Peace Agreements as Triggers of Violence: Evidence from the 2016 Peace Referendum in Colombia*

Andrés F. Rivera†

July 4, 2024

Abstract

Partial peace agreements with a subset of non-state actors can disrupt existing power dynamics within a conflict, potentially triggering new episodes of violence. Using a regression discontinuity approach, the analysis reveals a statistically significant increase in violence perpetrated by non-state armed groups, other than the FARC, in municipalities that rejected the peace agreement between the Colombian government and the FARC insurgency in the 2016 peace referendum. I interpret the peace agreement as an economic shock that altered the incentives for violence among non-state armed groups that did not participate in the peace process. Consistent with this interpretation, I find that the increase in violence is more pronounced in areas characterized by significant coca cultivation and gold mining activities.

*I thank Juan Vargas, Paula Zamora, Austin Wright, Ethan Kaspstein, Mateo Uribe, Ethan Kaplan, Michael Weintraub, Isabel Laterzo, Ana Paula Pellegrino, Jason Lindo, John Mauro Perdomo, Bilal Salaymeh, Hannah Smidt, and participants at the 1st Political Economy Workshop at Universidad del Rosario, Seminario CID at Universidad Nacional, the Violence, Instability, and Peace Workshop, Congreso Anual de Red Investigadores de Economía at Universidad Icesi, the Latin American Peace Science Society 4th Annual Congress at Universidad EAFIT, Swiss Political Science Association Annual Congress at Universität Basel, and Seminario de Economía at Universidad Javeriana-Cali for helpful comments and suggestions. All errors remain my own.

†Universidad del Rosario. andresfel.rivera@urosario.edu.co

1 Introduction

The PA-X database reports 2,055 peace agreements associated with 175 peace processes.[1] Among these, 443 are ceasefire agreements within 166 peace processes, representing 95% of all peace processes. After cross-referencing with the Uppsala Conflict Data Program (UCDP), I calculated that 48 conflicts reignited after the signing of a ceasefire agreement, indicating a failure rate of about 29% for these peace processes.[2] A closer inspection reveals that these 166 peace processes span 49 countries, with 29 of these countries facing multi-actor armed conflicts—where state forces combat more than one non-state armed actor. This means that 60% of the countries that return to conflict after arranging peace agreements are those dealing with multi-actor armed conflicts. This suggests that state forces fighting multiple non-state armed actors is a strong predictor of failed peace processes.

What factors contribute to the resurgence of violence in post-conflict societies? Peace agreements are pivotal in resolving armed conflicts and fostering long-term stability. Partial peace agreements involving only some non-state armed actors can disrupt existing power dynamics and potentially trigger new violence.[3] These disruptions often stem from the reallocation of resources and territorial control, creating economic shocks that alter the incentives for violence among groups excluded from the peace process.

This study focuses on the peace agreement between the Colombian government and the FARC insurgency, one of the longest-running and most complex conflicts in Latin America. The peace process, which culminated in a national referendum, aimed to end decades of violence and integrate FARC combatants into civilian life. However, the referendum results, particularly the rejection of the peace agreement in specific municipalities, had unintended consequences on local violence dynamics.

I argue that the peace agreement acted as an economic shock that reshaped the incentives for non-state armed groups that were not part of the peace process. These groups, such as the ELN, paramilitary factions, and criminal organizations, saw opportunities to expand their influence and control over lucrative territories previously

[1] The PA-X Peace Agreement Database.

[2] UCDP/PRIO Armed Conflict Dataset version 24.1.

[3] A partial peace agreement is a type of accord that is negotiated and signed between a government and one or more, but not all, of the non-state armed actors involved in a conflict. Unlike comprehensive peace agreements, which aim to address and resolve all aspects of the conflict by including all significant parties, partial peace agreements deal with only a subset of the warring factions

dominated by the FARC. This shift increased violent attacks, particularly in areas with significant coca cultivation and gold mining, critical financing sources for these groups.

I use a regression discontinuity design with a discrete score variable to study the theoretical argument. The analysis reveals a statistically significant increase in violence in municipalities that rejected the peace agreement. Point estimates show an average increase equivalent to 1,4 the average of violent attacks perpetrated by non-state armed groups during the sample period. Additionally, the effects are observable only in the year immediately following the peace referendum and not in subsequent years. The study explores the impact of historical violence and electoral preferences on the referendum results, revealing no significant correlation. The results remain robust under the standard identification assumptions of a regression discontinuity design. They are also robust to various methodological choices, such as using unequal bandwidths, incorporating quadratic polynomials, and applying different kernel functions.

The results of the peace referendum sent signals to non-state armed groups about which territories to target after the FARC insurgency's departure. Areas that rejected the peace agreement were often characterized by a lack of social capital, indicating insufficient local collective action to resist these groups. The findings show an increase in violence in these municipalities with low social capital. Economic motivations also significantly contribute to the escalation of violence. Specifically, municipalities that rejected the peace agreement and are heavily involved in coca cultivation or gold mining—key income sources for non-state armed groups in Colombia—saw a larger surge in violence.

This paper contributes to the broader understanding of the unintended consequences of partial peace agreements and the economic motivations behind post-agreement violence. There is substantial evidence demonstrating that economic shocks can lead to increased violence. For instance, Miguel et al. (2004a) finds that negative economic shocks, like adverse weather affecting agricultural yields, significantly increase the likelihood of civil conflict in sub-Saharan Africa. Similarly, Bazzi and Blattman (2014) conclude that while economic shocks might not initiate new conflicts, they can significantly influence ongoing ones by contributing to their persistence or increasing their intensity. Dube and Vargas (2013) examines the opportunity cost and rapacity effects that link conflict with income fluctuations, as proposed by Dal Bó and Dal Bó (2011). It finds that a drop in coffee prices lowered wages and

increased violence more significantly in municipalities with greater coffee cultivation, indicating an opportunity cost effect. Conversely, a rise in oil prices increased both municipal revenue and violence in oil-producing regions, suggesting a rapacity effect. Not only do price shocks explain the increase in violence, but military assistance also contributed to escalating conflicts. Dube and Naidu (2015) finds that US military aid increases paramilitary attacks, especially during election years and in politically competitive municipalities, but has no impact on guerrilla attacks. In this paper, I demonstrate that peace agreements can act as economic shocks, potentially triggering increased violence.

The paper also contributes to the literature on post-electoral violence by illustrating how political shifts, such as the outcomes of peace referendums, can escalate armed conflicts. Democracy, while often seen as a mechanism for peaceful conflict resolution and political stability, can paradoxically generate political violence under certain conditions. Competitive elections can exacerbate existing societal tensions, especially in fragile or deeply divided societies. Chacón et al. (2011) argues that as the size of a group increases, so does its likelihood of winning an election or an armed conflict. Therefore, if all groups have a strong chance of electoral success, they also have a high likelihood of prevailing in a fight. Collier and Rohner (2008) suggests that democracy decreases rebellion in wealthy countries while increasing it in poorer ones. In the Colombian case, Fergusson et al. (2021) shows that when left-wing parties, previously excluded, narrowly win local executive office, there is a corresponding increase in violent events by right-wing paramilitaries. This paper highlights the unintended consequences of expressing preferences about peace and war during a peace referendum on post-electoral violence. It demonstrates how the outcomes of such referendums can influence the actions of armed groups and escalate violence.

Finally, this paper contributes to the existing literature on the consequences of the peace agreement signed between the Colombian government and the FARC insurgency in 2016. There is research on the effects of the peace agreement on the production of coca crops (Prem et al., 2023), fertility choices (Guerra-Cujar et al., 2024), human capital (Prem et al., 2020a), firm creation (Bernal et al., 2024), selective violence (Prem et al., 2022), deforestation (Prem et al., 2020b), and landmine victimization (Perilla et al., 2024).

2 The Unintended Consequences of Peace Agreements

Peace agreements can fail for various reasons, notably due to the complex and dynamic nature of post-conflict environments. A major factor is the lack of trust among parties involved in the agreement. Historical grievances and deep-seated mistrust can make it difficult for former adversaries to cooperate and honor the terms of the agreement (Hartzell and Hoddie, 2003; Walter, 2002). Additionally, the presence of spoilers—individuals or groups who benefit from continued conflict—can actively undermine the peace process (Reiter, 2016; Stedman, 1997).

Political and economic incentives might misalign with peace goals, prompting key actors to prioritize personal or group interests over national stability (Collier et al., 2008; Weinstein, 2006). Furthermore, the exclusion of significant stakeholders from the negotiation process can result in dissatisfaction and resistance (Nilsson, 2012; Paffenholz, 2014). Lastly, socio-economic conditions such as poverty and unemployment, coupled with weak state institutions, can foster an environment prone to recurring violence (Cederman et al., 2011; Collier and Hoeffler, 2004; Prem et al., 2022).

Even when peace agreements do not fail outright, they can trigger unintended consequences that may undermine long-term stability and development. As peace agreements often involve the redistribution of power and resources, they can create new tensions and rivalries at the local level. For instance, in Sierra Leone, disarmament, demobilization, and reintegration (DDR) programs, while essential for reducing combatant numbers, left many former fighters with limited economic opportunities, leading to increased crime and insecurity (Knight and Özerdem, 2004).

Moreover, the implementation of peace agreements can sometimes weaken state institutions. In Bosnia and Herzegovina, efforts to integrate former rebels into government or security forces strained these institutions, leading to inefficiencies and corruption (Krebs and Licklider, 2015). This process also created a dual authority problem where former combatants maintained influence in their original areas of control, complicating governance and the rule of law (Walter, 2002). Peace agreements can lead to social and cultural tensions, such as resistance to reintegration efforts, as seen in South Sudan, and economic inequalities, like in Guatemala, where uneven aid distribution deepened disparities (Nkurunziza et al., 2011). Environmental degradation, exemplified by Angola's resource depletion, and political instability, as in the Democratic Republic of Congo with power struggles among new actors, further complicate post-conflict recovery (Bala, 2017; Kahl, 2006).

Much of the literature on failed peace processes and the unintended consequences

of peace agreements focuses on settings where a state negotiates with a single actor, often leaving aside situations where a central government faces multiple uprisings from different actors with varied interests. This more complex scenario can exacerbate the challenges of achieving and maintaining peace, as the diverse motivations and goals of the various factions complicate negotiation efforts and the implementation of agreements.

The dynamics between various non-state armed groups can significantly influence the success or failure of the peace process. These groups often have complex relationships that include alliances, rivalries, and competition for resources or territorial control. Non-signatory groups may perceive a peace accord between a government and a non-state armed actor as a threat to their interests or power, prompting them to engage in spoiling activities to disrupt implementation efforts, or seek to gain territorial control, leading to a resurgence of violence. For example, in Colombia, following the peace agreement with the FARC, other armed groups such as the National Liberation Army (ELN) and various criminal organizations intensified their activities, filling the power vacuum left by the FARC (Prem et al., 2022).

A partial peace accord can alter the balance of power among non-signatory groups, leading to shifts in alliances and potential fragmentation. Some groups may splinter, with factions choosing to support or oppose the peace process. This fragmentation can lead to internal conflicts within these groups, further complicating the security landscape (Duursma and Fliervoet, 2021). In Sierra Leone, the peace process led to the fragmentation of the Revolutionary United Front (RUF), with some members integrating into the political process while others continued armed resistance (Gberie, 2005).

In conflicts driven by economic interests, control over resources—whether they are natural resources like minerals and oil, or illicit markets such as drug trafficking—is a primary motivator for many groups (Dube and Vargas, 2013). Partial peace agreements that do not involve all stakeholders can exacerbate competition for these resources. For instance, if one group is integrated into the political process and gains economic advantages while others are excluded, the latter groups may intensify their efforts to control lucrative territories and resources to compensate for their exclusion. Armed groups involved in illicit economies thrive in environments of instability and weak governance. Partial peace agreements may inadvertently strengthen these illicit economies by creating power vacuums that non-signatory groups can exploit (Prem et al., 2021).

I contend that in multi-actor armed conflicts fueled by greed, partial peace agreements can have adverse effects. When one group demobilizes, the illicit resources that were once their domain become available to the remaining armed groups. This redistribution of resources can incite violence among the non-signatory actors as they fight for control, ultimately escalating conflict. In contexts where multi-actor armed conflicts are driven by economic interests, partial peace agreements can be interpreted as economic shocks, which can have destabilizing effects similar to those caused by abrupt changes in income. There is ample evidence demonstrating that income shocks are significant drivers of violence (Bazzi and Blattman, 2014; Berman et al., 2017; Dal Bó and Dal Bó, 2011; Dube and Naidu, 2015; Dube and Vargas, 2013; Elliott and Kreutz, 2019; Gawande et al., 2017; Le Billon, 2005; Maystadt and Ecker, 2014; Miguel et al., 2004b; Miguel and Satyanath, 2011; Morelli and Rohner, 2015; Nwokolo, 2021; Ross, 2004).

While partial peace agreements aim to reduce conflict, they can inadvertently trigger economic shocks that escalate violence. To test my theoretical argument that partial peace agreements can act as economic shocks, leading to increased violence among non-signatory armed groups, I will employ a quasi-natural experiment in Colombia, utilizing the peace agreement between the FARC insurgency and the Colombian government in 2016 as a case study.

3 The Colombian Context

The confrontation between the Colombian government and leftist guerrilla groups began in the 1960s with the formation of the Revolutionary Armed Forces of Colombia (FARC) and the National Liberation Army (ELN). These guerrilla groups, inspired by Marxist-Leninist ideology, sought to address social inequalities and redistribute land to the peasantry. Over time, the conflict evolved, drawing in other actors, including paramilitary groups and criminal organizations, leading to a multifaceted and protracted war.

As the conflict in Colombia progressed, non-state armed groups increasingly engaged in drug trafficking and illegal mining to fund their operations. Initially motivated by ideological goals, these groups gradually found that involvement in the lucrative drug trade and control over illegal mining operations provided substantial financial resources (Abadie et al., 2015; Saab and Taylor, 2009). The FARC, in particular, became deeply entrenched in the cocaine trade, overseeing coca cultivation,

production, and distribution networks. By the early 2000s, it was estimated that a significant portion of the FARC's income—up to 60%—was derived from drug trafficking, while illegal mining also emerged as a critical revenue stream, contributing to their financial sustenance (Brittain, 2010; Mejía, 2016). This shift towards economic-driven activities marked a significant evolution in the nature of the conflict, blending ideological motivations with profit-oriented criminal enterprises (Mejia and Restrepo, 2013).

In 2011, the Colombian government initiated secret conversations with the FARC insurgency, aiming to negotiate an eventual demobilization of the guerrilla group. These clandestine discussions were a strategic move to build trust and set the stage for more formal peace negotiations. In 2012, the Colombian government and the FARC insurgency made a formal announcement in Havana, Cuba, signaling the official commencement of peace negotiations. This announcement marked a significant milestone in the peace process, outlining key points of discussion, including land reform, political participation, disarmament, and the rights of victims. The peace talks aimed to address the root causes of the conflict and create conditions for lasting peace and stability in Colombia. After several years of intense negotiations, the FARC announced a formal ceasefire in July 2016. This ceasefire paved the way for the finalization of the peace agreement, which was formally presented to the then-UN Secretary-General, Ban Ki Moon.

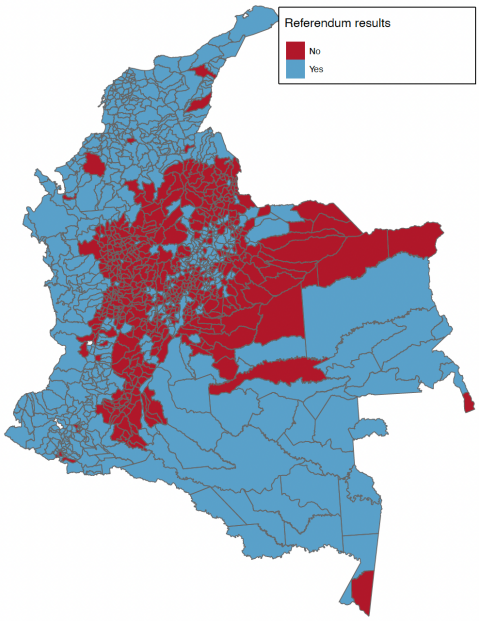
In an effort to legitimize the peace agreement with the FARC insurgency and ensure broad national support, the Colombian government decided to hold a national referendum.[4] This decision reflected the government's commitment to seek the approval of the Colombian people for the terms negotiated with the FARC. The referendum, held on October 2, 2016, posed a simple question to voters: whether they accepted or rejected the peace accord. Despite widespread anticipation and international support for the peace process, the referendum resulted in a narrow rejection of the agreement, with 50.2% voting against it (Branton et al., 2019).

Figure 1 depicts the geographic distribution of the peace referendum results and reveals a stark contrast in voting patterns across Colombia. It shows that the peace agreement was predominantly supported by municipalities located at the periphery of

[4]The peace referendum was sanctioned by both the Constitutional Court and Congress, with specific criteria to ensure its validity. For the referendum to be valid, two conditions had to be met: first, the percentage of votes in favor of the peace deal needed to constitute at least 13% of the total electorate; second, the number of supporting votes had to exceed the number of votes rejecting the peace deal. These requirements were put in place to confirm that the peace agreement had substantial support from the Colombian population.

the country. These areas, characterized by their remoteness, had borne the brunt of the armed conflict. As a result, they are municipalities with low levels of development, high poverty rates, significant presence of coca crops, and historically high levels of violence. Following the unexpected rejection of the peace agreement in the October 2016 referendum, the Colombian government and the FARC insurgency promptly initiated a second round of negotiations to address the concerns and issues raised by the referendum's outcome. In December 2016, the Colombian government and the FARC formally signed the final peace agreement.

Figure 1. Outcome of the peace referendum in October 2016



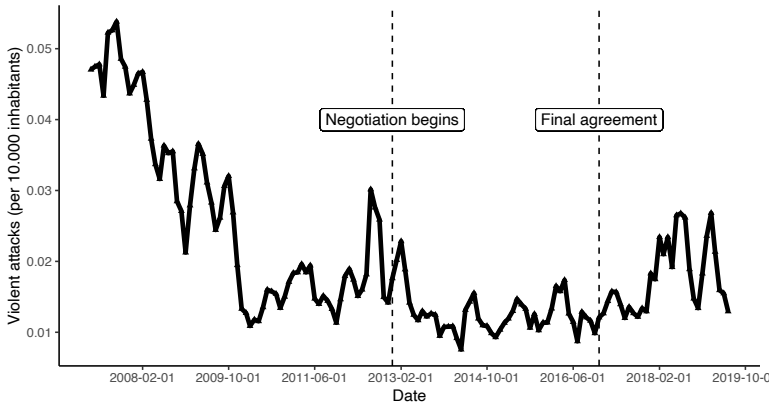
The map presents the distribution of the outcome of the referendum across Colombian municipalities in October 2016 and does not include the islands of San Andrés and Santa Catalina.

While the FARC insurgency and the Colombian government were engaged in peace negotiations, other non-state armed groups, such as the ELN, Clan del Golfo, and various criminal organizations, continued to operate. These groups maintained their involvement in illicit activities, particularly drug trafficking, which remained a significant source of revenue and power. These armed actors exploited the power vacuum left by the FARC in certain regions, expanding its influence and control over drug production and distribution networks (Prem et al., 2022).

Figure 2 illustrates the evolution of attacks perpetrated by non-state actors, normalized by population, from 2007 to 2019. It marks key milestones, including the

beginning of the peace negotiations in 2012 and the signing of the final peace agreement in December 2016. The data shows a general downward trend in violence leading up to the negotiations, reflecting broader efforts to reduce conflict. However, a sharp reduction in violence is particularly noticeable starting in 2012, coinciding with the announcement of ceasefires by the FARC as part of the peace process. This period of decreased violence highlights the immediate impact of the peace talks on reducing hostilities. Despite this progress, the figure also shows a concerning trend following the signing of the peace agreement. From late 2016 onwards, there is a notable increase in violent events, with levels of violence eventually rising to resemble those observed in 2009.

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



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.

My argument is that the peace agreement between the Colombian government and the FARC insurgency created an economic shock within the context of the armed conflict. Before the peace negotiations (2007-2011), the FARC was active in 109 municipalities, 29 of which had coca crops, representing 30% of all coca-producing municipalities. These areas covered 37,015 hectares, or 38% of the total coca crop area in Colombia, which was 96,085 hectares in 2015. After the FARC's demobilization, other non-state armed groups likely took over this production. In 2015, each hectare produced an average of 6.8 kg of cocaine hydrochloride, priced at US$1,732 per kilo (UNODC, 2016). Thus, the FARC-controlled municipalities could produce approximately 251,702 kg of cocaine hydrochloride, with a market value of around US$436 million. The unintended economic effects of the partial peace agreement are

evident in this economic shift, which the redistribution of such a resource likely fueled increased competition and violence among the remaining armed groups.

The increase in violence following the FARC's demobilization is unlikely to be widespread but will instead concentrate in specific areas. Non-state armed groups will use the peace referendum results as an indicator of the costs associated with controlling former FARC territories. They are likely to focus on municipalities that rejected the peace agreement, interpreting the rejection as a sign of weaker social capital and lower community cohesion, making these areas easier to dominate. This does not imply that these municipalities support the presence of armed actors but rather that there is insufficient social resistance to oppose them (Arjona, 2016; Kaplan, 2017). To maintain control, these groups will employ strategic violence against the civilian population (Kalyvas, 2006). Additionally, given the strategic value of former FARC territories, armed groups will target municipalities where they can extract illicit rents, such as those involved in coca production or illegal mining. These activities are significant sources of financing in the Colombian context, and controlling these areas provides economic benefits to the non-state armed groups.

In summary, my empirical expectations suggest that there will be an increase in violence after the peace referendum in municipalities that rejected the peace agreement. This rise in violence will be more pronounced in areas that were previously controlled by the FARC insurgency. Additionally, municipalities that generate significant illicit economic rents from coca crops and illegal mining will experience higher levels of violence. Furthermore, the increase in violence will be especially acute in municipalities with low levels of social capital, where the community's capacity to resist the presence and influence of non-state armed groups is weaker.

4 Empirical Strategy

4.1 Data

I utilized conflict data from Universidad del Rosario, which provides detailed information on violent events, including the armed actor involved, location, date, and other relevant characteristics.[5] This dataset enables the identification of four primary non-state armed groups: the FARC insurgency, the ELN, paramilitary groups, and other

[5]The conflict data used was compiled using reports from *Revista Noche y Niebla*. These statistics are highly reliable, as they are derived from news reports from 25 major Colombian newspapers, supplemented by detailed reports from Catholic priests documenting incidents of political violence. Furthermore, these events are cross-verified with official government reports to ensure accuracy.

groups. I focus on estimating the number of monthly violent attacks initiated by these non-state armed groups per 10,000 population, covering the period from October 2016 to September 2018. This timeframe captures the immediate aftermath of the FARC peace agreement and allows for an analysis of how violence dynamics evolved during the early implementation phase of the accord.

I incorporated voting data from the *Registraduría Nacional del Registro Civil*, which provides detailed results from the peace referendum. Specifically, I calculate the vote share for both options—supporting and rejecting the peace agreement—at a municipal level. Additionally, I analyze voter turnout to gauge the level of political engagement. I also include data from the 2014 presidential elections at the municipal level obtained from the same source, and data on electoral risk from *Misión de Observación Electoral* (MOE). This electoral data provides additional context for understanding the political landscape of each municipality prior to the peace agreement.

Finally, I incorporate data on various municipal characteristics from multiple sources. First, I use data on the presence of coca crops from the *Integrated Monitoring System for Illicit Crops* (SIMCI) by the *United Nations Office on Drugs and Crime* (UNODC). Legal mining statistics are obtained from the *Ministry of Mines and Energy* in Colombia, while information on illegal mining comes from Prem et al. (2020b). Additionally, I include socioeconomic data from a municipal panel provided by *Centro de Estudios sobre Desarrollo Económico* (CEDE) at Universidad de los Andes. The final database is a pooled panel of municipal-level microdata spanning from October 2016 to September 2018.

Table 1 provides an overview of key variables relevant to the study. It includes the share of municipalities that supported the peace agreement and voter turnout. Additionally, it presents the number of attacks perpetrated by non-state armed groups, broken down by specific groups such as the FARC, ELN, paramilitary groups, and other armed factions. Table 1 indicates that voter turnout was relatively low, even compared to typical levels in Colombia. Despite the peace agreement with the FARC insurgency, reports show that FARC dissidents—combatants who did not adhere to the peace deal—continued to engage in violent activities. Furthermore, the data reveals that the majority of attacks were carried out by unidentified actors.

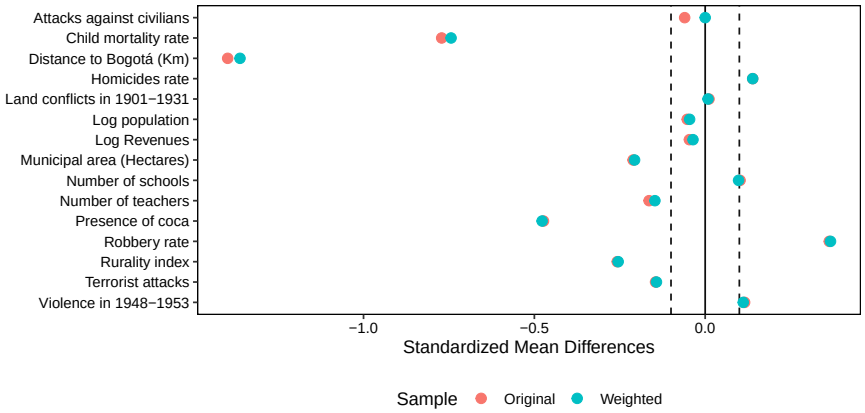
Table 1. Summary statistics

	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

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

Figure 3 highlights the distinct characteristics of municipalities that rejected the peace agreement compared to those that supported it. Municipalities rejecting the peace deal are typically closer to Bogotá, have lower child mortality rates, and are smaller in geographical size. They also tend to have fewer coca crops, are less rural, and have experienced fewer terrorist attacks. On the other hand, these municipalities report higher crime rates and higher homicide rates, indicating a different set of social and security challenges compared to areas that supported the peace agreement.

Figure 3. Covariate balance



Covariate balance for a set of municipal characteristics in 2015 assessed using *cobalt* in R (Greifer, 2024).

4.2 Estimation

The difference in the number of violent attacks between municipalities that rejected the peace agreement and those that supported it is insufficient to derive a causal estimate of the effect of the peace referendum results on violent attacks by non-state armed actors. Multiple observable and unobservable individual, and municipal characteristics in Colombia affect preferences for peace. As Figure 3 illustrates, municipalities that supported the peace agreement experienced more violence in the past and were more significantly affected by the presence of coca crops, among other notable differences.

Omitted variable bias may affect the correlation between the peace referendum results and violence. Various unaccounted factors, such as economic conditions, historical grievances, and local leadership, could simultaneously impact both the referendum results and the levels of violence. Additionally, reverse causality is a concern; it is plausible that existing violence levels influenced preferences for peace, thereby affecting the referendum outcomes. For example, Kibris (2011) finds that Turkish voters are sensitive to experiencing terrorism. Similarly, Berrebi and Klor (2008) and Getmansky and Zeitzoff (2014) provide evidence from Israel supporting this observation.

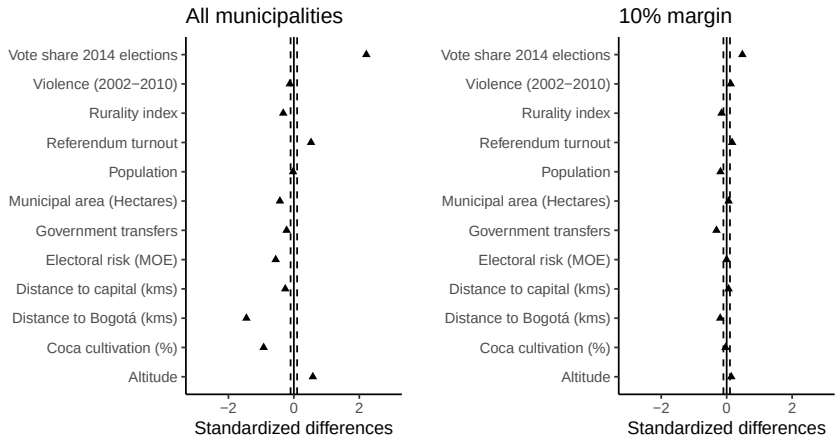
To estimate the causal effects of the peace referendum results on violence perpetrated by non-state armed actors not involved in negotiations with the Colombian government, I employ a regression discontinuity design, using the vote share reported in the peace referendum as a score variable. Although the referendum's outcome depends solely on the total votes cast at the national level, local preferences regarding peace offer information that non-state actors can use strategically. The empirical model employs a regression of the following form:

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

In this context, y_{it} represents the outcome variable for municipality i in month t. The variable D_{it} is a binary treatment indicator that denotes whether a municipality rejected the peace agreement during the referendum. The term $f\left(X_{it}\right)$ is a polynomial function of the score variable, and ϵ_{it} is an idiosyncratic error term. Here, X_{it} is calculated as the vote share rejecting the peace agreement minus the vote share supporting it, with each vote share representing a fraction of the total votes cast. Therefore, the treatment variable D_{it} equals 1 if X_{it} and 0 otherwise.

The coefficient of interest is β_2, which represents a discontinuous change in the outcome variable at the threshold where the score variable is zero. I estimate β_2 both parametrically and nonparametrically within a narrow bandwidth, following the approach of Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019). Additionally, I test the robustness of the results by using different bandwidths and applying local linear and quadratic polynomials. The causal interpretation of β_2 relies on two main assumptions: first, that covariates other than the outcome variable change smoothly at the threshold, indicating that any abrupt change in violence by non-state armed groups can be attributed solely to the rejection of the peace agreement; and second, that there is no systematic manipulation of the referendum results around the score threshold.

Figure 4. Standardized difference between treatment and control groups



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.

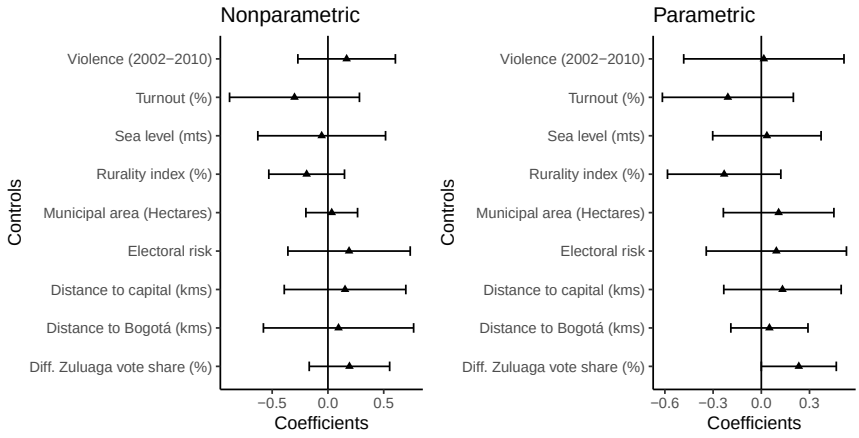
To ensure that the treatment and control groups are more comparable, I employ a regression discontinuity design that focuses on a subgroup of observations near the threshold. This approach allows me to compare municipalities that narrowly rejected the peace agreement with those that narrowly accepted it, thereby reducing potential differences between the groups. Figure 4 presents the standardized differences between the treatment and control groups across various municipal characteristics. The left panel includes all municipalities, displaying a broader range of differences. In contrast, the right panel focuses solely on municipalities within a 10% margin of the threshold, resulting in more comparable observations.

By concentrating on observations close to the threshold, I can more accurately isolate the effect of the peace referendum results on subsequent violence, ensuring that the municipalities in both groups are similar in terms of observable and unobservable characteristics. This enhances the validity of the causal estimates and provides a clearer understanding of the impact of the peace agreement's rejection on the behavior of non-state armed actors.

4.3 Identification

Two important assumptions must be met for the regression discontinuity design to be interpreted as causal: First, covariates other than the outcome must change smoothly at the threshold. This makes sure that any sudden changes in the outcome variable are due to the treatment. Second, there must be no systematic manipulation of the assignment variable around the threshold, meaning that the assignment mechanism is not manipulated.

Figure 5. Continuity assumption

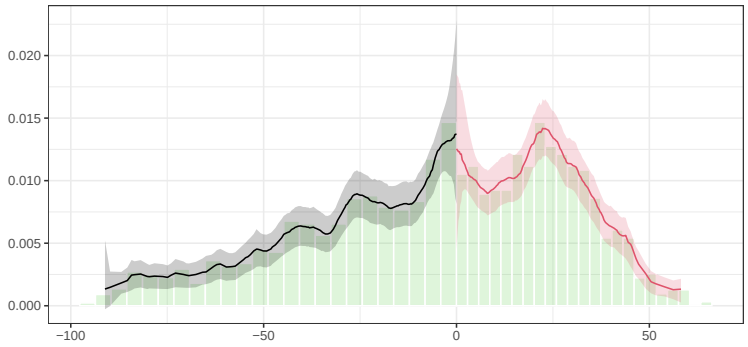


Point estimates accompanied by confidence intervals at the 95% level.

Based on Calonico et al. (2014), Figure 5 shows the differences between the treatment and control groups for a number of municipal characteristics at the point where the score variable is zero, before the peace referendum. This figure suggests that the first key assumption for a regression discontinuity design is likely to hold. Specifically, there are no statistically significant differences between the treatment and control municipalities around the threshold for these set of observable characteristics. This lack

of significant differences supports the plausibility that covariates change smoothly at the threshold.

Figure 6. Score density



Manipulation test based on Cattaneo et al. (2020), where p-value is 0.449.

I use a manipulation test that Cattaneo et al. (2020) proposed, which modifies the McCrary test, to evaluate the second identifying assumption (McCrary, 2008). Figure 6 shows the distribution of the score variable around the threshold. A discontinuous jump in this distribution would suggest that it was more or less likely to see a narrow win for the rejection of the peace agreement during the referendum. However, Figure 6 demonstrates that there is no significant increase in density at the threshold (p-value = 0.449), indicating no evidence of score manipulation.[6] I test for manipulation in the score variable across different quartiles of the electorate's empirical distribution, as shown in Figure A1, to check for score manipulation in municipalities with larger electorates. The findings reveal no evidence of manipulation in the score variable for any electorate quartile, supporting the assumption that there is no systematic score manipulation around the threshold.

The data appear to support the two key identifying assumptions of the regression discontinuity design. First, covariates other than the outcome variable seem to be continuous around the threshold, and second, there is no evidence of manipulation in the score variable. This suggests that the results derived from this analysis have a causal interpretation, providing a reliable estimate of the impact of the peace referendum results on violence perpetrated by non-state armed actors.

[6]Additionally, when performing the McCrary (2008) test, the results show no apparent sorting on the score variable (p-value = 0.022).

5 Results

5.1 Main Results

Table 2. 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)
Panel A: Nonparametric estimates and bias-corrected standard errors - Kernel: Uniform						
Rejection share (%)	0.014**	0.014**	0.014**	0.011**	0.015**	0.010**
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
Mean Dep. Var.	0.010	0.010	0.010	0.009	0.010	0.009
Bandwidth	13.776	14.392	15.265	17.854	13.593	17.435
Observations	3,780	3,900	4,128	4,764	3,768	4,704
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	0.013**	0.013**	0.013**	0.012*	0.012**	0.012**
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Mean Dep. Var.	0.010	0.010	0.010	0.010	0.010	0.010
Bandwidth	14.392	14.392	14.392	14.392	14.392	14.392
Observations	3,900	3,900	3,900	3,900	3,900	3,900
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

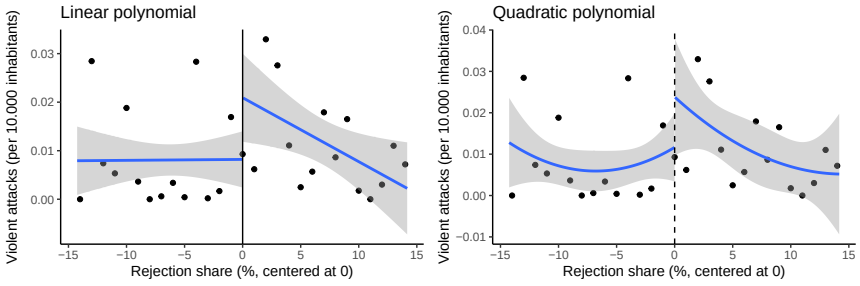
Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Table 2 presents the main results. Panel A reports the non-parametric estimates based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019), while Panel B displays the corresponding parametric estimates. Column 1 shows the results from the most basic empirical model. Column 2 incorporates clustered standard errors at the department-month level for more robust inference. Column 3 adds municipal controls, including municipal area size, population size, distance to Bogotá, and a rurality index. Column 4 includes political controls such as the vote share in the 2014 presidential elections and an electoral risk index. Column

5 accounts for prior violence by including the number of attacks before the peace referendum. Finally, Column 6 combines all the aforementioned controls, providing a comprehensive view of the factors influencing the relationship between the peace referendum results and subsequent violence.

All estimates consistently show a positive and statistically significant relationship between the share of votes rejecting the peace referendum and the number of attacks carried out by non-state armed actors during the first year after the referendum, from October 2016 to September 2017. As an example, the results in Panel A, Column 2, show that the rejection of the peace referendum, on average, generates an increase of 0.014 violent attacks per month from October 2016 to September 2017. When we compare this point estimate to the mean of the dependent variable, it represents almost 1.4 times the average number of violent attacks during the sample period. This signifies a notable escalation in violence linked to the rejection of the peace agreement.

Figure 7. Municipal characteristics by treatment and control groups



Bins within Calonico et al. (2014) and Calonico et al. (2019) optimal bandwidths are displayed for linear and quadratic polynomials without additional controls. Standard errors are clustered at the department-month level.

Figure 7 presents the main estimates derived from the parametric approach in Column 2 of Table 3, using both linear and quadratic polynomials with a uniform kernel. Each point on the graph represents the average number of violent attacks for a specific bin within the optimal bandwidth range, as determined by Calonico et al. (2014) and Calonico et al. (2019). Both figures in the graph indicate a statistically significant increase in violent attacks near the threshold, highlighting the impact of the peace referendum rejection on subsequent violence.

5.2 Robustness Checks

I performed a validity test by manipulating the threshold of the regression discontinuity design at different levels. This approach helps confirm that the discontinuity is only observable at the threshold that actually matters in this context, which is zero. By systematically adjusting the threshold, I should observe null results for other thresholds, indicating that the observed treatment effects are not driven by arbitrary cutoff points. Figure A2 confirms the validity test by demonstrating that the discontinuity is only observable at the threshold of zero.

One important robustness check is the donut hole regression discontinuity design, which excludes observations very close to the threshold to mitigate potential biases (Barreca et al., 2011). Its relevance lies in confirming that the results are not disproportionately driven by data points immediately adjacent to the cutoff, which might be subject to manipulation, anomalies, or measurement error. Figure A3 confirms that there are no observations near the cutoff that could have disproportionately influenced the results.

Different bandwidths can affect the balance between bias and variance in the estimates. Narrower bandwidths may increase precision but introduce bias, while wider bandwidths may reduce bias but increase variance (Calonico et al., 2014, 2019). By examining the consistency of the results across a range of bandwidths, I can confirm that the observed treatment effects are not driven by a specific bandwidth selection. Figure A4 confirms that the results remain consistent across different bandwidths.

I run the main estimates using different bandwidths on both sides of the threshold (Table A1), employing a quadratic polynomial (Table A2), and using both triangular and epanechnikov kernels (Table A3). The results remain consistent across these various specifications, demonstrating that the observed treatment effects are robust to different methodological choices. This consistency across multiple approaches reinforces the reliability of my conclusions and provides strong evidence for the causal impact of the peace referendum results on violence perpetrated by non-state armed actors. I also tested for an effect two years after the peace referendum. However, these additional tests did not yield significant results (Table A4).

Because the main database is a municipal pooled panel, the score variable inherently has multiple mass points. This means that while each municipality has a single fixed value associated with the score variable, the outcome variable varies monthly. As a result, the score variable, which is constant for each municipality, essentially becomes 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 a regression discontinuity design behave essentially as if we had the same number of observations as mass points. Instead of having a continuous spread of data points around the cutoff, we have clusters of observations at specific values (Cattaneo et al., 2017).

To address the issue of a discrete score variable, I implemented a global regression discontinuity approach by collapsing the database at the municipal level. Specifically, I calculated the average outcome for each of the 1,088 municipalities included in the main sample. The results in Table A5 support the main findings, demonstrating that the observed treatment effects remain consistent. I also employed a local randomization approach that adjusts for any confounding variables by randomly perturbing the assignment variable within a small window around the threshold (Cattaneo et al., 2015). Table A6 presents the results of a local randomization regression discontinuity design. This approach continues to show a statistically significant increase in violence perpetrated by non-state armed groups, with the significance range within the 15% threshold that is appropriate for this analysis (Cattaneo and Titiunik, 2022).

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) shows that these CIs do not effectively protect against model misspecification and tend to have poor coverage properties. This means that the resulting confidence intervals may not accurately reflect the true uncertainty around the estimated effects, potentially leading to misleading inference. Table A7 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.

In 2014, Colombia held presidential elections that were widely considered the first informal peace referendum (Weintraub et al., 2014). The two main candidates had opposing views on the peace agreement with the FARC. Incumbent President Juan Manuel Santos, who initiated the peace talks during his first term, was a strong advocate for continuing the peace process. In contrast, his opponent, Oscar Iván Zuluaga, campaigned on a platform that sought to break the peace agreement, presenting a clear choice for voters on the future of the negotiations. Table A8 demonstrates that the increase in violence perpetrated by non-state armed groups is not influenced by

the vote share during the 2014 presidential elections. Furthermore, there appears to be no direct disruption between the political agendas of the presidential candidates and the public's preferences regarding peace (see Figure A5).

Past violence could significantly influence electoral preferences, potentially affecting the outcomes of the peace referendum. Communities that have experienced higher levels of violence may develop distinct political attitudes, prioritizing security and stability over other issues (Berrebi and Klor, 2008; Getmansky and Zeitzoff, 2014; Kibris, 2011). Table A9 indicates that violence, at least between 2012 and 2015, does not have a relationship with the results of the peace referendum. Levels of violence experienced during this period did not directly influence how municipalities voted in the peace referendum.

5.3 Heterogeneous Effects

To further understand the factors driving the increase in violent attacks perpetrated by non-state armed actors in Colombia, I will test a set of heterogeneous effects. This analysis will include variables such as the presence of other non-state actors, the level of social capital within municipalities, the presence of coca crops, the extent of gold mining activities, and a subset of municipalities prioritized to receive resources for local development programs. By examining these factors, the aim is to identify specific conditions and contexts that may influence the escalation of violence.

The analysis revealed that violence in municipalities that rejected the peace agreement is primarily driven by the presence of non-state armed actors, particularly in municipalities contested between the FARC and other non-state armed groups. Table A10 demonstrates a statistically significant increase in violent attacks, with an average rise of 0.57 attacks in these disputed municipalities. In contrast, municipalities not disputed by these groups do not exhibit any increase in violence.

The absence of social capital may mediate the relationship between the peace referendum results and violence perpetrated by non-state armed actors in Colombia. Communities with low social capital often lack the cohesion and collective efficacy needed to resist or deter armed groups (Kaplan, 2017). In areas where social networks, trust, and civic engagement are weak, it is easier for non-state armed actors to exploit vulnerabilities, impose control, and escalate violence (Arjona, 2016). To capture the concept of social capital in my analysis, I utilize three variables: the level of protest activity in 2013 at the municipal level, the presence of social leaders as indicated by

statistics on their killings, and the level of voter turnout during the peace referendum.[7] Table A11 reveals that rejecting the peace agreement generates more violence in municipalities that report low levels of social capital. This pattern holds true across all three indicators used to measure social capital.

I argued that the peace agreement represented an economic shock for other non-state armed groups, as the demobilization of the FARC left strategic territories vacant, particularly in areas where coca crops were prevalent. Table A12 supports this argument, showing that violence indeed follows patterns of coca cultivation. It indicates that municipalities with significant coca cultivation experienced increased violence after the peace agreement, as other non-state armed groups moved in to control these valuable territories. The impact of the economic shock caused by the peace agreement is even more pronounced in municipalities where the FARC insurgency was present before the peace agreement. Additionally, I find that the economic shock effect is similarly pronounced in municipalities with significant gold mining activities, as show in Table A13.

After the peace agreement, the Colombian government identified and grouped a subset of municipalities into three special categories: PDET (Development Programs with a Territorial Focus), PNIS (National Comprehensive Program for the Substitution of Illicit Crops), and ZOMAC (Zones Most Affected by the Conflict). These designations were part of a broader strategy to promote development, address the root causes of conflict, and support the transition to peace in areas that were significantly impacted by the armed conflict.

These programs, particularly PNIS, could undermine the interests of non-state armed actors by disrupting their economic base. PNIS aims to replace coca cultivation with legal crops and alternative livelihoods, thereby cutting off a major source of income for armed groups that rely on the coca trade for funding their operations. By providing farmers with financial incentives, technical assistance, and infrastructure support to transition to legal agriculture, PNIS reduces the availability of coca for illegal markets. This, in turn, weakens the economic power of non-state armed actors

[7]The level of protest activity serves as a proxy for civic engagement and the community's willingness to mobilize for collective causes. The presence of social leaders reflects the strength of community organization and leadership, crucial for fostering social cohesion and resistance against armed actors. Identifying social leaders in Colombia is challenging due to the absence of official registration mechanisms for civil society organizations. However, the killings of social leaders serve as an indicator of their presence and activity levels. Finally, voter turnout during the peace referendum indicates the degree of political participation and community involvement in decision-making processes.

who exploit coca cultivation and trafficking. The results in Table A14 suggest that non-state armed groups seem to target PNIS municipalities. There is an increase in violence in PNIS municipalities that rejected the peace agreement. This pattern indicates that these areas, which are central to the government's strategy for transitioning away from coca cultivation, have become focal points for conflict as non-state armed actors attempt to maintain their economic interests and control.

6 Conclusion

Peace agreements can fail to deter violence due to their inability to address the interests and grievances of all parties involved in a conflict. When such agreements are made with only a subset of non-state actors, they can create an imbalance in power dynamics, leading to unintended consequences. Non-state groups that are excluded from the peace process may view the agreement as an opportunity to further their economic interests, particularly in regions with valuable resources. Thus, this exclusion can incentivize these groups to escalate violence to assert their dominance or protect their economic activities. Consequently, while peace agreements aim to establish stability, they can inadvertently provoke new conflicts by disrupting the status quo among competing factions.

The findings indicate that the rejection of the peace agreement in the 2016 Colombian peace referendum precipitated a surge in violence by non-state armed groups excluded from the peace process with the FARC insurgency. Employing a regression discontinuity approach, the empirical analysis reveals an average increase of 0.014 violent attacks in municipalities that opposed the agreement. This effect represents almost 1.4 times the average level of violence during the sample period, highlighting the substantial impact of the referendum's outcome on local security conditions in Colombia a year after the peace referendum took place.

This study contributes to the broader literature on the relationship between income and violence, and examines the effectiveness of peace agreements in preventing future conflicts. Unlike most research on the effectiveness of peace agreements, which often relies on qualitative and anecdotal evidence, this study provides a quantitative analysis of the causal impact of peace agreements on subsequent violence. By employing a regression discontinuity approach, this paper offers robust evidence on how the rejection of a peace agreement can escalate violence among non-state armed groups, making it one of the first studies to rigorously quantify the causal effects of

peace agreements on future violence.

In the Colombian context, the results of the peace referendum signaled which municipalities became focal points for non-state armed groups following the demobilization of the FARC insurgency. These groups sought to fill the power vacuum left by the FARC. Municipalities that rejected the peace agreement typically had low levels of social capital, which could otherwise deter non-state armed groups. Additionally, the increase in violence was more pronounced in municipalities with significant economic resources such as coca crops and gold mining, which are common income sources for non-state armed groups in Colombia. This dynamic underscores how the referendum's outcome influenced both the geographical and economic landscape of post-conflict violence.

One of the main caveats of this study is that it estimates a local average treatment effect by focusing on municipalities that narrowly rejected or supported the peace agreement. This approach means that the findings are most applicable to areas where the vote was closely contested, and may not fully capture the broader impact of the peace agreement on municipalities with more decisive outcomes. Therefore, while the results provide valuable insights into the localized effects of the peace referendum, they should be interpreted with caution when generalizing to all municipalities across Colombia. Another limitation of this study is that it focuses exclusively on one specific aspect of violence: attacks perpetrated by non-state armed groups. This narrow focus means that other forms of violence and their potential impacts were not considered. Additionally, the analysis is confined to the effect of the peace agreement as determined by the outcome of the peace referendum. This approach overlooks other possible mechanisms through which the peace agreement could influence violence, such as changes in government policies, shifts in public sentiment, or the implementation of local development programs.

Promising avenues for future research on this topic include exploring the broader impacts of peace agreements on various forms of violence and examining different mechanisms through which peace agreements can influence conflict dynamics. Additionally, comparative studies across different regions or countries that have undergone similar peace processes could provide valuable insights into the generalizability of these findings. Finally, incorporating qualitative methods to complement quantitative analyses could help uncover nuanced local contexts and actors' perspectives, offering a more comprehensive understanding of the complex relationship between peace agreements and violence.

The findings of this study carry several policy implications, particularly for the design of future peace processes. First, peace agreements should strive to include all relevant non-state actors to prevent the exclusion of groups that may feel threatened and respond with increased violence. Comprehensive inclusion can prevent power vacuums that might otherwise be exploited by excluded group. Furthermore, continuous monitoring and evaluation of peace agreements' implementation can help identify and address emerging threats promptly. Integrating local stakeholders and communities in the peace process can ensure that agreements are more attuned to the specific needs and dynamics of different regions, increasing the likelihood of sustainable peace. Moreover, policy measures that enhance security and law enforcement in vulnerable regions can directly reduce the capacity of non-state armed groups to perpetrate violence. Strengthening the presence of state institutions and ensuring the rule of law can create an environment where the strategic use of violence becomes less viable for these groups.

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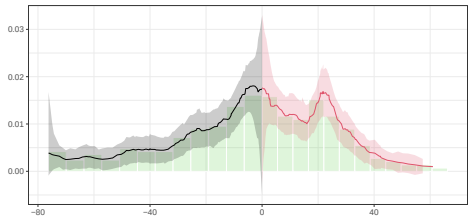
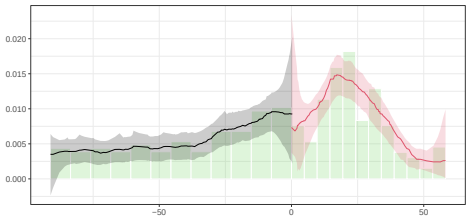
A Appendix Figures

Appendix Figure A1. Score density by electorate quartile

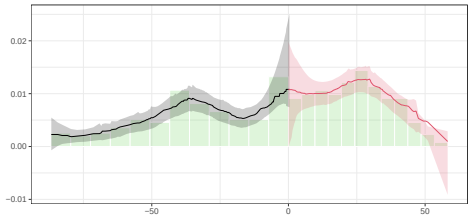
(a) Quartile 1



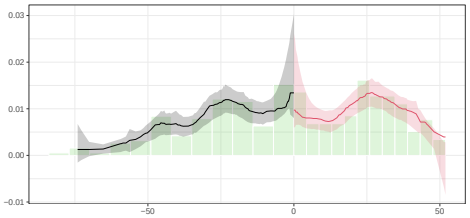
(b) Quartile 2



(c) Quartile 3

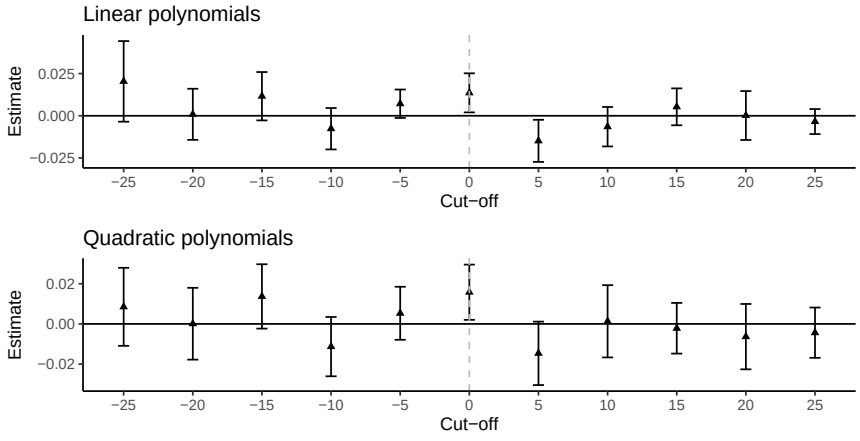


(d) Quartile 4



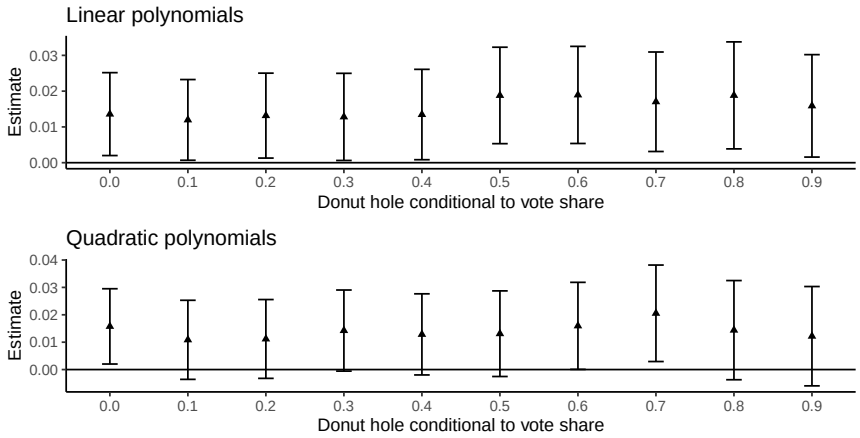
Manipulation test based on Cattaneo et al. (2020). p-values are 0.997 in (a), 0.900 in (b), 0.579 in (c), and 0.803 in (d).

Appendix Figure A2. Sensitivity analysis to different cut-offs



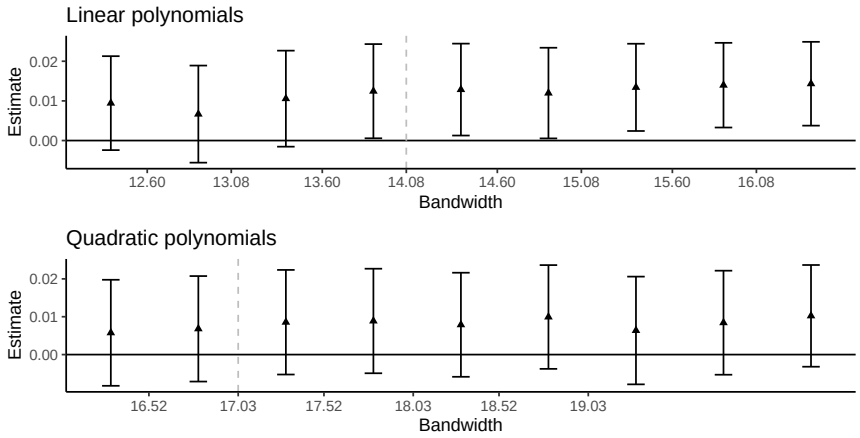
Point estimates for the common support of the score variable with confidence intervals at the 95% level. Parametric estimates using optimal bandwidths of Calonico et al. (2014) based on linear and quadratic polynomials, no controls, and clustered standard errors at the department-month level case.

Appendix Figure A3. Sensitivity analysis to observations near the cut-off



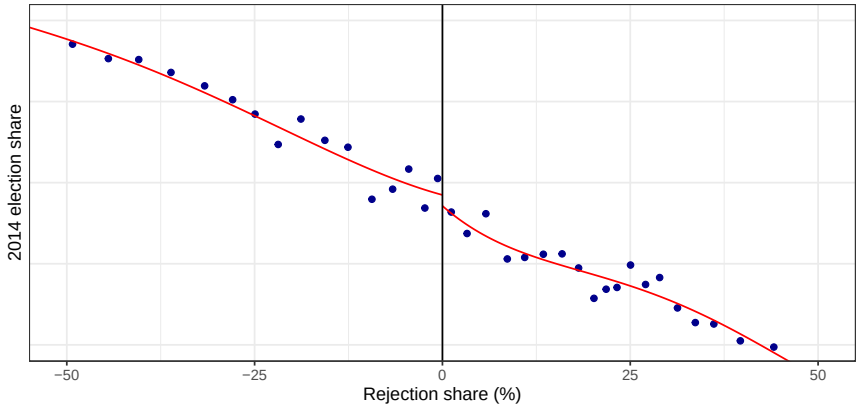
Point estimates for the common support of the score variable with confidence intervals at the 95% level. Parametric estimates using optimal bandwidths of Calonico et al. (2014) based on linear and quadratic polynomials, no controls, and clustered standard errors at the department-month level case.

Appendix Figure A4. Sensitivity analysis to bandwidth choice



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.

Appendix Figure A5. 2014 presidential election vote share and 2016 peace referendum results



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

B Appendix Tables

Appendix 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)
Panel A: Nonparametric estimates and bias-corrected standard errors - Kernel: Uniform						
Rejection share (%)	0.015***	0.015**	0.014**	0.012**	0.017**	0.009
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
Mean Dep. Var.	0.010	0.010	0.010	0.010	0.010	0.009
Bandwidths	(11.682, 12.668)	(11.485, 12.635)	(11.382, 13.289)	(11.377, 16.185)	(12.398, 12.416)	(10.236, 16.906)
Observations	3,408	3,372	3,456	3,840	3,516	3,792
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	0.013**	0.013*	0.015**	0.007**	0.013**	0.012**
	(0.006)	(0.007)	(0.007)	(0.003)	(0.006)	(0.006)
Mean Dep. Var.	0.010	0.010	0.010	0.010	0.010	0.010
Bandwidths	(11.485, 12.635)	(11.485, 12.635)	(11.485, 12.635)	(11.485, 12.635)	(11.485, 12.635)	(11.485, 12.635)
Observations	3,372	3,372	3,372	3,372	3,372	3,372
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix 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)
Panel A: Nonparametric estimates and bias-corrected standard errors - Kernel: Uniform						
Rejection share (%)	0.016**	0.016**	0.016**	0.016**	0.020***	0.019***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Mean Dep. Var.	0.009	0.009	0.009	0.009	0.009	0.009
Bandwidths	18.301	18.302	17.270	18.366	18.509	18.958
Observations	4,848	4,848	4,668	4,860	4,896	4,968
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	0.015**	0.015*	0.013*	0.015**	0.018**	0.017**
	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)
Mean Dep. Var.	0.010	0.010	0.010	0.010	0.010	0.010
Bandwidths	18.302	18.302	18.302	18.302	18.302	18.302
Observations	4,848	4,848	4,848	4,848	4,848	4,848
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix 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)
Panel A: Nonparametric estimates and bias-corrected standard errors - Kernel: Triangular						
Rejection share (%)	0.014***	0.014**	0.013**	0.011**	0.015**	0.012**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Mean Dep. Var.	0.009	0.009	0.009	0.009	0.010	0.009
Bandwidths	19.841	20.116	20.246	21.472	16.407	18.845
Observations	5,256	5,364	5,400	5,688	4,416	4,956
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Nonparametric estimates and bias-corrected standard errors - Kernel: Epanechnikov						
Rejection share (%)	0.014***	0.014**	0.014**	0.010**	0.014**	0.011**
	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)
Mean Dep. Var.	0.009	0.009	0.009	0.009	0.009	0.009
Bandwidths	18.281	18.609	18.852	20.124	17.172	19.158
Observations	4,848	4,920	4,968	5,364	4,608	5,028
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix 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)
Panel A: Nonparametric estimates and bias-corrected standard errors - Kernel: Uniform						
Rejection share (%)	-0.001	-0.001	-0.002	-0.004	-0.004	-0.006
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Mean Dep. Var.	0.013	0.013	0.014	0.014	0.014	0.014
Bandwidth	18.028	17.984	16.543	16.489	17.535	16.604
Observations	5,076	5,040	4,656	4,656	4,944	4,668
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓
Panel B: Parametric estimates						
Rejection share (%)	-0.003	-0.003	-0.007	-0.009	-0.006	-0.010*
	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Mean Dep. Var.	0.013	0.013	0.013	0.013	0.013	0.013
Bandwidth	17.984	17.984	17.984	17.984	17.984	14.392
Observations	5,040	5,040	5,040	5,040	5,040	5,040
Municipal controls			✓			✓
Political controls				✓		✓
Conflict controls					✓	✓
Clustered SE		✓	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix Table A5. Global RD (collapsed data)

	Linear (1)	Quadratic (2)
Panel A: Nonparametric estimates		
Rejection share (%)	0.005	0.015**
	(0.005)	(0.008)
Mean Dep. Var	0.014	0.014
Bandwidth	98.000	98.000
Observations	1,088	1,088
Panel B: Parametric estimates		
Rejection share (%)	0.010*	0.005
	(0.005)	(0.007)
Mean Dep. Var	0.014	0.014
Bandwidth	98.000	98.000
Observations	1,088	1,088

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix Table A6. Local randomization

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

Results based on Cattaneo et al. (2015).

Appendix Table A7. Alternative CIs

	Taylor (1)	Hölder (2)
Rejection share (%)	0.010***	0.010***
	(0.001)	(0.001)
Mean Dep. Var	0.010	0.010
Bandwidth	14.014	14.014
Observations	3,840	3,840

Results based on Kolesár and Rothe (2018) and Armstrong and Kolesár (2020).

Appendix Table A8. 2014 presidential elections and violent events between 2016-2017

	Linear	Quadratic
	(1)	(2)
Panel A: Nonparametric estimates		
Zuluaga's share (%)	0.003	0.002
	(0.005)	(0.007)
Mean Dep. Var	0.009	0.009
Bandwidth	22.044	30.804
Observations	4,680	6,180
Clustered SE	✓	✓
Panel B: Parametric estimates		
Zuluaga's share (%)	0.002	0.001
	(0.005)	(0.007)
Mean Dep. Var	0.009	0.009
Bandwidth	22.044	30.804
Observations	4,680	6,180
Clustered SE	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix Table A9. Violence before the peace referendum (2012-2015)

	Linear	Quadratic
	(1)	(2)
Panel A: Nonparametric estimates		
Rejection share (%)	0.309	-0.596
	(0.422)	(0.779)
Mean Dep. Var	0.724	0.825
Bandwidth	21.978	14.921
Observations	489	332
Clustered SE	✓	✓
Panel B: Parametric estimates		
Rejection share (%)	0.299	0.098
	(0.330)	(0.462)
Mean Dep. Var	0.724	0.825
Bandwidth	21.978	14.921
Observations	489	332
Clustered SE	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix Table A10. Presence of non-state armed groups

	FARC and Other groups	FARC	Other groups	None
	(1)	(2)	(3)	(4)
Rejection share (%)	0.568***	-0.031	0.030	0.005
	(0.097)	(0.022)	(0.029)	(0.005)
Mean Dep. Var.	0.012	0.010	0.010	0.009
Bandwidth	6.944	12.030	11.431	16.925
Observations	108	204	228	3732
Clustered SE	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019). Presence of non-state armed groups is measured as a dummy indicator of attacks perpetrated by these groups in 2007-2010. Each column reports results for different subsample of municipalities.

Appendix Table A11. Presence of social capital

	Protests		Social leaders killings		Turnout	
	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
Rejection share (%)	0.024***	-0.057***	0.021***	-0.078***	0.019**	0.008
	(0.007)	(0.009)	(0.006)	(0.023)	(0.010)	(0.007)
Mean Dep. Var.	0.010	0.010	0.010	0.010	0.010	0.009
Bandwidth	12.940	11.978	14.152	11.644	14.128	18.086
Observations	3,432	156	3,588	228	1,680	2,688
Clustered SE	✓	✓	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019). Low and high indicators are defined by the median value of the empirical distribution of a given variable. Each column reports results for different subsample of municipalities.

Appendix Table A12. FARC presence and coca cultivation

	FARC		Non-FARC	
	Coca	Non-coca	Coca	Non-coca
	(1)	(2)	(3)	(4)
Rejection share (%)	0.418***	0.004	0.070*	0.008
	(0.085)	(0.026)	(0.040)	(0.005)
Mean Dep. Var.	0.010	0.010	0.013	0.010
Bandwidth	12.153	13.844	6.300	15.723
Observations	84	300	108	3,756
Clustered SE	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix Table A13. FARC presence and gold mining

	FARC		Non-FARC	
	Mining	Non-mining	Mining	Non-mining
	(1)	(2)	(3)	(4)
Rejection share (%)	0.215***	-0.074***	0.001	0.004
	(0.053)	(0.018)	(0.005)	(0.008)
Mean Dep. Var.	0.010	0.010	0.013	0.010
Bandwidth	12.315	6.032	17.547	14.121
Observations	96	120	1,212	2,424
Clustered SE	✓	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).

Appendix Table A14. Prioritized municipalities after the peace agreement

	PDET	PNIS	ZOMAC
	(1)	(2)	(3)
Rejection share (%)	-0.002	0.167***	0.011
	(0.025)	(0.046)	(0.014)
Mean Dep. Var.	0.011	0.011	0.011
Bandwidth	7.676	9.958	10.756
Observations	336	120	948
Clustered SE	✓	✓	✓

Standard errors in parentheses are clustered at the department-month level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Results based on Calonico et al. (2014), Calonico et al. (2015), Calonico et al. (2018), and Calonico et al. (2019).