Peace Referendum in Colombia*

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Abstract

Political polarization can result in a lack of compromise and cooperation between groups, which can ultimately lead to violence. This article examines the impact of a close peace referendum held in Colombia in October 2016. It employs a regression discontinuity approach to show that the narrow results of the referendum provoked an outbreak of violence in municipalities that rejected the agreement. The surge in violence emphasizes the fact that, in order for a democracy to be consolidated, not all groups must have a chance of winning an election. Democracy is only stable when one group dominates; therefore, when political support is evenly balanced, it can lead to radicalization and violence. Political polarization regarding a peace agreement between the Colombian government and the FARC insurgency could have created a volatile and dangerous environment that increased the risk of violence.

Keywords: Colombia, Peace, Post-Conflict, Referendum, RDD.
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1 Introduction

Peace agreements can backfire for a variety of reasons. The most common one is asymmetric information (Acemoglu and Robinson, 2001; Filson and Werner, 2002; Langlois and Langlois, 2006; Mattes and Savun, 2010; Corchón and Yıldızparlak, 2013). When one party has more information than the other, they may be able to gain an advantage in the negotiation process. For example, if one party has detailed knowledge of the military capabilities of the other, they may be able to extract more concessions in exchange for a ceasefire, or they may be able to negotiate more favorable terms. Asymmetric information can also generates commitment problems leading to mistrust (Powell, 2006; Walter, 2009; Wolford et al., 2011; Bell and Johnson, 2015; Streich and Levy, 2016). If one party believes the other is withholding information, they may be less willing to make concessions or trust the other party to uphold their end of the agreement.

One feature of peace agreements that is frequently ignored is that they are contentious and divisive. Peace agreements often include compromises on involved sides, which can be seen as concessions by hardline elements within the government or a rebel group. This can lead to criticism from those who feel that the agreement does not go far enough, or that it gives too much to the other side. Also, the implementation of a peace agreement can be a long and difficult process, with many challenges and obstacles to overcome. If progress is slow or uneven, this can lead to frustration and disillusionment among those who supported the agreement, which can in turn lead to political polarization. In extreme cases, polarization can lead to radicalization and violence, as individuals become more willing to resort to violence to achieve their political goals (Chacón et al., 2011).

Understanding the factors that condition the success of peace agreements is critical for preventing the recurrence of conflict and promoting sustainable peace in the long-term. By identifying the underlying causes of conflict and addressing them through peace agreements, it is possible to ensure that peace agreements have a lasting impact and do not simply provide a temporary solution to the conflict. According to the PA-X Peace Agreement Database[1], there are 1,915 agreement documents from 140 peace initiatives that span 1990 to 2021. This database includes well-known conflicts such as those in Angola, Bosnia, and Afghanistan, as well as border conflicts between Nigeria and Cameroon, and the Falkland Islands conflict between Argentina and the United Kingdom. Of the 1,915 agreements 399 (28%) are related to ceasefire declarations to deescalate violence. A question that then arises is: to what extent peace agreements are effective in reducing violence?

In 2012, the Colombian government decided to begin peace negotiations with the FARC insurgency (Revolutionary Armed Forces of Colombia). The FARC was one of the main

[1]Peace agreements database: https://www.peaceagreements.org/about

actors involved in the decades-long armed conflict in Colombia and was responsible for significant levels of violence and human rights abuses. The impact of the peace negotiations on violence at the local level would depend on a number of factors, including the successful implementation of the agreement, the ability of the government to provide security, and the willingness of other armed actors to disarm themselves. The peace agreement signed in 2016 did lead to a reduction in violence and killings in Colombia, but this reduction was not uniform across the country. Regions that were strategic to FARC saw an increase in violence after its disarmament (Prem et al., 2021, 2022).

The purpose of this study is to determine the impact of the peace referendum outcome on violence at the local level in Colombia. It contends that the negotiated settlement reached between the Colombian government and the FARC insurgency attempted to bring an end the armed conflict while also consolidating the country's democracy. The referendum provided an opportunity for Colombian citizens to directly express their views on the peace agreement. Nevertheless, it was a highly contentious issue, with strong opinions on both sides. The rejection of the agreement indicates that there were deep divisions within Colombian society regarding how to achieve peace and justice. The article follows closely Chacón et al. (2011) by arguing that a contentious electoral result could spark violence. Situations where all groups have an almost equal chance of winning an election, it is also likely that they have a similar chance of winning in a violent conflict. When the support of political parties is evenly distributed, the intensity of fighting between them tends to increase.

The article leverages on a regression discontinuity design (RDD) to assess if the level of local support for the final agreement influences the extent of violence one year after the peace referendum took place (October 2016 - September 2017). The article uses the difference between the rejection and approval rates during the referendum as the score variable. Findings reveal that a close peace referendum rejection leads to up to 0.012 extra monthly violent events per 10,000 people, a significant effect equivalent to nearly 1.3 times the sample mean. Weintraub et al. (2014) explains that the 2014 presidential election in Colombia was reportedly defined by candidates' positions on negotiations with the FARC. Indeed, the surge in violence is primarily concentrated in municipalities that supported the pro-peace candidate, Juan Manuel Santos, during the 2014 presidential election and narrowly rejected the peace agreement. The average effect is larger in municipalities that plant coca and have gold deposits, as a proxy for the presence of illicit rents. Importantly, there is no evidence of a surge in violence perpetrated by the FARC insurgency or dissidents as a result of the unexpected outcome of the peace referendum. The article also provides empirical evidence of no differential trends in historical violence that could have motivated voters to choose any particular option in the referendum.

There appears to be little evidence of vote rigging, particularly in key locations such as municipalities represented by a relatively large electorate. The main results are not driven

by the dynamics of conflict right before the peace negotiations secretly started, or directly by the results of the 2014 presidential election. Point estimates are consistent across multiple bandwidths, and when different sub-samples of observations near the cut-off get removed (Donut RD). Given that the motivation for RDDs is a comparison of expected outcomes as one approaches the cutoff from both sides, estimates should not be sensitive to observations at the cutoff (Barreca et al., 2011). Statistically significant effects are detectable only at the 0 cutoff point.

The article contributes both empirically and theoretically. In general, this article relates to a larger field of study on the impact of democracy on violence. Estimating the causal effect of democracy on conflict is empirically challenging. First, conflicts can prompt the implementation of elections (reverse causality). Similarly, unobserved variables can determine both democracy and conflict (omitted variable bias). In this study, the close referendum results allow to estimate the causal effect of voters' preferences regarding war and peace on violence. I study the effect on a subset of municipalities that are supposed to be similar in a wide range of observable and unobserved characteristics, being different only in whether they reject or approve the final agreement reached between the Colombian government and the FARC insurgency. From a theoretical point of view, the article contends that evenly balanced support for the disarmament of FARC , ironically, could trigger spirals of violence.

2 Institutional Context and Economic Framework

The Colombian government battled against two non-state armed organizations in the 1960s: *Revolutionary Armed Forces of Colombia* (FARC by its Spanish acronym) and *National Liberation Army* (ELN). Both violent groups arose in response to the demand for political disenfranchisement expressed by rural peasants who felt ignored by the political elite. After years of intensive violence between 1948 and 1958, a period known as *La Violencia* (The Violence), Colombia's elite overcame a political reform designed to address long-standing disagreements between the Liberal and Conservative parties. The *National Front* agreement, implemented between 1958 and 1974, allowed both parties to share power while excluding other political gruops, particularly liberal and leftist guerrillas operating in Colombia's borders.

The FARC and the ELN lacked the manpower to constitute a serious threat to the establishment and, more broadly, to the institutional arrangement determined by the *National Front*. Between the 1970s and 1980s, other non-state armed groups, such as the *Popular Army of Liberation* (EPL), *April 19 Movement* (M-19), *Quintín Lame Armed Movement* (MAQL), and *Revolutionary Party of the Workers* (PRT), joined both the FARC and the ELN to the list of illegal armed groups in Colombia. Although these groups had various differences, they all shared a common left-leaning ideology of opposing established local elites

who historically held power and excluded other groups from participating in politics. Local elites in Colombia also formed their own militias, which eventually merged under the name of *United Self-defenses of Colombia* (AUC), a paramilitary organization.

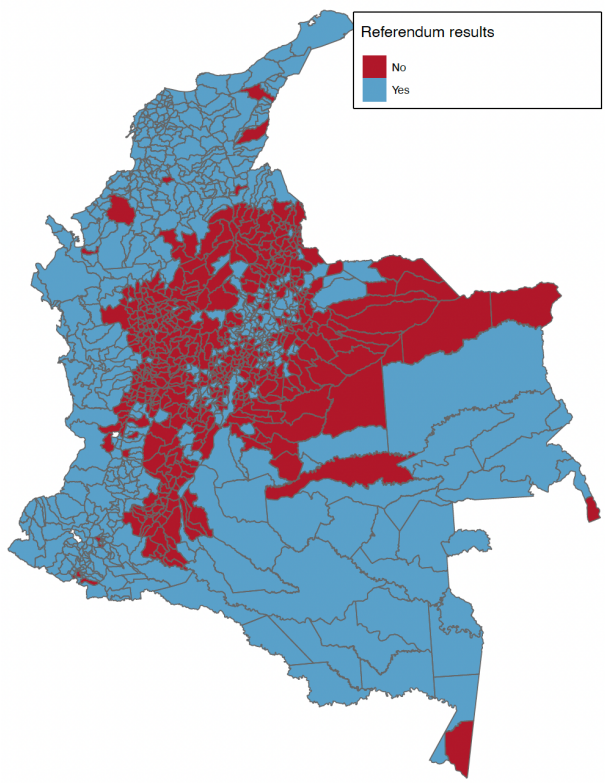
Eventually, several violent groups surrendered their weapons. and, in the late 1990s, the FARC and AUC were the two most influential non-state armed groups in Colombia. An important feature of the Colombian conflict at this time is that these groups got engaged in drug trafficking as a means of generating a significant portion of their funding. While income from drug trafficking accounted for 48% of FARC's budget, it is known it accounted for 70% of AUC's budget (Saab and Taylor, 2009; Fisher and Meitus, 2017; Abadie et al., 2015). Coca crops expanded rapidly in the second half of the 1990s, coinciding with the outbreak of Colombia's civil war. Colombia became one of the main producers of coca leaves in the world after the planting rate of coca bushes increased from 19% to 74% between 1990 and 2000 (Rozo, 2012; Mejía, 2016). This production was spread over 200 municipalities, and roughly half of all crops were concentrated within ten municipalities (Mejía, 2016). Colombia got to be the leading cocaine exporter in 2009, accounting for 60% to 80% of the global supply (Mejía, 2016; Fisher and Meitus, 2017). This trend persisted even after peace negotiations between 2003 and 2007 leaded to AUC disarming (Mejía, 2016). This could be because former AUC members joined new criminal organizations that continued to engage in illegal activities such as drug trafficking and illegal mining.

In 2011, during Juan Manuel Santos' administration, the Colombian government initiated secret negotiations with FARC representatives in hopes of an eventual demobilization and disarmament of the insurgency group. In 2012, the Colombian government and FARC publicly declared the beginning of peace talks, with Norway and Cuba serving as guarantors of the process. The official peace discussions commenced in Havana, Cuba, in October of the same year. Subsequently, in July 2016, the FARC announced a formal ceasefire with the Colombian government, and the final settlement document was presented to the then-UN Secretary-General, Ban Ki Moon.

In order to legitimize and ratify the final agreement that was reached with the FARC, the Colombian government opted to conduct a nationwide referendum. This decision received approval from both the Constitutional Court and Congress. To be valid, the referendum had to meet two requirements: the share that approves the peace deal (votes for the "Yes" in the referendum) i) had to represent at least 13% of the electorate, and ii) had to outnumbered the share that rejected the peace deal (votes for the "No" in the referendum). Although opinion polls consistently placed "Yes" as the virtual winner of the electoral process, the final result on 2 October 2016 showed that 50.22% of those who voted rejected the peace deal, which represented 6,438,552 votes, a margin of barely 0.44% against the "Yes". Figure 1 illustrates the geographical distribution of the referendum results. Consequently, the FARC and the Colombian government needed to revise the agreement and release an updated version in

December of 2016. The Disarmament, Demobilization, and Reintegration (DDR) process of the FARC insurgency commenced in January of 2017. Despite ongoing peace negotiations with the FARC, other non-state armed groups, including the ELN and paramilitary factions, continued to engage in violent confrontations to maintain control over drug trafficking routes and revenues and illegal mining revenues.

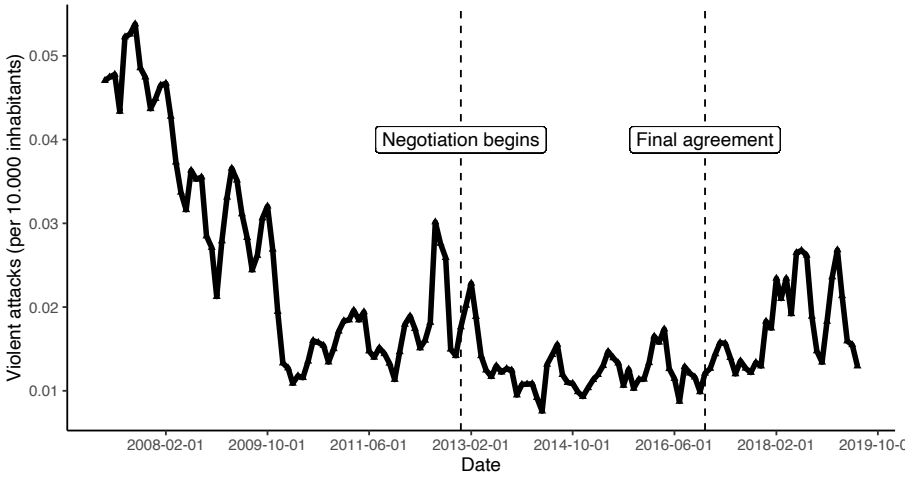
Figure 1: The outcome of the referendum in October 2016.



Notes: The map presents the distribution of the outcome of the referendum across Colombian municipalities in October 2016 and does not include the islands of San Andrés and Santa Catalina.

Figure 2 makes explicit a surge in violence in Colombia after the disarmament of the FARC insurgency (Charles et al., 2020). Although such rise does not reach 2007 levels, it is indeed similitar to levels that existed prior to the negotiations (2009-2011). Experts attribute the outbreak of violence to attacks perpetrated by other non-state armed groups that were not involved in the peace negotiations with the FARC. There is a struggle for territorial control in coca-growing areas and there is evidence that local disputes are driving the assassination of social leaders and former FARC combatants (Charles et al., 2020; Prem et al., 2022).

Figure 2: Violent attacks perpetrated by non-state armed groups (2007-2019)



Notes: The figure presents the evolution of violent attacks perpetrated by non-state armed actors between 2007-2019 in Colombia. It highlights the date of the beginning and end of peace negotiations between the Colombian government and the FARC insurgency.

2.1 Economic Framework

Armed actors usually take advantage of economic opportunities during civil wars (Collier and Hoeffler, 1998; Sambanis, 2002; Fearon and Laitin, 2003; Humphreys, 2003; Wood, 2003; Collier and Hoeffler, 2004; Kalyvas, 2007; Justino, 2007; Collier et al., 2009). Non-state armed groups often strive to gain dominion over lucrative resources, including minerals, oil, and other commodities, as a means of generating income and backing their operations. Additionally, they may involve themselves in illicit activities such as the smuggling and trade of weapons, wildlife, and counterfeit goods, further bolstering their financial resources. As a result, unexpected fluctuations in revenue or resources serve as reliable indicators for predicting the emergence and duration of conflict (Le Billon, 2001; Leonard and Straus, 2003; Ross, 2004; Le Billon, 2005; Lujala et al., 2005; Humphreys, 2005; Ross, 2006; Besley and Persson, 2008; Dal Bó and Dal Bó, 2011; Dube and Vargas, 2013). The nature of the relationship between income and violence remains ambiguous. A decline in income may increase the likelihood of violence by decreasing the opportunity cost of joining an armed group for potential combatants (Dube and Vargas, 2013). On the other hand, an increase in income can also stimulate violence by augmenting the rewards for which armed actors are competing (Miguel et al., 2004; Bazzi and Blattman, 2014). In both scenarios, fluctuations in income can trigger outbreaks of violence.

The article interprets the peace negotiations between the Colombian government and the FARC insurgency, and particularly the disarmament of the FARC insurgency following the

signing of the final agreement, as an exogenous shock that rises the amount of resources other armed groups that did not participate in the talks can potentially appropriate by disputing strategic territories formerly controlled by the FARC. Further, as it has extensively been shown in the literature, such territorial contestation is often carried out by violent means (Kalyvas, 2007; Prem et al., 2020; Rivera-Triviño, 2022). Even if the size of the disputed resources remains constant, an armed actor's stake in them may increase if it is able to seize previously controlled territories from the FARC. Such territories procure an strategic value because they provide additional income, for example, from coca crops, illegal mining, or other economic activities. This consolidation of territorial control by armed actors implies that confrontations and the struggle for territorial control will engender violence at the local level (Kalyvas, 2007).

Non-state armed groups will use violence strategically and leverage on the polarization generated through the outcome of the peace referendum to do so. Political polarization can lead to a fragmentation of the state and the emergence of non-state actors who seek to fill the power vacuum created by the breakdown of the state's authority. This can increase the likelihood of violence as non-state actors may seek to use violence to gain power and control over territory. In the case of Colombia, the polarization around the peace agreement led to the emergence of new armed groups, particularly in areas where the FARC had a strong presence, as these groups sought to fill the power vacuum created by the demobilization of the FARC. Non-state actors would gain from majority support for the peace agreement, and their preferences would prevail if that occurred. As a result, the degree to which these groups may resort to violence is determined by the outcome of the peace referendum.

Chacón et al. (2011) shows that as the probability of winning an election increases with the size of a group, so does the probability of winning an armed conflict. A situation where all groups have a high chance of winning an election, they may also have a high chance of winning a fight, and democracy may never be consolidated in such a case. In the context of the peace referendum in Colombia, it is expected that an outbreak of violence would occur in municipalities with narrow electoral results. Moreover, as other non-state armed groups are eager to take advantage of the power vacuum created by the demobilization of the FARC but the rejection of the agreements denies it initially, municipalities that narrowly rejected the peace agreement are likely to experience a significant increase in violence. This argument provides a set of empirical hypotheses, as follows:

- Violent attacks will increase in municipalities where most people voted against the final agreement reached between the Colombian government and the FARC insurgency.
- The rise in violence concentrates in municipalities the FARC considered had an strategic value and other non-state armed groups that did not participate in the negotiation process want to take under their control.

According to own estimations, the FARC insurgency was active in 109 municipalities between 2007 and 2011, just before peace talks began, with 29 municipalities reporting the existence of coca crops, or 30% of municipalities in Colombia affected by coca crops in 2015. The area of coca crops in these 29 municipalities amounted 37,015 hectares. Since coca cultivation covered a total area of 96,085 hectares in 2015, coca planting within municipalities that reported the presence of the FARC insurgency represented the 38% of Colombia's total production that same year. This is an important area that can be redistributed among other non-state armed groups after the disarming of the FARC insurgency in 2017. According to UNODC (2016), average production of cocaine hydrochloride per hectare reached 6.8 kg during 2015. The average price of cocaine hydrochloride per kilo was of US$1.732 during the same year. Thus, municipalities affected by the presence of the FARC insurgency potentially produced 251.702 kg of cocaine hydrochloride. The face value of such production went around US$436 million in 2015.

3 Empirical strategy

3.1 Data

Table 1: Summary statistics.

	Mean	Std. Dev.	Min	Max
Peace referendum (October 2, 2016)				
Proportion of municipalities in favor of peace	0.515	0.500	0.000	1.000
Voting turnout	35.298	8.321	3.386	62.411
Violent attacks (per 10,000 people)				
Total number of attacks	0.013	0.114	0.000	6.122
Attacks perpetrated by FARC	0.001	0.032	0.000	2.630
Attacks perpetrated by ELN	0.002	0.043	0.000	3.061
Attacks perpetrated by paramilitary groups	0.002	0.054	0.000	3.060
Attacks perpetrated by an unknown armed actor	0.008	0.074	0.000	2.461
Attacks perpetrated by security forces	0.002	0.033	0.000	1.558

Notes: Summary statistics are calculated for the sample studied (October 2016 - October 2017) using monthly averages.

Universidad del Rosario provided the dataset on violent attacks that occurred during the Colombian armed conflict, which encompasses an detailed depiction of each conflict incident, including the armed actor involved, the number of civilian casualties, and the precise

date and location[2]. I consolidated the occurrences of violent incidents every month and categorized them by armed actor (FARC, ELN, paramilitary groups, and other parties) at the municipal level. I then standardized the count of violent attacks to represent every 10,000 inhabitants. The primary outcome variable I evaluated represents the total number of violent attacks committed by non-state armed groups from October 2016 to September 2018.

The article reports data from *Integrated Monitoring System for Illicit Crops* (SIMCI, in Spanish) from *United Nations Office on Drugs and Crime* (UNODC) to examine any heterogeneous effects of coca crops presence on violent attacks at the municipal level. Moreover, as non-state armed groups finance their military operations not solely through drug trafficking but also by means of revenues obtained from illegal mining, I incorporated data on mining statistics in Colombia. The *Ministry of Mines and Energy* in Colombia records mineral production at the municipal level and Prem et al. (2020) reports the presence of illicit mining at the same level. This facilitates the examination of heterogeneous effects in regions where there exists both legal and illegal mining.

To create the treatment variable, the article utilizes the result of the peace referendum of *National Registry for Civil Status in Colombia*.[3] The treatment variable is assigned a value of 1 when the percentage of votes within a municipality that opposed the peace agreement surpassed the percentage that favored it (the "No" won); otherwise, it takes the value of 0 (the "Yes" won). Lastly, I incorporate the results of the 2014 presidential election to explore how this election impacted the ultimate outcome of the peace referendum vote. The article also reports data on electoral risk during the peace referendum reported by *Misión de Observación Electoral*, which include information on presence of non-state armed groups and a host of other local risk measures. The final database comprises a pooled panel of municipal-level microdata spanning from October 2016 to September 2018.

[2]The dataset was created using reports from *Revista Noche y Niebla*. These statistics are highly reliable since they are based on news reports from 25 major Colombian newspapers, as well as reports filed by Catholic priests documenting any incident involving political violence. These events are then cross-checked against government reports.

[3]This is the official institution in Colombia responsible for holding the elections and scrutinizing votes. For the referendum, it reported the number and percentage of votes cast in favor or against the peace agreement, as well as the null votes and unmarked votes, for every polling station.

Table 2: Summary statistics: "Yes" versus "No" municipalities.

	YES	NO	Difference
Andean region	0.324	0.818	-0.494
	(0.468)	(0.386)	[0.000]
Caribbean region	0.308	0.027	0.282
	(0.462)	(0.161)	[0.000]
Pacific region	0.255	0.053	0.202
	(0.436)	(0.224)	[0.000]
Orinoquía region	0.032	0.076	-0.044
	(0.176)	(0.265)	[0.000]
Amazon region	0.080	0.027	0.054
	(0.272)	(0.161)	[0.000]
Total population	20,628.642	20,250.466	378.176
	(24,726.291)	(24,052.305)	[0.079]
Rurality index	0.620	0.549	0.071
	(0.238)	(0.221)	[0.000]
Municipal area (hec^2)	135,807.843	64,772.348	71,035.495
	(418,250.746)	(166,411.805)	[0.000]
Altitude (km)	920.094	1,387.794	-467.699
	(1,379.018)	(810.294)	[0.000]
Distance to departmental capital (km)	89.657	76.644	13.013
	(66.505)	(51.411)	[0.000]
Distance to Bogotá (km)	405.974	226.189	179.785
	(196.919)	(127.602)	[0.000]
Unsatisfied basic needs index	55.429	36.260	19.169
	(21.197)	(15.330)	[0.000]
Total municipal income	14,758.270	14,765.387	-7.117
	(24,909.421)	(21,088.913)	[0.973]
Total municipal expenditure	17,347.887	16,664.036	683.852
	(28,470.011)	(23,077.724)	[0.003]
Dummy indicator of violence between 1948-1953	0.114	0.159	-0.046
	(0.317)	(0.366)	[0.000]
Land conflicts between 1901-1917	0.090	0.078	0.012
	(0.286)	(0.268)	[0.000]
Land conflicts between 1901-1931	0.119	0.104	0.015
	(0.324)	(0.306)	[0.000]
Potential students in primary school	2,246.950	2,006.138	240.812
	(2,668.919)	(2,351.161)	[0.000]
Potential students in secondary school	2,646.116	2,439.341	206.775
	(3,117.347)	(2,837.554)	[0.000]
Total number of schools	42.743	40.735	2.008
	(38.640)	(30.724)	[0.000]
Dummy indicator of coca crops presence	0.244	0.134	0.110
	(0.430)	(0.341)	[0.000]
Infant mortality rate	24.758	18.548	6.210
	(10.849)	(6.127)	[0.000]

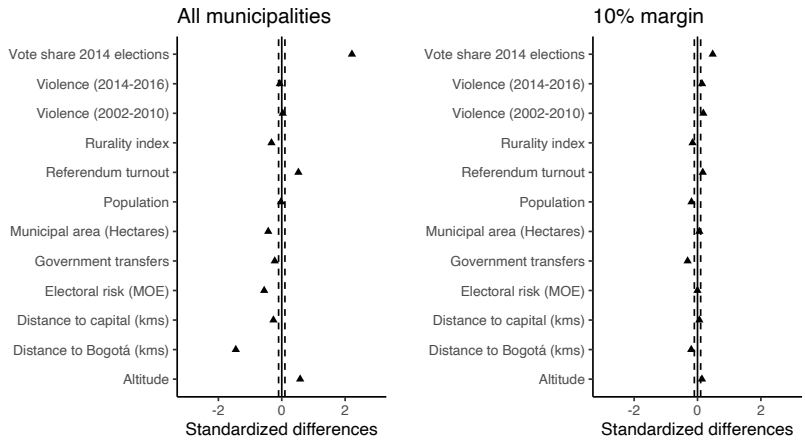
Notes: Summary statistics are calculated for the sample studied (October 2016 - September 2017) using monthly averages.

The summary statistics for treatment and dependent variables are shown in Table 1. The peace referendum was approved in 51.5% of the municipalities, despite a low turnout of 35%. Although the referendum was supported by 51.5% of municipalities, the final vote share in favor of the peace agreement was just 49.78%. Table 1 shows the number of non-state armed organizations that were active during the sample period. Table 2 shows how different the municipalities that supported "Yes" and "No" during the peace referendum were based on a set of observable municipal socioeconomic characteristics. Table 2 shows that the municipalities that approved the peace agreement are located in the rural area, far from major urban cities, mostly in the Caribbean, Pacific, Orinoquía, and Amazon regions. These municipalities are poorer, report higher infant mortality rates, and grow coca crops to a greater extent than municipalities where most people rejected the agreement.

3.2 Methodology and identification

The result of the peace referendum is expected to correlate with various observable and unobservable municipal characteristics. Furthermore, there is evidence that electoral results are influenced by violence (Kibris, 2011; Berrebi and Klor, 2008; Getmansky and Zeitzoff, 2014). Therefore, making a comparison between municipalities that approved the peace agreement and those that did not might produce a biased estimation of the causal effect of the peace referendum results on the local-level violence dynamics in Colombia.

Figure 3: Municipal characteristics by treatment and control groups.



Notes: The figure presents the standardize differences of municipal characteristics between treated and control municipalities. Left panel includes all municipalities, while right panel includes only municipalities reporting a 10% margin favoring either option during the referendum.

The article relies on the fact that the majority of the voting changes discontinuously at the centered threshold of 0. Even if the final decision regarding the peace agreement was based solely on the total number of votes cast at the national level, the article is able to

identify municipalities in which most voters rejected or approved the final peace agreement reached between the Colombian government and the FARC insurgency. It contends that other non-state armed groups utilize this information to exert violence strategically. The empirical model is based on a regression of the following form:

$$y_{it} = \beta_1 + \beta_2 \times D_{it} + \beta_3 \times f(X_{it}) + \beta_4 \times D_{it} \times f(X_{it}) + \epsilon_{it} \quad (1)$$

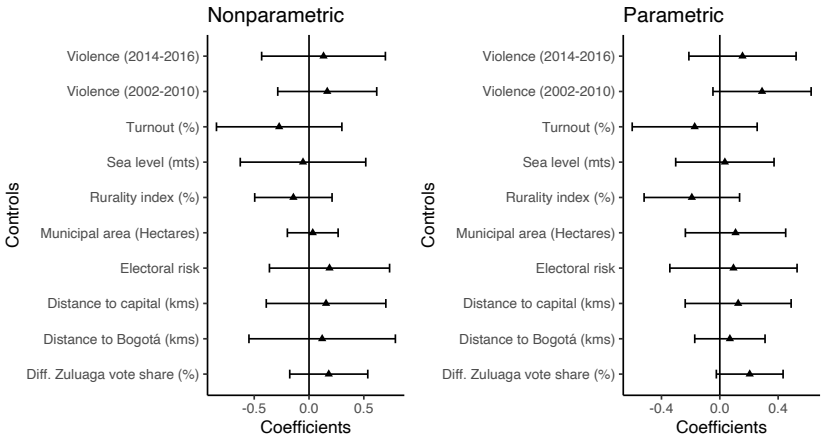
where y_{it} is the outcome variable for municipality i in month t, D_{it} represents a dummy treatment indicator of whether a municipality rejected the peace agreement during the referendum, the term $f(X_{it})$ is a polynomial function of the score variable, and ϵ_{it} is an idiosyncratic error term. The term X_{it} is the vote share rejecting the peace agreement minus the vote share supporting it, where a vote share represents a fraction of the total number of votes. Thus, the treatment variable equals 1 if $X_{it} > 0$ and 0 otherwise.

The coefficient of interest is β_2, which accounts for a discontinuous jump in the outcome variable around the score variable at 0. I estimate β_2 parametrically and nonparametrically in a narrow bandwidth following Calonico et al. (2014). I also evaluate the results using different bandwidths and local linear and quadratic polynomials (Lee and Lemieux, 2010; Gelman and Imbens, 2019). The causal interpretation of β_2 supports itself on two main assumptions: i) covariates other than our outcome variable vary smoothly at the threshold, meaning that any discontinuous jump in violence perpetrated by non-state armed groups is only attributable to the rejection of the final peace agreement, and ii) there is no systematic manipulation of the results of the referendum around the score threshold.

Figure 3 shows the standardized differences of a set of observable characteristics between treated and control municipalities. For instance, municipalities where the agreement got rejected also supported the presidential candidate who called for the end of peace negotiations. These same municipalities are less rural and closer to the country's capital, on average, than municipalities that approved the peace agreement. As the article restricts the sample to municipalities closer to the threshold at 0 by a margin of 10%, treated and control municipalities look similar on average, at least for those characteristics reported in the figure. Figure 4 shows the distribution of a set of municipal characteristics along different values of the score variable before the peace referendum takes place, following Calonico et al. (2014). Overall, this figure suggests that the first identifying assumption for a regression discontinuity design is plausible to hold; there is no evidence of statistically significant differences around the threshold between treatment and control municipalities for this set of observable variables.

To assess the second identifying assumption, the article implements a manipulation test proposed by Cattaneo et al. (2020), which is a modification of the McCrary test (McCrary, 2008). Figure 5 shows the distribution of the score variable. A discontinuous jump in either direction of the threshold would indicate that it is more or less likely to see a narrow win

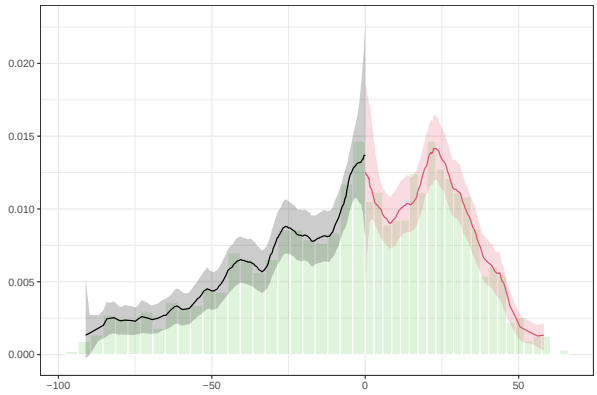
Figure 4: Continuity assumption.



Notes: Point estimates accompanied by confidence intervals at the 95% level.

of the peace agreement rejection during the October 2016 referendum. However, Figure 5 shows that there is no significant increase in density at the threshold (p-value = 0.449). Furthermore, when it runs a McCrary (2008) test, the article finds no apparent sorting on the score variable (p-value = 0.022). The article tests the manipulation in the score variable along different quartiles of the empirical distribution of the number of potential voters (electorate) in Figure A1 to explore the possibility of score manipulation in municipalities with a larger electorate since the final outcome depends on the total number of cast votes. Again, there is no evidence of manipulation in the score variable for any electorate quartile.

Figure 5: Score density.



Note: Manipulation test based on Cattaneo et al. (2020), where p-value is 0.452.

4 Results

4.1 Main results

Table 3: Effect of the referendum results on the average monthly violent events involving non-state armed groups using linear polynomials, October 2016 – September 2017.

Dependent variable	Average monthly violent events involving non-state armed groups (per 10,000 inhabitants)					
	(1)	(2)	(3)	(4)	(5)	(6)
Nonparametric estimates and bias-corrected standard errors of Calonico, Cattaneo, and Titiunik (2014) - Kernel: Uniform						
Rejection share (%)	0.012**	0.012**	0.010**	0.010**	0.008*	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mean Dep. Var.	0.009	0.009	0.008	0.008	0.009	0.008
Bandwidth	13.850	14.085	17.323	17.519	16.107	16.605
Observations	3,804	3,864	4,680	4,716	4,380	4,452
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	0.011**	0.011*	0.011*	0.011*	0.008	0.008
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)
Mean Dep. Var.	0.009	0.009	0.009	0.009	0.009	0.009
Bandwidth	14.085	14.085	14.085	14.085	14.085	14.085
Observations	3,864	3,864	3,864	3,864	3,864	3,864
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

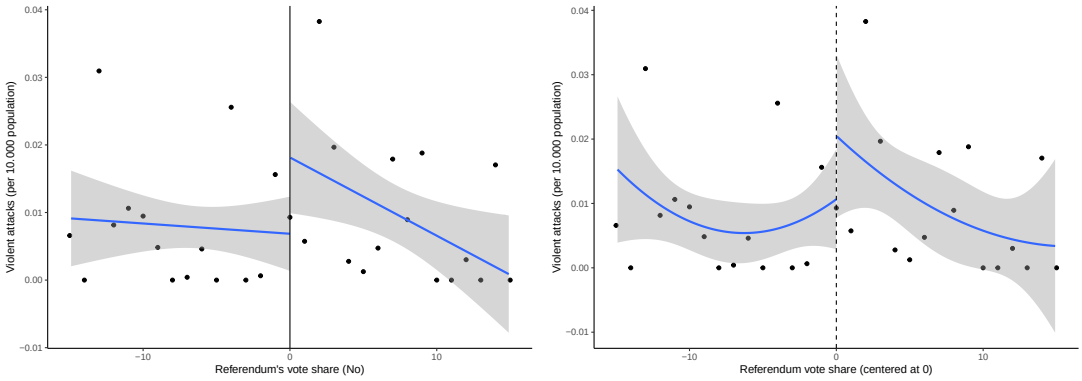
Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3 presents the main findings that rejecting the peace agreement causes a sizable and statistically significant increase in violent attacks carried out by non-state armed groups equal to 0.012 attacks, on average. Panel A shows the nonparametric estimates of the treatment effect following Calonico et al. (2014), and panel B shows the parametric estimates[4]. Column 1

[4]In Panel A I report uniform kernels of local polynomials of order one implementing bias corrected and robust standard errors as well as optimal bandwidths. In Panel B, I fit a linear polynomial and restrict the

presents the baseline results without additional controls; column 2 reports clustered standard errors at the department-month level; column 3 includes predetermined municipal characteristics (rurality index, municipal area in hectares, sea level, distance to Bogotá in kilometers, distance to capital, central government budget transfers, and population); column 4 includes political controls such as the 2014 presidential election vote share, the turnout during the referendum, and a global measure of electoral risk during the referendum; column 5 includes conflict controls (number of violent attacks between 2002-2010 and 2014-2016. All measures are normalized by 10,000 inhabitants); column 6 includes all controls. All nonparametric estimates indicate a positive and statistically significant effect that varies between 0.008 and 0.012 attacks, on average, depending on the specification. Parametric estimates have a magnitude similar to those of nonparametric estimates and almost all are statistically significant.

Figure 6: Effect of referendum results on the average monthly violent events involving non-state armed groups, October 2016 – October 2017.



(a) Linear polynomials (b) Quadratic polynomials

Note: Bins within Calonico et al. (2014) optimal bandwidths are displayed for linear and quadratic polynomials without additional controls. Standard errors are clustered at the department-month level.

The nonparametric estimates in Table 3 show that a year after the peace referendum, rejecting the peace agreement between the Colombian government and the FARC insurgency rises the number of violent attacks carried out by non-state armed groups by about 0.012 attacks per 10,000 inhabitants (see column 2). This increase is significant, since it accounts 1.3 times the sample mean of violent attacks. Furthermore, our results are robust to the choice of bandwidth (Table A1). Estimates remain statistically significant when I use a quadratic polynomial (Table A2), and triangular or epanechnikov kernels (Table A3). As

sample according to the optimal bandwidths of nonparametric estimates with standard errors clustered at the department-month level and no controls following Calonico et al. (2014).

expected, estimates are not statistically significant when considering the following year, that is, violent events that occurred between October 2017 and September 2018 (Table A4).

Figure 6 depicts the main estimates based on the parametric approach in column 2 of Table 3 using linear and quadratic polynomials, and a uniform kernel. Each point represents the average number of violent attacks for a specific bin within the optimal bandwidth range according to Calonico et al. (2014). Both figures suggest a statistically significant jump near the threshold.

4.2 Mechanisms

The article studies potential mechanisms behind the outbreak of violence after the disarming of the FARC insurgency. It does so by using the raw results in column 2 of Table 3. Thus, I analyze the impact of the peace referendum on violence dynamics at the local level by estimating heterogeneous effects for a range of municipal characteristics. I focus on three main categories: the strategic use of violence, the potential for other armed actors to expand into former FARC strategic territories, and the economic value of these territories.

4.2.1 Strategic use of violence

An unexpected electoral outcome can trigger violence by causing frustration and anger among the supporters of the losing party. When a party or candidate is expected to win but loses, their supporters may feel their interests disregarded. In the case of the peace referendum, the surge in violence documented after October 2016 may be explained by the fact that municipalities that rejected the peace agreement supported Santos during the 2014 presidential election in the first place. The rejection of the peace agreement after supporting a pro-peace candidate was an unseen event to occur and therefore have prompted non-state armed groups to employ violence strategically. They resort to violence in municipalities where the peace agreement had a fair chance of passing, but it was ultimately defeated by a narrow majority (Chacón et al., 2011).

The article aims to formally examine this idea by dividing the main sample of municipalities based on whether the majority of voters supported Santos or Zuluaga in the 2014 presidential election. It estimates the same Equation 1 for both samples to assess the impact of the peace agreement support on the outcome of interest. The 2014 presidential election was defined by candidates' positions on negotiations with the FARC (Weintraub et al., 2014). As candidate, Zuluaga was against the peace agreement with the FARC and advocated for a more hardline approach to the conflict. Santos was the pro-peace candidate who was in favor of negotiating a peace agreement.

Table 4: Violent events conditional on 2014 presidential elections.

	Zuluaga (1)	Santos (2)
Approving referendum share (%)	-0.012**	
	(0.006)	
Rejection referendum share (%)		0.019*
		(0.011)
Mean Dep. Var.	0.009	0.009
Bandwidth	13.864	8.783
Observations	2,388	1,032
Controls	✓	✓
Clustered SE	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Column 1 in Table 4 contains a sample of municipalities where Zuluaga received a majority of cast votes, whereas Column 2 has a sample of municipalities where Santos received a majority of cast votes. As seen in Table 4, a rejection rate just above the threshold of 0 in municipalities that previously supported Santos has been related to more violent attacks by non-state armed groups. In contrast, an approval rate just above the threshold of 0 in municipalities that supported Zuluaga is associated with less violence.

4.2.2 Strategic territories

Expanding into territories that were strategic for the FARC may give non-state armed groups that did not participate in the peace negotiations an advantage in terms of territory, population, or infrastructure. Primarily, such expansion may be seen as a way to advance their economic aims by controlling valuable resources. I investigate whether violence spreads differently along municipalities the FARC considered had an strategic value. Thus, I interact a dummy indicator of rejecting the peace agreement with a measure of the magnitude a municipality is exposed to the potential control of other non-state armed groups. These groups are represented by the ELN insurgency and paramilitary groups. I asses the impact of such exposition in FARC's strategic municipalities and municipalities where the FARC did not make any presence to verify the plausibility of the differential impact on FARC's strategic municipalities. I define presence of an armed group as a dummy indicator of whether the total number of attacks committed by an armed group within a municipality exceeds the median of attacks across Colombian municipalities between 2007-2011. Uncontrolled municipalities are thus defined as areas where the presence of any non-state armed group is not reported. The idea holds that if a municipality has no strategic importance, no violent actor will act there. The degree of exposure of FARC's strategic municipalities to the presence of

other armed groups is defined as:

$$Z = \alpha_i \times FARC_i$$

Table 5: Violent attacks and territorial expansion.

	Any	ELN	Paramilitary groups
	(1)	(2)	(3)
Panel A: Expansion to FARC's strategic areas			
Rejection share (%)	0.007	0.011*	0.006
	(0.005)	(0.006)	(0.005)
Rejection share (%) × Z	0.036	-1.121*	0.077*
	(0.046)	(0.662)	(0.039)
Mean Dep. Var.	0.009	0.009	0.009
R^2	0.020	0.050	0.020
Observations	3,864	3,864	3,864
Clustered SE	✓	✓	✓
Panel B: Expansion to uncontrolled areas			
Rejection share (%)	0.014**	0.010*	0.014**
	(0.006)	(0.006)	(0.006)
Rejection share (%) × Z	-0.046**	-0.047	-0.060**
	(0.022)	(0.092)	(0.025)
Mean Dep. Var.	0.009	0.009	0.009
R^2	0.003	0.019	0.005
Observations	3,864	3,864	3,864
Clustered SE	✓	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

where α_i stands for the proportion of neighboring municipalities of municipality i that report the presence of armed actors other than FARC, and $FARC_i$ is a dummy indicator for FARC presence in municipality i. The degree of exposure of uncontrolled municipalities goes the same way:

$$Z = \alpha_i \times Uncontrolled_i$$

where $Uncontrolled_i$ is a dummy indicator for uncontrolled municipalities. The heterogeneous effects are reported in Table 5. Column 1 in Panel A shows that municipalities that were strategic for the FARC and more vulnerable to the influence of other armed groups report a differential increase in violent events. Though this effect is not statistically significant. Then, in columns 2 and 3, I disaggregate the measure of exposure by type of armed actor,

the ELN and paramilitary groups. For the paramilitary case it shows that the coefficient of the interaction term becomes statistically significant at 10%. There is a differential increase in violent events in municipalities where people mostly rejected the final peace agreement, represented an strategic territory for the FARC, and where paramilitary groups could have a greater influence.

Panel B replicates the results of Panel A, this time using a sample of uncontrolled municipalities. The results show a differential reduction in violent events in uncontrolled municipalities exposed to the influence of other armed groups, particularly paramilitary groups. Overall, Table 5 shows that non-state armed groups other than the FARC are aiming to expand their territorial power to strategic municipalities.

4.2.3 Economic rents

Table 6: Violent attacks, rents, and state presence.

	Coca	Legal mining	Illegal mining	State presence
	(1)	(2)	(3)	(4)
Panel A: FARC's strategic areas				
Rejection share (%)	0.008	0.006	0.012*	0.009
	(0.005)	(0.005)	(0.006)	(0.006)
Rejection share (%) × Z	0.074*	0.104***	-0.124	-0.026
	(0.041)	(0.036)	(0.084)	(0.039)
Mean Dep. Var.	0.009	0.009	0.009	0.009
R^2	0.014	0.016	0.012	0.020
Observations	3,864	3,864	3,828	3,864
Clustered SE	✓	✓	✓	✓
Panel B: Uncontrolled areas				
Rejection share (%)	0.014	0.011*	0.005	0.011**
	(0.006)	(0.006)	(0.006)	(0.005)
Rejection share (%) × Z	-0.034	0.005	-0.004	-0.001
	(0.026)	(0.013)	(0.004)	(0.007)
Mean Dep. Var.	0.009	0.009	0.009	0.009
R^2	0.006	0.000	0.001	0.000
Observations	3,864	3,864	3,444	3,864
Clustered SE	✓	✓	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The article argues that non-state armed groups that did not take part in the peace process are tilted to support the disarming of the FARC insurgency. When the FARC leaves strategic territories, these other violent groups can seize control of these areas. Such control may entitle them to economic rents previously owned by the FARC. If this is the case, I should observe a larger increase in violent attacks around the threshold in municipalities where coca crops are planted, or municipalities that have gold deposits, than in municipalities in which these economic activities do not exist. Table 6 demonstrates that the increase in violent attacks around the threshold comes almost exclusively from municipalities where coca crops are planted and where government titles for legal extraction of gold resources are issued, a proxy for the presence of mining rents. Such effect is only observable for FARC's strategic municipalities (see Panel A). Both panels further show that the presence of state security forces have no impact on dynamics of violence locally. The variable Z is defined as before, though this time α_i represents a dummy indicator of each feature reported in the columns of Table 6.

Table 7: Violent events and development programs.

	ETCR	PDET	PNIS	ZOMAC
	(1)	(2)	(3)	(4)
Rejection share (%)	0.011*	0.008	0.009	0.009
	(0.006)	(0.005)	(0.006)	(0.006)
Rejection share (%) × Z	0.015	0.004	0.051**	0.000
	(0.015)	(0.014)	(0.023)	(0.007)
Mean Dep. Var.	0.009	0.009	0.009	0.009
R^2	0.0005	0.015	0.009	0.005
Observations	3,864	3,864	3,864	3,864
Clustered SE	✓	✓	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Following the conclusion of discussions between the Colombian government and the FARC insurgency, 170 municipalities most affected by the armed conflict were targeted for structural transformation initiatives through development programs. This is referred to as Territorial Focus Development Programs (PDET, its acronym Spanish). A similar strategy, known as the Program to Substitute Crops Used for Illegal Purposes, was designed to replace coca crops with alternative types of sustainable livelihood (PNIS). Municipalities prioritized for development programs after the signing of the peace agreement with the FARC insurgency in Colombia may be rich in natural resources, such as minerals or fertile land, that non-state armed groups seek to control for their own economic gain. Also, the presence of development programs and infrastructure projects in these municipalities can increase the political influence of the Colombian government in these areas. Non-state armed groups may target these municipalities as a way to challenge the government's authority and assert their

own political influence. Finally, non-state armed groups may view the prioritization of certain municipalities for development programs as a threat to their territorial control. As a result, they may resort to violence in order to maintain their power and influence in these areas. Table 7 reveals that violent attacks have increased in municipalities targeted by government programs. For the PNIS case, the effects are statistically significant. Areas prioritized by the Colombian government and where it is making significant efforts to alleviate the conditions that sparked violent conflict in the past have seen a rise in violent attacks. This impact is seen in crucial territories for non-state armed groups, i.e. areas where coca is grown. I do not observed any sort of effect in municipalities historically affected by armed conflict (ZOMAC) nor municipalities where FARC combatants gathered after a ceasefire announcement at the end of the negotiations (ETCR).

4.3 Robustness checks

4.3.1 Does the 2014 presidential election explain the rise in violent attacks?

Table 8: Violent events between 2016-2017 and 2014 presidential elections.

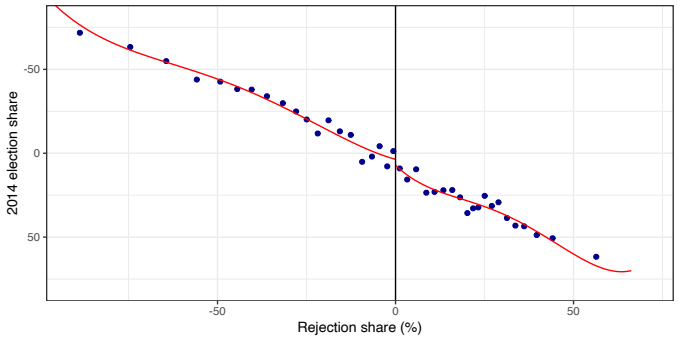
	Linear (1)	Quadratic (2)
Panel A: Nonparametric estimates		
Zuluaga share (%)	0.004	-0.005
	(0.006)	(0.007)
Mean Dep. Var	0.009	0.009
Bandwidth	19.743	25.323
Observations	4,188	5,244
Clustered SE	✓	✓
Panel B: Parametric estimates		
Zuluaga share (%)	0.003	-0.004
	(0.006)	(0.007)
Mean Dep. Var	0.009	0.009
Bandwidth	19.743	25.323
Observations	4,188	5,244
Clustered SE	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

An important robustness test is to show that political preferences in general are not correlated with violent attacks locally. The article evaluates whether the vote share of the 2014 presidential election had an impact on violent attacks perpetrated by non-state armed groups

after the peace referendum. Table 8 finds no statistically significant effect around the threshold in the 2014 elections. Violent attacks after the peace referendum are not statistically associated with the share of presidential election votes in 2014. Overall, empirical evidence suggests that the main findings are not influenced by recent national elections. Also, the article evaluates the effect the 2014 presidential election could have had on violent events after FARC's disarmament through its effect on the outcome of the referendum. First, I do not find a discontinuous jump in the score variable due to the 2014 vote share, as Figure 8 confirms it.

Figure 7: 2014 presidential election vote share and 2016 peace referendum results.



Note: RD plot based on Calonico et al. (2014).

The results of the 2014 presidential election and the peace referendum match almost perfectly. The article confirm this pattern with by leveraging on a fuzzy regression discontinuity as Table A5 shows in the Appendix. Still, there is no statistical significant effects.

4.3.2 Does historical conflict influence voters' behavior?

So far, the article has focused on the effect of the outcome of the referendum on post-conflict violence. Electoral preferences and election outcomes are determined by conflict in the past (Kibris, 2011; Berrebi and Klor, 2008; Getmansky and Zeitzoff, 2014). In this case, there is anecdotal evidence showing that the referendum result responded to the intensity of Colombia's armed conflict, particularly at the local level. According to Branton et al. (2019), the level of support for the peace agreement was proportional to the level of exposure to violence. To evaluate whether this is the case in the sample it uses for the estimates, the article looks for any jump in the number of attacks perpetrated by non-state armed groups between 2002-2010 around the threshold of the score variable. Finding a jump would imply that armed conflict in the past influenced the outcome of the peace referendum. Table 9 finds no statistical significant effects, allowing the article to discard the possibility that the outcome of the referendum was conditioned to historical conflict in Colombia. Further,

results are virtually the same when it evaluates the effect of most recent violent events (2014-2016, the pre-referendum period) as Table A6 seems to confirm.

Table 9: Historical violence (2002-2010) and electoral results.

	Linear	Quadratic
	(1)	(2)
Panel A: Nonparametric estimates		
Rejection share (%)	2.228	2.242
	(2.136)	(2.448)
Mean Dep. Var	6.740	6.950
Bandwidth	16.436	24.723
Observations	368	562
Clustered SE	✓	✓
Panel B: Parametric estimates		
Rejection share (%)	2.636	3.558
	(2.424)	(2.232)
Mean Dep. Var	6.740	6.950
Bandwidth	16.436	24.723
Observations	368	562
Clustered SE	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.3.3 Discrete score variable

Because the main database is a municipal pooled panel, the score variable has multiple mass points. That is, while each municipality has only one value associated with the score variable, the outcome variable changes on a monthly basis. This feature of the database may cause the score variable to be discrete. If this is the case, the continuity-based local polynomial method may no longer be applicable (Lee and Card, 2008). When the score variable contains mass points, local polynomial methods for RD analysis behave essentially as if we had the same number of observations as mass points. In other words, the effective number of observations used by continuity-based methods when applied to an RD design with a discrete score is the number of mass points or distinct values, not the total number of observations. Thus, the article runs a global regression discontinuity by collapsing the database at the municipal level and calculate the average outcome for each of the 1,088 municipalities included in the main sample. Table 10 reports the results using nonparametric and parametric estimates. Even when the effective number of observations used in the estimates is reduced significantly, there is a positive and statistically significant relationship between the rejection of the peace agreement and violent attacks carried out by non-state armed groups in Colombia.

Table 10: Global RD (collapsed data).

	Linear (1)	Quadratic (2)
Panel A: Nonparametric estimates		
Rejection share (%)	0.004	0.013*
	(0.005)	(0.007)
Mean Dep. Var	0.013	0.013
Bandwidth	98.000	98.000
Observations	1,088	1,088
Panel B: Parametric estimates		
Rejection share (%)	0.008*	0.004
	(0.005)	(0.006)
Mean Dep. Var	0.013	0.013
Bandwidth	98.000	98.000
Observations	1,088	1,088

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Another alternative to handle a regression discontinuity design with a discrete score variable is to use a local randomization approach. This approach adjusts for any confounding variables by randomly perturbing the assignment variable within a small window around the threshold, reducing the correlation between the assignment variable and any confounding factors. Table 11 illustrates the results of the difference in means in the number of violent attacks within the smallest possible window according to Cattaneo et al. (2015). It highlights a positive difference in violent attacks at a 0.138 significance level, lower than the 0.15 level that is normally set as a threshold in this type of settings (Cattaneo and Titiunik, 2022). Overall, the presence of mass points in the context of the article does not seem to affect the robustness of the main results.

Table 11: Local randomization

	Difference in means
Violent attacks	0.050
Asymptotic p-value	0.138
Window	(-0.005; 0.037)

Kolesár and Rothe (2018) discusses the issue of using confidence intervals (CIs) based on standard errors that are clustered by the running variable in regression discontinuity designs with a discrete running variable, as recommended by Lee and Card (2008). Kolesár and

Rothe (2018) show that these CIs do not guard against model misspecification and have poor coverage properties.

Table 12: Alternative CIs

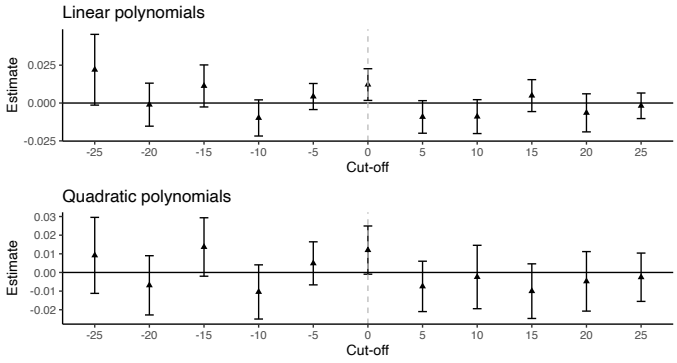
	Taylor (1)	Hölder (2)
Rejection share (%)	0.009***	0.009***
	(0.001)	(0.001)
Mean Dep. Var	0.009	0.009
Bandwidth	14.014	14.014
Observations	3,840	3,840

Notes: Standard errors in parentheses are clustered according to Kolesár and Rothe (2018). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 12 reports results following Kolesár and Rothe (2018), and two different smoothness class (Armstrong and Kolesár, 2020). In both cases, the number of violent attacks perpetrated by non-state armed groups increases more in municipalities that rejected the peace agreement. Overall, there is evidence that the a discrete score variable is not an issue in the study and results are not affected by that characteristic of the score variable.

4.3.4 Other robustness checks

Figure 8: Sensitivity analysis to different cut-offs.

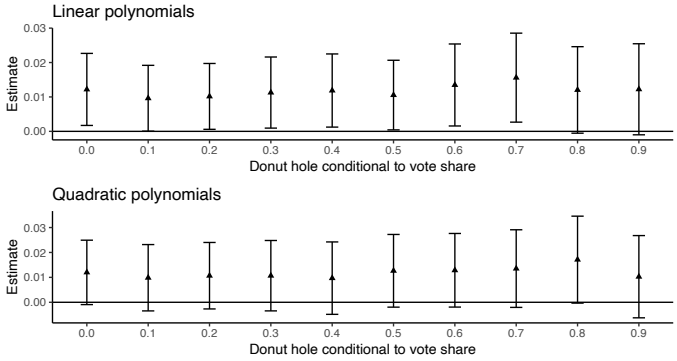


Note: Point estimates for the common support of the score variable with confidence intervals at the 95% level. Parametric estimates using optimal bandwidths of Calonico et al. (2014) based on linear and quadratic polynomials, no controls, and clustered standard errors at the department-month level case.

The article tests the sensitivity of the results when it runs the same discontinuous design at different cut-offs (Figure 8). The article also drops out a subset of observations near

the cutoff point of 0 (Barreca et al., 2011) in Figures 9. Finally, it tests the sensitivity of the results when it uses a different set of bandwidths (Figure 8). Overall, these figures demonstrate that the point estimates do not change, particularly in the linear polynomial case. Results are statistically significant at 10% for quadratic polynomials.

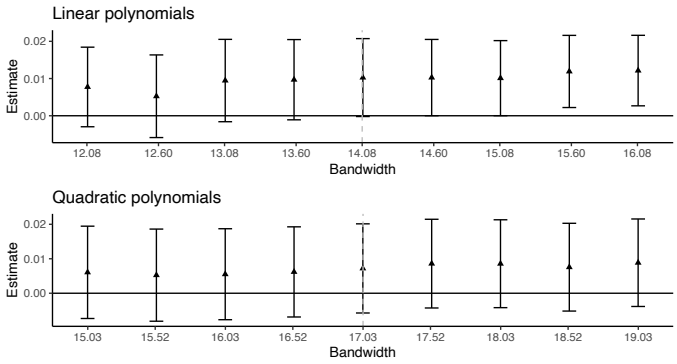
Figure 9: Sensitivity analysis to observations near the cut-off.



Note: Point estimates accompanied by confidence intervals at the 95% level.

Figure 10 confirms the robustness of the results when I consider different sets of optimal bandwidths following Calonico et al. (2014).

Figure 10: Sensitivity analysis to bandwidth choice.



Note: Point estimates accompanied by confidence intervals at the 95% level.

5 Conclusion

This research contributes to the discussion of the effects of political polarization on violence. I exploit local narrow referendum outcomes regarding the peace agreement to uncover a significant increase in violent attacks in municipalities where the peace agreement was rejected by the majority of the local population. This impact has been driven by the strategic value of specific areas, mostly places the FARC considered strategic, and areas where violent actors that did not participate in the peace negotiations can potentially extract economic rents. Importantly, the article rules out other plausible explanations driving the findings, such as historical conflict or political preferences in general. Overall, the outbreak of violence in Colombia during the afterwards of FARC's disarming appears to be linked to economic factors. Non-state armed groups that remained active after the peace negotiations with the FARC insurgency are attempting to keep control of former FARC's strategic area. Furthermore, these violent actors are trying to hold control of FARC's former economic rents.

The article contends that the reasons that led to the outbreak of violence in the first place can likewise lead to violence in a post-conflict stage. This is especially true in civil wars that involve multiple factions. Partial peace settlements in which just a subset of armed actors lay down their weapons while others continue to participate in violent confrontations create the conditions for violence to escalate. Peace talks with the FARC insurgency represented an economic opportunity for armed actors who refused to accept a peaceful settlement. Because of the FARC's disarmament, economic rents previously controlled by the FARC were contested by other armed actors. Fighting for territorial control and economic rents fueled the increase in violence one year after the peace referendum. In terms of the close referendum results, political polarization provided an opportunity for non-state armed groups to employ violence strategically.

Findings show how well-intended measures used to legitimize a negotiated settlement, such as one that leveraged the agreement between the FARC insurgency and the Colombian government, turned out to be an ineffective approach to promote a pacification policy. Policies aimed at reinforcing the state's monopoly of violence and disarming non-state armed groups operating locally must include conditions to avoid violence against the local population and be more focused on establishing the right conditions to allow a permanent presence of the government at the local level.

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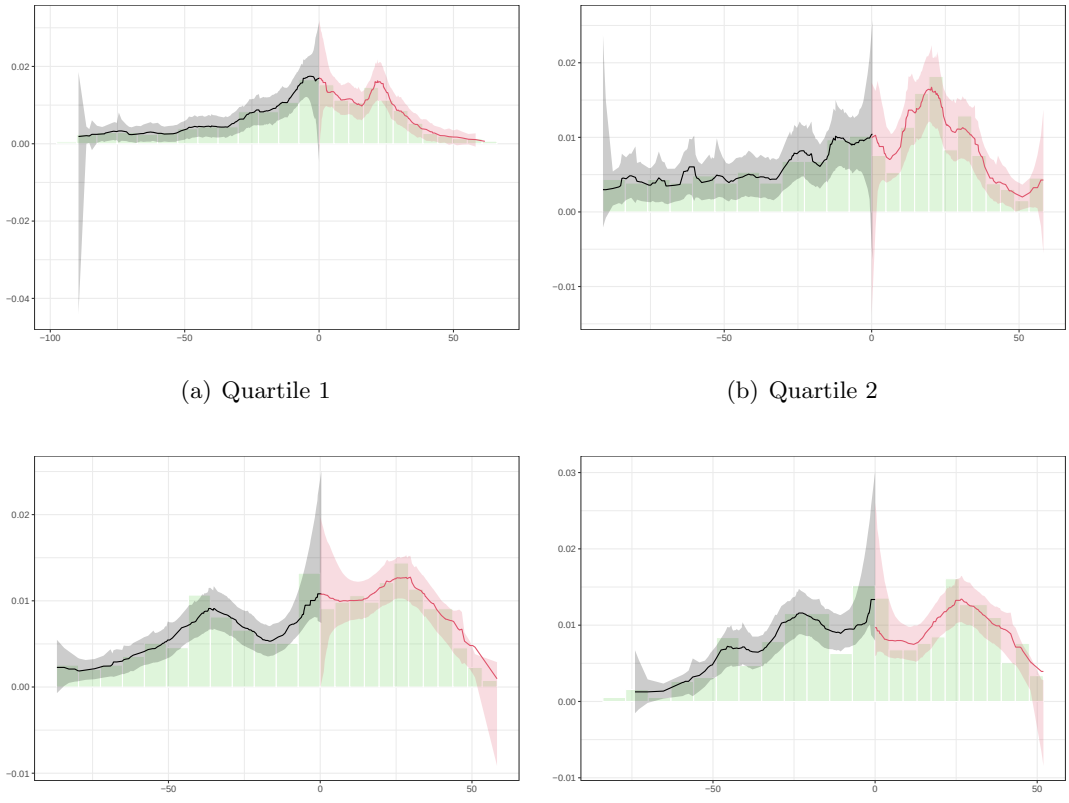
A Appendix

Figure A1: Score density by electorate quartile.



(a) Quartile 1

(b) Quartile 2

(c) Quartile 3

(d) Quartile 4

Note: Manipulation test based on Cattaneo et al. (2020). p-values are 0.862 in (a), 0.998 in (b), 0.569 in (c), and 0.803 in (d).

Table A1: Effect of the referendum results on the average monthly violent events involving non-state armed groups using unequal bandwidths, October 2016 – September 2017

Dependent variable	Average monthly violent events involving non-state armed groups (per 10,000 inhabitants)					
	(1)	(2)	(3)	(4)	(5)	(6)
Nonparametric estimates and bias-corrected standard errors of Calonico, Cattaneo, and Titiunik (2014) - Kernel: Uniform						
Rejection share (%)	0.013**	0.012**	0.009*	0.011**	0.006	0.013**
	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Mean Dep. Var.	0.009	0.009	0.008	0.008	0.008	0.009
Bandwidths	(11.942, 12.393)	(11.893, 13.008)	(11.167, 16.118)	(11.886, 16.894)	(10.895, 16.321)	(11.706, 12.880)
Observations	3,456	3,516	3,828	4,020	3,780	3,432
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	0.010*	0.010	0.011*	0.005*	0.008	0.008
	(0.005)	(0.006)	(0.006)	(0.003)	(0.006)	(0.006)
Mean Dep. Var.	0.009	0.009	0.009	0.009	0.009	0.009
Bandwidths	(11.893, 13.008)	(11.893, 13.008)	(11.893, 13.008)	(11.893, 13.008)	(11.893, 13.008)	(11.893, 13.008)
Observations	3,516	3,516	3,516	3,516	3,516	3,516
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A2: Effect of the referendum results on the average monthly violent events involving non-state armed groups using quadratic polynomials, October 2016 – September 2017

Dependent variable	Average monthly violent events involving non-state armed groups (per 10,000 inhabitants)					
	(1)	(2)	(3)	(4)	(5)	(6)
Nonparametric estimates and bias-corrected standard errors of Calonico, Cattaneo, and Titiunik (2014) - Kernel: Uniform						
Rejection share (%)	0.012*	0.012*	0.012*	0.014**	0.012*	0.016**
	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)
Mean Dep. Var.	0.008	0.008	0.009	0.008	0.008	0.009
Bandwidth	16.851	17.029	15.696	18.708	20.179	19.517
Observations	4,500	4,560	4,296	4,944	5,388	5,136
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	0.012*	0.012	0.013*	0.013*	0.012*	0.012*
	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Mean Dep. Var.	0.008	0.008	0.008	0.008	0.008	0.008
Bandwidth	17.029	17.029	17.029	17.029	17.029	17.029
Observations	4,560	4,560	4,560	4,560	4,560	4,560
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Note: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3: Effect of the referendum results on the average monthly violent events involving non-state armed groups using linear polynomials with triangular and epanechnikov kernels, October 2016 – October 2017

Dependent variable	Average monthly violent events involving non-state armed groups (per 10,000 inhabitants)					
	(1)	(2)	(3)	(4)	(5)	(6)
Nonparametric estimates and bias-corrected standard errors of Calonico, Cattaneo, and Titiunik (2014) - Kernel: Triangular						
Rejection share (%)	0.011**	0.011**	0.009*	0.007	0.012*	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Mean Dep. Var.	0.008	0.008	0.008	0.008	0.008	0.008
Bandwidth	20.027	20.351	21.963	20.852	20.179	18.554
Observations	5,304	5,436	5,868	5,556	5,388	4,908
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Nonparametric estimates and bias-corrected standard errors of Calonico, Cattaneo, and Titiunik (2014) - Kernel: Epanechnikov						
Rejection share (%)	0.012**	0.012**	0.009*	0.009*	0.008*	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mean Dep. Var.	0.008	0.008	0.008	0.008	0.008	0.008
Bandwidth	18.808	19.146	19.861	20.526	18.474	17.911
Observations	4,956	5,016	5,268	5,484	4,872	4,776
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Note: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4: Effect of the referendum results on the average monthly violent events involving non-state armed groups using linear polynomials, October 2017 – September 2018

Dependent variable	Average monthly violent events involving non-state armed groups (per 10,000 inhabitants)					
	(1)	(2)	(3)	(4)	(5)	(6)
Nonparametric estimates and bias-corrected standard errors of Calonico, Cattaneo, and Titiunik (2014) - Kernel: Uniform						
Rejection share (%)	0.000	0.000	-0.002	-0.004	-0.005	-0.001
	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
Mean Dep. Var.	0.013	0.013	0.013	0.013	0.013	0.013
Bandwidth	17.964	17.910	16.082	16.439	18.475	16.214
Observations	5,040	5,016	4,572	4,620	5,112	4,596
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	-0.002	-0.002	-0.005	-0.008	-0.005	-0.010*
	(0.008)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Mean Dep. Var.	0.013	0.013	0.013	0.013	0.013	0.013
Bandwidth	17.910	17.910	17.910	17.910	17.910	17.910
Observations	5,016	5,016	5,016	5,016	5,016	5,016
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Note: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A5: Violent events between 2016-2017 and electoral preferences

	Linear (1)	Quadratic (2)
Rejection share (%)	0.001	0.001
	(0.001)	(0.001)
Mean Dep. Var	0.009	0.008
Bandwidth	8.618	12.304
Observations	2,580	3,504
Clustered SE	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6: Past violence (2014-2016) and electoral results

	Linear (1)	Quadratic (2)
Panel A: Nonparametric estimates		
Rejection share (%)	0.080	0.001
	(0.175)	(0.234)
Mean Dep. Var	0.009	0.008
Bandwidth	15.193	20.113
Observations	342	447
Clustered SE	✓	✓
Panel B: Parametric estimates		
Rejection share (%)	0.097	0.147
	(0.159)	(0.129)
Mean Dep. Var	0.009	0.008
Bandwidth	15.190	20.113
Observations	342	447
Clustered SE	✓	✓

Notes: Standard errors in parentheses are clustered at the department-month level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.