PRETENDING TO BE THE LAW: VIOLENCE TO REDUCE THE COVID-19 OUTBREAK*

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ABSTRACT. Did the COVID-19 pandemic create an opportunity to earn population control through illegal violence? We argue that criminal groups in Colombia portrait as de facto police by using mass killings to reduce the COVID-19 outbreak. They used massacres as a threat to enforce social distance measures in places they considered worth decreasing mobility. Our results from an Augmented Synthetic Control Method model estimated that commuting to parks fell 20% more in areas with massacres than in places without mass killings. In addition, we do not find a decline in mobility to workplaces and COVID-19 deaths after the first mass killing. These findings are congruent with the hypothesis that illegal armed groups used fear to enforce mobility restrictions without hurting economic activities and their sources of revenue. However, violence slightly impacted the virus' spread. Treated areas had a decline of 35 cases per 100.000 inhabitants four months after the first massacre.

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1. Introduction

The COVID-19 pandemic was an immense shock that changed power balances between criminal bands, legal military forces, government, and civilians (Ali, Hassan, and Hossain, 2021). These changes were particularly relevant in disputed environments where legal and illegal groups battle for territory and population control (Abrams, 2021). We argue that criminal groups acted as de facto police by using violent strategies when the national government dropped all lockdown measures. We focused on non-state Colombian armies enforcing illegitimate stay-at-home orders by using massacres that is simultaneously killing three or more civilians not directly involved in the conflict.

Our argument is not that COVID-19 was the primary explanation for civilian victimization in Colombia after 2020. The literature has shown that revenues from illicit economics, like coca cultivation, drive mass killings in Colombia (Prem et al. (2022) and Llanes (2022)).[1] Instead, we argue that illegal armies use violence as a sign of control and power, and this is especially true in areas where criminal payments do not rely heavily on the use of local population in illicit activities. In the case of Colombia, in areas where the population does not participate in coca growth, therefore we focused our analysis on places where growing coca is more challenging due to low suitability for coca cultivation. First, this strategy allows us to reduce concerns about alternative channels that explain the use of violence during the pandemic since we concentrate the analysis of the phenomena in places where illegal activities do not drive the motivation of massacres. Second, it allows us to show how the pandemic had different effects on the balance of power depending on the relations structures between civilians and armed groups.

[1]Massacres have multiple motivations, such as electoral incentives, illicit dispute revenues, and population alignment (Alesina, Piccolo, and Pinotti, 2018; Humpreys and Weinstein, 2006; Robinson and Torvik, 2009)

We used an augmented synthetic control model (ASCM) to estimate the causal effect of the first massacre on mobility and COVID-19 cases. Using the history of massacres after the national lockdowns on March 24^{th}, 2020. we built a weighted average of non affected units that match the pretreatment outcomes of areas with massacres (Ben-Michael, Feller, and Rothstein, 2021a). The method creates contrafactual control regions to model the behavior of mobility and COVID-19 behaviour as if it were not a massacre. Before showing the results of the first massacre on human movement and the COVID-19 case, we presented evidence supporting the plausibility of conditional treatment assumptions to estimate an unbiased parameter with the ASMC model. We showed that neither previous COVID-19 cases nor past human mobility trends predict mass killings. These results show that criminal bands did not target civilians depending on pretreatment outcomes, physical attributes of the areas, or population characteristics.

Our results showed that human mobility declined 20% more in areas with mass killings than in synthetic control units after the first massacre. The difference in mobility was statistically significant for trips to parks but not for commuting to workplaces. The reduction in mobility to low-risk transmission areas slowly translated into a decline in the COVID-19 cases. Four months after a mass killing, treated units dropped 35 cases per 100.000 inhabitants compared with synthetic control units. However, the decrease was only significant for the population between 15-44 years old. We did not find a statistically significant effect of mass killings on COVID-19-related deaths.

As robustness, we estimated a placebo test to show that massacres in 2022 did not affect population movement. We did not find effects of massacres two years after the first COVID-19 case when non-lockdowns were in place in Colombia. This result supports our hypothesis about illegal groups using violence only during the pandemic to demonstrate control over the population. Another possible story was that violence affected the detection of COVID-19 cases. However, we showed that the likelihood of catching a new positive case was the same for all Colombian sub-regions independently of the occurrence of massacres. While COVID-19 testing did not correlate with violence, geographic characteristics explained the testing variation among provinces. Finally, we reject the possibility that data disponibility explains our results. We arrive at the same conclusions when using several samples of affected areas.

This article contributes to the broad literature studying how diseases affect the decision of war-making. For example, infections can produce risker individuals or increase the willingness to rebel by reducing life expectancy (Cervellati, Sunde, and Valmori (2017) and Kustra (2017), respectively). Diseases can also become a natural barrier for criminal groups who hide in contaminated zones, as in the case of Malaria (Bagozzi, 2016). Our paper adds a new mechanism not previously analyzed: *pretend to be the law*. We show that with the increment of concerns about public wellness, illegal Colombian groups saw an opportunity to portray as a valid alternative force that controls population and territory.

Our work also contributes to explaining non-state and state violence during the COVID-19 pandemic. Since governments spend time and financial aid facing the pandemic, criminal groups could either react violently to reduce the COVID-19 outbreak or avoid confrontation to save economic and human resources (Koehnlein and Koren, 2022). Authoritarian states also repressed domestic dissidents without the pressure of the international community or citizen scrutiny (Barceló et al., 2022). African states, for example, engaged in repressive campaigns after imposing lockdowns (Grasse et al., 2021). In the Colombian case, we found that illegal groups acted as state actors to establish themselves as viable alternative government who took advantage of low scrutiny to use violence for controlling the population.

Finally, we contribute to the growing literature on the explanation of use of violence against civilians.[2] While the role of civilians is essential to all sides in civil wars

[2] Fearon and Laitin (2003) and Blattman (2022) present the reasons behind violence and irregular wars.

(Berman, Shapiro, and Felter, 2011; Clutterbuck, 1966; Galula, 1964; Thompson, 1966), illegal groups still use violence against the population as an optimal strategy (Kalyvas, 2006). Little force could lead to loose authority (Balcells, 2017; Kocher, Pepinsky, and Kalyvas, 2011; Lyall, 2009; Stoll, 1993; Vargas, 2016), but too much violence could push civilians to leave the territory or join the enemy for revenge (Schwartz and Straus, 2018).[3] Illicit armed groups use violence when people are not a principal component of revenue production (la Calle, 2017). At the same time, weak insurgents have incentives to target the local population with violence since they cannot ensure credible support with other means (Wood, 2014). During the COVID-19 pandemic, we showed a high level of violence in areas with low labor demand from illegal groups and several armed groups fighting for territorial control. We also presented evidence that criminal bands sought not to hurt economic activities but to control leisure activities.

The remainder of the article is as follows: Section 2 describes Colombia's COVID-19 situation and civil war background. Section 3 describes the different data sources and descriptive statistics of the COVID-19 evolution and mass killings in Colombia. Section 4 shows the synthetic control method and assumption to create a valid control group. Section 5 shows the results for human movment and COVID-19 cases. Section 6 presents robustness tests. Finally, section 7 highlights the implications of the findings for policymakers.

2. Background

2.1. The Civil War in Colombia.

The Colombian conflict is a multi-party conflict that has lasted more than 60 years. Besides state forces, there are several left-wing guerrillas groups in dispute, such as the Revolutionary Armed Forces of Colombia (FARC) and the National Liberation Army (ELN). These organizations have a strong

[3]Civilians can implement strategies to punish the previous criminal groups for extreme violence (Condra and Shapiro, 2012; Shaver and Shapiro, 2021). However, the back fighting is not symmetric, and some cases depend on the alignment or preferences of local inhabitants (Huber, 2019; Lyall, Blair, and Imai, 2013; Toft and Zhukov, 2015).

presence in remote rural areas and have financed their activities using illegal activities and taxes on legal activities (Arango, 2020). Moreover, there are also right-wing paramilitary criminal organizations in dispute. These illegal groups were born as a counterinsurgency strategy under the approval of the sector of military forces (Arjona, 2016).

The Colombian civil world reached its highest point during the 1990s when most groups were involved in drug cultivation and trafficking (Oslender, 2007). During this period several criminal organizations used massacres of civilians as a strategy to consolidate their power. Specially paramilitary groups that unified under the United Self-Defense Forces of Colombia (AUC) used mass killings as a strategy to contain the local support for left-wing guerilla (Aranguren, 2001). By 2002, Colombia faced more than one hundred massacres per quarter (Restrepo, Spagat, and Vargas, 2004). However, massacres decreased after the AUC's peace process finished in 2006. Although Colombia still has several paramilitary groups that splintered from the leading organization, the accord was successful to reduced massacres (Holmes et al., 2021).[4]

Recently there have been efforts to reduce violence. After four years of negotiation between the Colombian government and the FARC, both sides signed a Peace Agreement in 2016 (Parada, 2022). However, the government faced the challenge of establishing control in territories historically handled by FARC structures. Other illegal armies established dominance in those previously controlled-FARC areas after fights with other bands and using violence against civilians (Arango, 2020).

2.2. **COVID-19 and lockdowns.** Like many countries around the world, the spread of the COVID-19 virus heavily affected Colombia. Beginning with the first confirmed case on March 6^{th}, 2020, the virus spread rapidly to most Colombian areas. By September 2022, Colombia had more than six million confirmed COVID-19 cases with a fatality rate of 2.25% (INS, 2022). However Colombia had fewer deaths per 100,000

[4]Figuire A.I in the Online Appendix shows the historical evolution of massacres in Colombia.

people than other countries in the region such as Peru, Brazil, Chile, and Argentina (Sullivan, 2020).[5]

The Colombian government implemented several strategies to mitigate the pandemic outbreak. On March 24th, 2020, the government announced a nationwide lockdown for 19 days. However, given the increase in transmission levels, the government progressible extended the lockdown with adding exceptions to alleviate the economic cost associated with the curfews. On May 4th, 2020, the government began an opening plan with manufacturing and construction sectors. These lockdowns ended on September 1st, 2020, when the government lifted all mobility restrictions (Arregocés, Rojano, and Restrepo, 2021).

We argue that massacres became a strategic tool to handle the COVID-19 pandemic under the presence of illicit actors competing for territory control and population support. According to qualitative interviews with social leaders, police officers, and civil society, armed groups imposed rules to contain the COVID-19 spread in Colombian rural areas (HRW, 2020).[6] In several regions, illegal groups saw the pandemic as an opportunity to size control and change the power balance in dispute regions (Colombia Investigative Unit, 2020).[7]

3. Data

3.1. **Province definition.**

The presence of spillovers is a challenge when analyzing the impacts of policies to contain infectious diseases like COVID-19. An administrative unit such as a county or a city does not retain the virus, and measures taken in a

[5] In the Online Appendix, Figure A.II shows that Colombia had four COVID-19 deaths peaks in August 2020, February 2021, June 2021, and March 2022.

[6] The following groups set rules to reduce the COVID-19 outbreak: the National Liberation Army (ELN), the Popular Liberation Army (EPL), the Gaitanist Self-Defenses of Colombia (AGC), Contadores in Nariño; La Mafia in Putumayo; Oliver Sinisterra Front, the United Guerrillas of the Pacific, the Jaime Martínez mobile column, the Dagoberto Ramos mobile column, the 1st Front, 7th Front, 10th Front, and the Carolina Ramírez Front (FARC dissident groups) among others (HRW, 2020).

[7] In the Online Appedix, Subsection B shows a list of qualitative examples where illegal armies used massacres to reduce human movement and control the COVID-19 outbreak.

municipality affect virus transmission in neighboring localities. We used as analysis unit the province to overcome the spillover effects. We grouped 1123 municipalities into 154 sub-regions using the definition proposed by Ramírez and De Aguas (2022), who defined a sub-region as a set of places with similar environmental characteristics and proximity to the closest urban center.[8] We believe aggregating municipalities at the providence level takes into account spillover.

3.2. **Number of massacres.** We used the Armed Conflict Location and Event Data Project (ACLED, Raleigh et al. (2010)). This project collects information about political violence events in the world. For the Colombian case, the data has been available since January 2018 and came from a wide range of national and local media with the help of local NGOs and community networks.[9] We focused our analysis on massacres, defined as killing three or more unarmed civilians in one attack. We also excluded events whose alleged perpetrator was a state force, such as the military or the police.[10] Between January 2018 and March 2022, ony 62 municipalities in 36 sub-regions had 94 massacres with 375 civilian causalities (5% of total municipalities in Colombia). Around 50% of these sub-regions observed only one mass killing, 28% had two or three, and 22% four or more massacres.

Figure 1 shows the quarterly evolution of massacres since 2018. Before the COVID-19 outbreak in March 2020, there were ten massacres per semester, on average. After the beginning of the pandemic, the mass killings increased to around 20 massacres per semester. In the third quarter of 2020, when the government completely lifted the

[8]Ramírez and De Aguas (2022) do not divide departments such as Arauca, Caquetá, Casanare, Guainiía, Guaviare, Putumayo, Vaupeés and Vichada. A sub-region is neither a political nor an administrative division in Colombia.

[9]One crucial source of information about massacres is an NGO named the Institute of Studies for Development and Peace (*Indepaz*) that monitors the conflict in Colombia. The data comes from different sources such as news, the police, the army, the Ministry of Defense and the Office of the Attorney General of the Nation, local agencies protecting the citizens' rights, and other human rights platforms (Indepaz, 2021).

[10]See ACLED (2019) for more details about the definitions of events and actors used during the codifications of the events.

curfews, massacres reached their maximum of 30 events, with 128 victims in a single quarter. We also found that this increasing trend comes from non-coca growing areas. In the Online appendix, Figure A.III shows that massacres in municipalities with high coca suitability remained relatively stable, with around seven massacres per quarter between 2018 and 2022. Mass killings in places with low coca suitability experienced a boom after the second quarter of 2020, from 10 to 20 massacres.[11]

Figure 2 shows the time distributions of mass killings, victims, and provinces with a massacre in our sample of low coca suitability regions. By March 31st, 2021, around 75% of mass killings happened in regions with coca suitability index below the national median. Mass killings, victims, and provinces with massacres increased after the Colombian government eliminated all the lockdowns. About 30% of the massacres from 2019 to 2022 occurred ten days after the total release of curfews. Overall, the raw data aligns with the hypothesis that the increase in massacres was not associated with the dispute over illegal activities. Mass killings targeted civilians in public spaces rather than people linked to illicit economies.

3.3. **Google community mobility.** We hypothesized that massacres aimed to affected COVID-19 evolution through changes in mobility patterns that the violence produced on local communities. We used Google Community Mobility reports (GCM) to address this hypothesis (LLC Google, 2021). Based on users that turned on the location history settings, Google could measure the number of visits to different types of locations and compare it to movement trends before the COVID-19 outbreak.[12] We

[11]We did not see an increase in killings in municipalities receiving government funding to reduce coca cultivation (see Figure A.IV in the Online Appendix).

[12]We do not have the raw number of visits to a place in a specific week. We observe, for example, -34% in week seven of 2020, which means a decline of 34% in trips to a particular place, comparing the median number of trips between the first six of the year and the median trips in week seven. The baseline date is the median number of visits to a specific place from January 3^{rd} to February 6^{th} in 2020 (LLC Google, 2021).

focused on movements to parks and workplaces that represent the primary behaviour of mobility patterns in small cities (Duranton, 2016).[13]

Google data is available for only 321 municipalities and certain days per week. To overcome these issues of data availability, we averaged the available days per week and built weights from the municipality population to aggregate the data at the providence level. When there is no information for a particular week, we interpolate or extrapolate the data to complete the missing observations. The final database recovered the mobility index at workplaces for 119 providences and parks for 122 sub-regions or what it is the same for 79% of Colombia's total number of provinces.[14]

After the first lockdown on March 24^{th}, 2020, human mobility declined by about 60% compared with the median trips in the first six weeks of 2022. Although trips outside the home gradually recovered over time, movements did not reach the levels before the pandemic (see Figure 3). Before the total lift of lockdowns, human mobility decreased more in areas with massacres than without mass killings. However, one month after the complete release of curfews, the movement trend changed in small sub-regions with mass killings. Trips to parks, for example, are below in areas with massacres than without violence. The movement trends did not change in big provinces, regardless of the level of these human rights violations. These pieces of raw data is consistent with our hypothesis that illegal groups enforced mobility restrictions through massacres.

3.4. **COVID-19 cases.** Colombian Institute of Health (INS) centralizes the information about the universe of COVID-19 events at the national level. The INS collects information regarding the patient's symptoms, location, and test result dates (INS,

[13]The GCM also includes mobility to grocery stores, pharmacies, parks, transport stations, workplaces, entertainment places, and residential areas (LLC Google, 2021).

[14]For reference, we recovered mobility in types of places such as supermarkets or recreation places for less than half of the provinces. Our final database recovered the mobility index for retail and residence in 78 and 68 sub-regions, respectively.

2022). We used only the evolution of symptomatic cases to study the pandemic's evolution.[15] We defined a new case using the self-reported date of the first symptoms instead of the date of diagnosis of the test. This date captures more precisely the growth and circulation of the virus. Even more, considering that COVID-19 tests are not widely available in all the regions, the timing for getting the results depends on the region's connectivity (INS, 2022).

During the first months of the pandemic, COVID-19 cases followed a similar pattern in small sub-regions with and without massacres. However, after the government completely lifted the lockdowns, small provinces with massacres reported a lower infection rate than places without mass killings (see Figure 4 panel A). Big sub-regions with and without massacres have a similar trend in COVID-19 events before and after the lift of the curfews (see Figure 4 panel B).[16]

Figure 5 shows Colombia's spatial distribution of massacres and COVID-19 cases. First, we observe that most massacres occurred in regions with low coca suitability. Second, when we looked at the areas with massacres, we observed that those regions generally report lower cumulative COVID-19 cases, especially when compared with their closest neighbors. These facts support our hypothesis that illegal armies use massacres to reduce the virus spread and not directly control illicit markets.

3.5. **Other data.** We use a large set of predetermined municipal characteristics such as the degree of rurality, population, area, altitude over the sea, distance to the departmental capital, population density, total municipality income, suitability for coca production, gold exploration, electoral risk, and justice inefficiency index. We aggregate these characteristics at the province level. For altitude, distance to the capital, and coca suitability, we aggregate the measure weighting by the total population or the

[15]Only Bogota, the Colombian capital, constantly reported asymptomatic patients. Asymptomatic cases in Bogota represent more than 90% of COVID-19 patients with non-symptoms in Colombia.

[16]Figure A.V in the Online Appendix shows that small provinces with massacres have fewer deaths from the pandemic than areas without mass killings.

total size of each of the municipalities that belong to the province. The source of this data is mainly *Centro de Estudios sobre Desarrollo Económico* (CEDE) at Universidad de los Andes and the Colombian Census Bureau (DANE). In the Online Appendix, table A.I shows in detail the definition of each variable and the source and table A.II presents the summary the descriptive statistics in our sample.

3.6. **Final sample.** We study the number of massacres from March 24^{th}, 2020, when the Colombian government started lockdowns to control the pandemic, to March 31^{st}, 2021, one month before generalized protests and riots (Uwishema et al., 2022). We were concerned that including events after would have captured a different range of motivations from illegal groups.[17]

We used the coca suitability index proposed by Mejía and Restrepo (2015) to define 597 (53%) out of municipalities as highly suitable when 95% of the area supports coca growth.[18] The authors estimated the coca leaf yields depending on geographic characteristics such as the height above the sea, soil erosion, soil nutrients, minerals, topography, and rainfall index. We averaged the index at the province level, weighting it by the municipality area, and calculated the distribution for each province.

Finally, we excluded Bogotá from our final sample since this city had a different tracing COVID-19 strategy than other parts of the country. The city conducted an active search in local communities of cases among positive patients and their contacts. Even more, the city is mainly urban, and its mobility patterns differ from all the other cities and towns of Colombia. We think that this exclusion allows us to perform a better comparison within similar groups.

[17]Our COVID-19 measures include data until September 30^{th}, 2021. That is around 30 weeks after the events we were analyzing. The maximum period that we think the behavior change would affect the evolution of the infection.

[18]A municipality where 95% of the area supports coca production corresponds to the $75th$ percentile in the distribution of the province area suitable for coca cultivation.

4. Empirical strategy

Our objective is to evaluate the effect of a massacre on community mobility and COVID-19 transmission rates in sub-regions with a historically low level of violence. Specifically, we were interested in comparing our outcomes ($Y_{pT}(1)$) on each period after a massacre T with a contrafactual cases as if there had been no massacres ($\hat{Y}_{pT}(0)$). We used an augmented synthetic control method (ASCM) to estimate a version of province p treated ($p \in W_p = 1$) that performed statistically equal before the first massacres ($T_0 < T$).

The seminal method synthetic control method (SCM) uses a weighted combination of untreated units ($W_p = 0$) to build a synthetic unit, such the behavior of the outcome resembles the original treated-unit before the treatment (Abadie, Diamond, and Hainmueller, 2010; Abadie and Gardeazabal, 2003). This method constructs weights ($\omega_p^{scm} \in [0,1]$) to minimize the difference in pre-intervention trends between the treated and the synthetic control. Once the weights are estimated, they are used to approximate the potential outcome $\hat{Y}_{p,T}^{syn}(0)$ of the treated unit in the post-intervention period. Formally, the estimated synthetic outcome at time T is:

$$\hat{Y}_{pT}^{syn}(0) = \sum_{W_p=0} \omega_p^{scm} Y_{pT} \tag{4.1}$$

However, this method does not guarantee a perfect balance in all the characteristics.[19] To overcome this issue, we corrected the bias on estimations when the pre-treatment fit was not perfect, following Ben-Michael, Feller, and Rothstein (2021a). Formally we estimated the synthetic level of infection at the treated unit using the following model:

$$\hat{Y}_{pT}^{aug}(0) = \sum_{W_p=0} \omega_p^{ascm} Y_{pT} + \left(\hat{m}_{pT}(X_p) - \sum_{W_p=0} \omega_p^{ascm} \hat{m}_{pT}(X_P) \right) \tag{4.2}$$

[19] Indeed Appendix Table A.III shows some differences between provinces without and with massacres. A particular concern is that massacres occurred in a place with more share of gold exploitation, more presence of coca substitution programs, provinces at lower altitudes and with higher density, and further away from important cities.

Where $\hat{m}$ is the outcome model that can be seen as an estimate of the bias due to imbalance. The model we choose to de-bias the original SCM estimate is a ridge-regularized linear regression that increases the pre-treatment fit using the variables set X_p. This set included a series of pre-treatment outcomes and a set of fixed province characteristics.[20] The method's cost is to employ negative weights to improve the pre-treatment fits when negative weights are generally more sparse and less interpretable (see Ben-Michael, Feller, and Rothstein, 2021a, sec 4.1).

4.1. **Build the average treatment effect on the treated (ATT).** Our goal is to identify the average effect of mass killings on COVID-19 cases. Since we have multiple treated units (i.e., sub-regions with massacres), we needed to aggregate the estimated effects for each unit to calcualte the ATT. This aggregation is particularly challenging since we have several treated provinces in different weeks. Thus, the weight estimation that minimizes the imbalance before the treatment must consider two forces. The first is the imbalance for each treated unit separately, and the second is the imbalance for the whole average of the treated units.

We followed Ben-Michael, Feller, and Rothstein (2021b) and calculated ω^{ascm} by minimizing the two sources of imbalance in the average effect instead of calculating the mean individual effects for each treated unit. The method is a partially pooled SCM that weights the combination of these two measures. We allow the algorithm to choose a combination of the two factors based on how well separate synthetic controls balance the overall average. Formally, the parameter that governs the relative weight is ν. $\nu = 0$ is equivalent to estimating separate SCM fits for each province, then estimating the ATT by averaging those estimates. $\nu = 1$ is equivalent to finding the weights that minimize the ATT's root mean squared placebo estimate.

[20]The characteristics are total population, area, the share of the rural population, women, coca suitability, municipalities with governmental financial support to reduce the cultivation of illegal crops, gold exploration area, population density, average altitude, total income and expenditures per capita and distance to the capital.

4.2. **Assumptions.** This method correctly estimates unbiased ATT in the presence of three assumptions. First, the treatment is stable across units, or what is the same, that massacre only affected the treated areas. An analysis at the municipality level violates this assumption. Colombian illegal armies do not operate in isolated municipalities, and massacres send signals to different municipalities beyond the location where they happened. By aggregating the data at the province level, we overcome this issue. These are units bigger than municipalities and represent neighboring places with physical connections. Yet, they are smaller than departments where the sign of a mass killing could get lost over large territorial extensions.

Second, massacres did not have effects before their occurrence, or there were no anticipation of mass killings. Given the unexpected nature of a massacre, we think this is a realistic assumption. According to the literature, the population cannot fully predict mass killings and therefore change their behavior before a massacre (Ibáñez and Vélez, 2008; Steele, 2018).

Third, the treatment assignment was random, conditional on the observable covariates and the pre-intervention path of the outcomes. We found that this assumption is valid in our setting. That is, the previous levels of our outcomes (COVID-19 cases and mobility indices) did not affect the hazard ratio of observing a massacre. We tested the assumption by estimating a discrete-time hazard model using the method described by Jenkins (1995). We modeled the probability of having the first massacre at a given week as a function of province fixed characteristics and time-varying covariates in a duration dependence equation. We used the following specification:

$$h_{pt} = \exp(\beta' X_p + \gamma' L_{pt} + c_t) \tag{4.3}$$

Where h_{pt} is the hazard rate for having at least one massacre between February 15^{th}, 2020, and October 6^{th}, 2022. X_p includes time-invariant characteristics of each province. L_{pt} is a set of time-variable aspects measuring past COVID-19 levels and community mobility. c_t are week dummies that control for duration dependence.

5. Results

5.1. **Addressing the randomized treatment assumption.** Before showing the results from the ASMC model, we presented evidence supporting that the level of COVID-19 cases in the past did not predict massacres in the future (i.e., plausibility of conditional treatment assumption). By estimating Equation 4.3, Table 1, Column 1 shows that positive cases from one to four weeks ago did not explain the likelihood of having a massacre. The coefficient of previous infection levels was non-significant and close to zero.

An alternative hypothesis was that illegal groups acted when they perceived a rise in human movements. We tested this explanation by introducing average mobility levels at workplaces and parks before the first massacre. Table 1, Column 2 shows that the likelihood of mass killings did not increase more in places with high levels of commutes to workplaces than in areas with low trips to work. Similarly, we did not see a variation in the probability of having a massacre depending on lag trips to parks (Column 3 in Table 1).

We also tested the relation of massacres with other province-fixed characteristics. We found population size, density, and share of the rural population increased the probability of massacre. This evidence is going in line with our hypothesis that the illegal groups used massacres to control the population, and they used this type of violence to incentivize social distancing. Moreover, variables related to the presence of illicit activities, such as coca cultivation, trafficking routes, or gold exploitation, do not explain the incidence of a massacre. This rejects the possibility that we are capturing the incidence of unintended consequences of disputes for illegal economies (see Table 1). Finally, previous levels of victimization also do not explain the incidence of the massacres in our sample [21]. This fact shows the massacres observed were not a common practice before COVID, and the increase was not the result of groups performing regular activities before the pandemic.

All together, these results present that illegal groups did not choose to increase violence in response to high or low levels of COVID-19 transmission. Criminal groups acted as regulators of social interactions in the territory and used massacres as a tool to enforce social distance measures. The treatment was randomly assigned to provinces conditional on donor pool, observable covariates, and pre-massacre path of the outcome. Both pre-levels of infections and mobility were unrelated to massacres. Altogether, the evidence shows that the randomized treatment asscumption is valid in this setting.

5.2. **Results on community mobility.** Our first hypothesis was that illegal groups used massacres as signals to incentivize illicit stay-at-home orders and reduced mobility among community members as a strategy to prevent COVID-19 transmission. By estimating the SMC model in Equation 4.2, Figure 6 shows the difference in percentage change of human movements compared to the first weeks of 2020 between treated provinces and synthetic control pre- and post- the first massacre.[22] As evidence that the ASMC model created syntethtic controls similar to the treated unit, we do not find any difference in human movement between control and treated sub-regions before the first massacre. The left panel in Figure 6 shows a three percentage points decrease in trips to work when comparing places with and without massacres, but the decline is statistically significant after week 15. For travels to parks, we found a statistically significant decrease of three percentage points one week after the first massacre. Park trip reduction continued in the following weeks by about six percentage points (see the right Panel in Figure 6).

[21] The only exception is the previous massacres of illegal groups, BACRIMS. This variable seems to increase the probability of having a massacre.

[22] We built standard errors and confidence intervals using a Jackknife method (see Ben-Michael, Feller, and Rothstein, 2021b, sec 5.3).

We found a different story when we replicated the same exercise using the sample of high coca suitable provinces. Figure A.VI in the Online Appendix shows a non-significant increase in human movement compared with and without massacres. Our interpretation of the opposite effects in low and high coca suitability areas is that criminal groups balance controlling the population and keeping the earnings from illegal activities such as coca cultivation. People became more critical in non-coca-growing areas when coca leaves were not a reliable source of income. This maximization behavior is not unusual in the Latin American region. Brazilian criminal organizations, for example, encouraged some businesses to remain open since they needed them as a source of revenue while forbidding social events (Miagusko and Da Motta, 2021; Sampaio, 2021).

5.3. **Results on COVID-19 transmission.** We evaluated if the reduction in human movement translated to a decline in COVID-19 transmission. Figure 7 presents the estimated average difference in new cases per 100.000 inhabitants between provinces with massacres (treatment) and synthetic estimated areas (control). As a test that the control units from the ASMC model matched treated provinces, Figure 7 shows that the COVID-19 trend is similar in treated and synthetic units before the first mass killing.

Four mounts after the first massacre, treated sub-regions saw 35 cases per 100.000 per week less than control units. This result was considerable in magnitude. On average, 5 cases per 100.000 inhabitants by day is around half of the rate of infection observed in small provinces during the first months of the pandemic and one-quarter of the infection rate in big provinces in a period with a low transmission rate.

The nature of COVID-19 transmission explains the gradual reduction of cases after the first massacre and the delay to observe a decrease on aggregate levels. The positive test decreases came from declining trips to parks, a place with low transmission risk (Althouse et al., 2020; Tenforde, Fisher, and Patel, 2021). The restriction of human mobility to low-risk contagion areas slowly translated to a drop in the total number of cases.

5.3.1. *Effects by Age.* As heterogeneous effects, we tested the model for different age groups. Younger people were more likely to transmit COVID-19, while older people were more likely to die from the virus (Davies et al., 2020). In Figure 8, we estimated the difference in COVID-19 cases between sub-regions with massacres and synthetic control units by age. As a test that the ASCM mode built synthetic controls that correctly emulate treated provinces, we did not find any statistically significant effect in the six categories before the first massacre.

Overall, we found that the reduction in COVID-19 events after a mass killing comes from a statistically significant decline in cases of people aged 15 to 29 and 30 to 34 (on average, 30 cases and 50 cases per 100.000 inhabitants, respectively). We did not find a significant decrease in children from 0 to 14 years old and adults from 45 years old or older (see Figure 8). This result is congruent with our previous finding showing a reduction in travel to parks since people from 15 to 34 years old in general have more social activities and networks.

5.3.2. *Effect on Deaths.* We checked if the reduction in a positive test also translated into a decline in the CPVOD-19-related deaths. Figure 9 shows a non-statistically significant difference in fatalities between synthetic control and treated provinces. Only 20 weeks after the first massacres, we estimated a reduction of the daily rate of around 0.4 cases per 100.000 inhabitants.

We looked at the differential effects in mortality rate by age. As before, we also did not find any significant impact on COVID-19 deaths. We found only a slight decline in deaths in people 45 years old or older (see Figure A.VII in the Online Appendix).[23] This result implies that reducing virus transmission levels was insufficient to alter

[23] Estimation for younger groups was not informative, given the low mortality levels among young individuals.

COVID-19 death. Massacres affected the young population, who are less likely to die from the pandemic.

6. Robustness cheeks

The first robustness was a placebo time type. We argue that the principal purpose of massacres during the pandemic was to reduce human movement. However, was the decline in park trips a typical community response after a massacre? If it was, we could not claim that mass killings aim to reduce mobility in the pandemic. To test the alternative explanation that mobility typically decreases after a massacre, we replicated the estimation of changes in visits to parks after a mass killing in 2022.[24] Figure A.VIII in the Online Appendix shows that human movements did not change after the mass killings in between October 2021 and October 2022. This result shows that the illegal groups only used massacres to reduce mobility during the pandemic and other reasons motivated mass killings after the COVID-19 outbreak.[25]

The second robustness test validated if massacres affected the tracking of COVID-19 cases. If this were the situation, the observed lower COVID-19 cases in our main result was not a product of a reduction in disease levels but a decline in tests conducted to identify the illness. We conducted several experiments to evaluate this alternative explanation. As a result, Figure A.IX in the Online Appendix shows that the time to detect a new COVID-19 case was not different in areas with and without massacres. Figure A.X presents non-changes in the number of tests conducted at the deparment level in areas with mass killings.[26] Finally, Table A.IV shows no correlation between

[24]Two years after the first COVID-19 case in March 2022 and the lockdowns to control the pandemic in September 2020, Colombia has completely opened curfews and eliminated restrictions to prevent the spread of the virus.

[25]It is important to mention that this period includes general election camping and that, historically, these periods are characterized by high levels of violence and therefore and increase in the number of massacres.

[26]Colombia did not provide detailed data on the daily number of tests conducted at the municipality level. INS only sporadically updated data with municipal cumulative tests. We use data on daily tests performed and available from May 9^{th}, 2021.

COVID-19 testing, massacres, and victims in massacres. Based on these results, massacres do not affected access to COVID-19 tests.

The third robustness test validated if our results are consistent with a subsample selection. We estimated Equation 2 for only the sample of areas where human mobility data is available. As in the main results COVID-19 cases decreased more in provinces with massacres than without massacres (see Figure A.XI in the Online Appendix). The results were analogous to Figure 7 for all Colombian provinces and therefore we are not concern that sample selections and the lack of full information in mobility trends biased our results.

7. Conclusion

The COVID-19 pandemic drained the financial and operational resources of countries around the planet. Weak states faced the trade-off between fighting crime or containing the virus. In this context, illegal armies saw the pandemic as an opportunity to show power and become a viable alternative government. In the Colombian case, we observed how once the government dropped all the lockdowns to prevent the pandemic, criminal groups became the facto police to control the COVID-19 outbreak. But these police activities came with the use of massacres as a deterrence measure of social activities but not economic activities. Illegal groups aimed to contain the spread without hurting the economic activities that were the source of the funding.

We tested the effect of massacres between March 24^{th}, 2020, and March 31^{st}, 2021, on human movement and COVID-19 cases in areas. This period went from the first Colombian lockdown to one month before massive protests and riots in the country. We focused our analysis on regions with low coca cultivation to rule out that massacres were used to control illicit economies.

We used Augmented Synthetic Control Method (ASCM) to build a synthetic control unit that matches the pre-levels of cases and mobility of sub-regions with massacres.

Our findings showed that illegal groups used massacres to reduce mobility to parks but not workplaces. We found that these reductions translated into a modest fall in positive COVID-19 cases, but only after four months from the first mass killing. The decrease in cases came mainly from people between 15-44 years old, the population group with more social activities. Finally, the decline in mobility did not translate to a significant decrease in COVID-19 deaths.

Overall, we argue that the increase in massacres resulted from the absence of the legitimate state's effort to control the territory. With the presence of illegal armies, these groups saw an opportunity to gain the favor of local communities acting as pandemic containers in their territories. However, given their lack of information, they opted to use violence to deter the social gatherings that they considered dangerous for the spread of the disease. We proved that these measures were ineffective in containing the disease and preventing deaths. With this in mind, explaining the reasons for implementing or withdrawing curfews is essential to reduce the lack of information to justify violence against civilians.

After moving from pandemic to endemic, COVID-19 deepened poverty and vulnerable conditions, mainly in areas where illegal armies fight for the control population. In this context, a good explanation of government decisions is vital to avoid unintended consequences of public policies. Good communication will prevent illegal groups' use of these measures to justify the use of violence against civilians. Territorial control is not enough to reduce violence. The state must support its efforts to control territory with good relations with local communities that allow them to convey the logic behind its policies.

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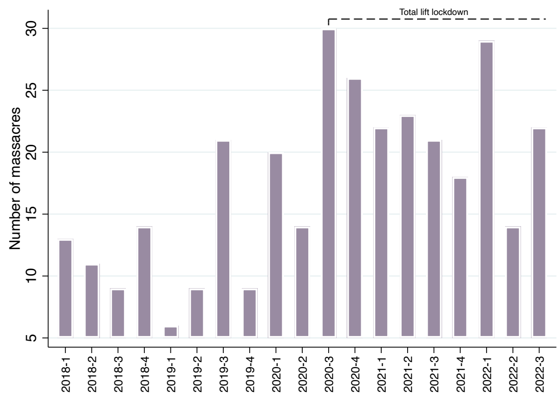
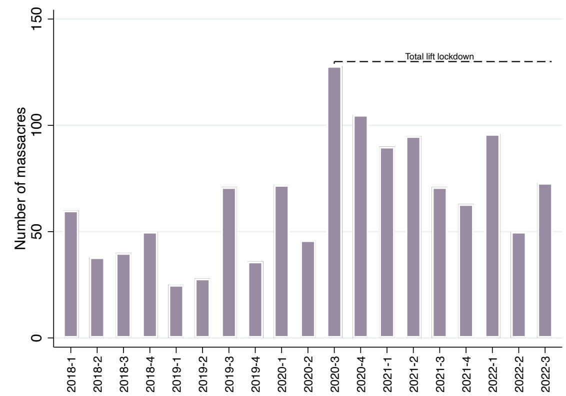
8. Figures and Tables

Figure 1. **Massacres and victims evolution**



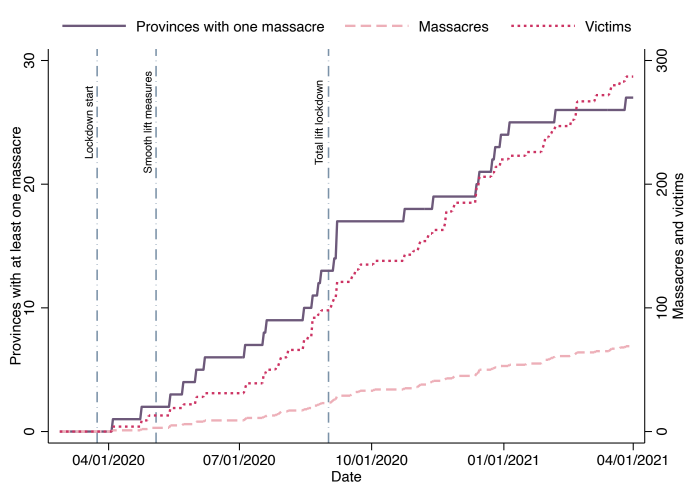
A. Total massacres



B. Total victims

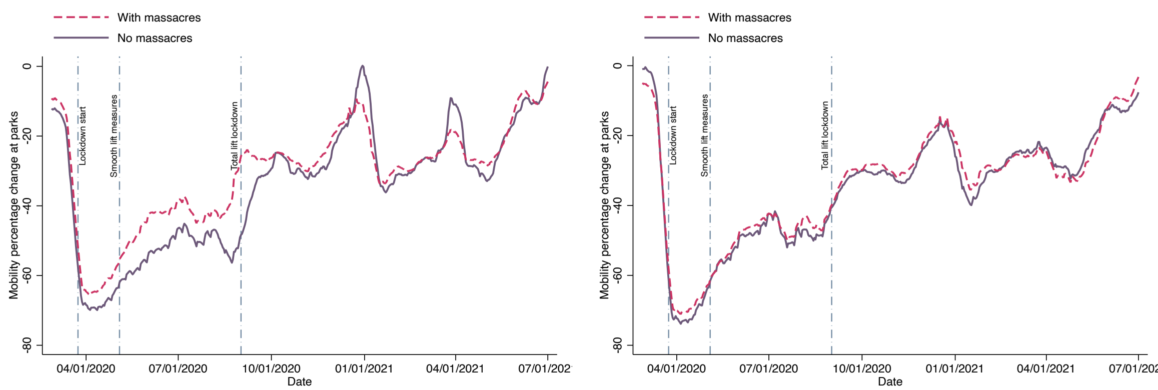
Notes: This graph shows the quarterly evolution of massacres between the first quarter of 2018 and the third quarter of 2022. Panel A shows the massacres, while Panel B shows the total number of civilians killed in those events.
Source: ACLED (Raleigh et al., 2010)

Figure 2. **Massacres evolution**



Notes: This graph shows the evolution of massacres in our sample (provinces with low coca suitability). On the left axis, we show the cumulative number of provinces that have experienced at least one massacre since the pandemic's beginning (March 24^{st} 2020). On the right axis, we show the evolution of the total number of massacres and victims over the same period.
Source: ACLED (Raleigh et al., 2010)

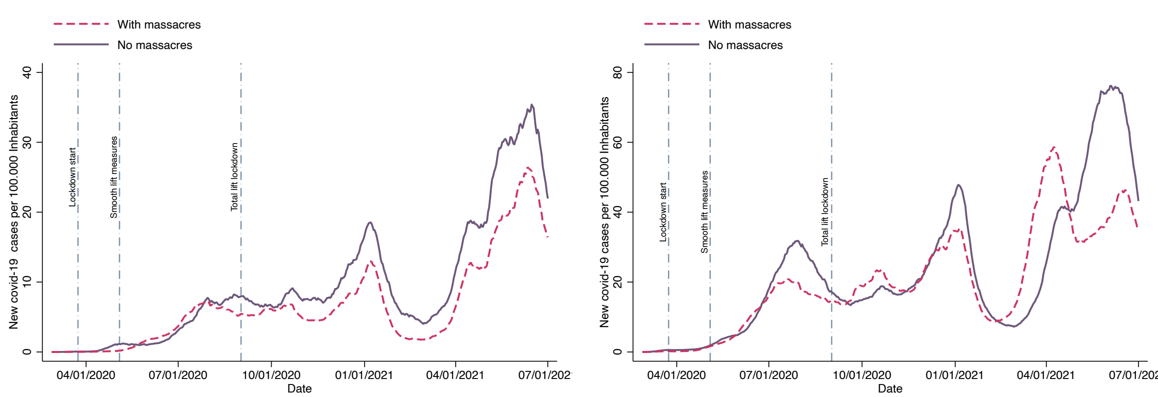
Figure 3. **Community mobility at workplaces by occurrence of massacres**



A. Small Provinces **B.** Big Provinces

Notes: This graph shows the evolution of community mobility at workplaces in our sample (provinces with low coca suitability) by province size. We define small provinces if the total population is below the 75th percentile of population distribution in the sample. For each province, we average the date weighting by the total population of each municipality; then, if there are gaps, we interpolate the data. Finally, we aggregate it by each group (with and without massacres), taking into account again the population of each province. We show 15 days mobile average in new COVID-19 cases per 100.000 inhabitants.

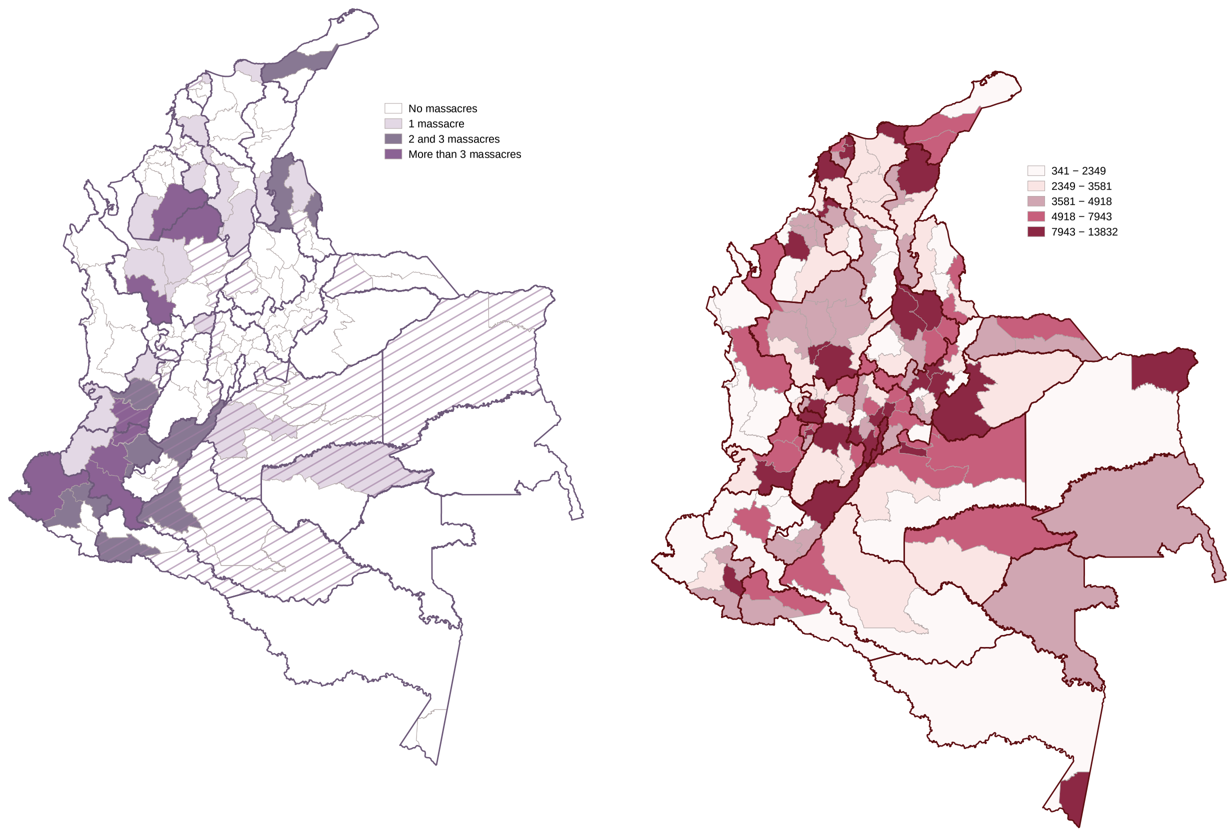
Figure 4. **COVID-19 new cases by occurrence of massacres**



A. Small Provinces **B.** Big Provinces

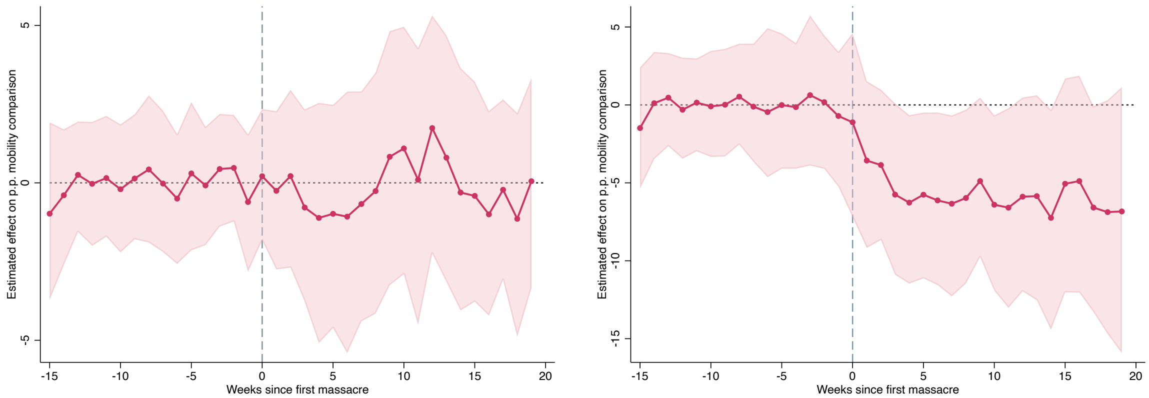
Notes: This graph shows the evolution of new cases in our sample (provinces with low coca suitability) by province size. We define small provinces if the total population is below the 75th percentile of population distribution in the sample. We show 15 days mobile average in new COVID-19 cases per 100.000 inhabitants.

FIGURE 5. **Spatial distribution of massacres and COVID-19 per 100.000 inhabitants**



Notes: The map on the left presents the spatial distribution of massacres from March 24^{th} 2020 to March 31^{st} 2021. Shaded regions represent places with high coca suitability. The map on the right shows the spatial distribution of cumulative COVID cases by September 30^{st} 2021.

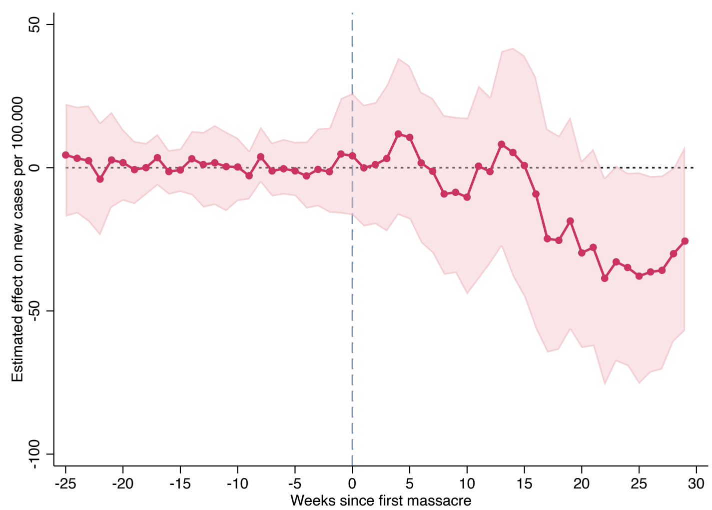
Figure 6. **Effect of a massacre mobility**



A. Workplaces **B.** Parks

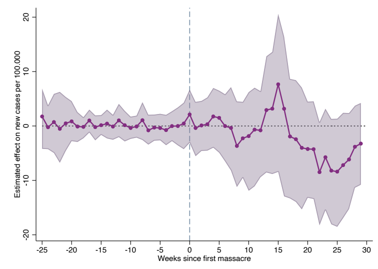
Notes: This graph shows the estimated difference in percentage change of community mobility compared to the first weeks of 2020 between treated provinces and synthetic control pre- and post- the first massacre. The sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval. For the workplaces parameter ν is 0.19. The scale imbalance coming from the average of treated units is 0.14 while coming only from treated units is 0.39. For the workplaces parameter ν is 0.18. The scale imbalance coming from the average of treated units is 0.18 while coming only from treated units is 0.37.

Figure 7. **Effect of a massacre on COVID-19 transmission**

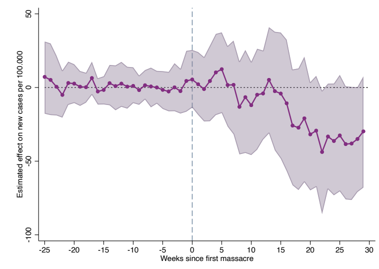


Notes: This graph shows the estimated difference in the number of new cases per 100.000 inhabitants between treated provinces and synthetic control pre- and post- the first massacre. The sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval. Parameter ν is 0.34. The scale imbalance coming from the average of treated units is 0.21 while coming only from treated units is 0.42.

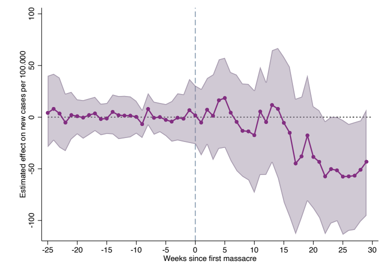
FIGURE 8. **Effect of a massacre on COVID-19 transmission by age**



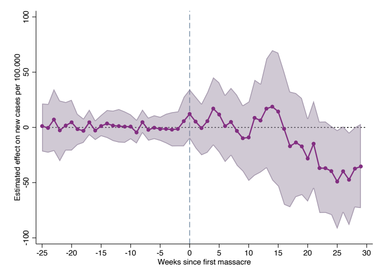
A. Age 0 to 14



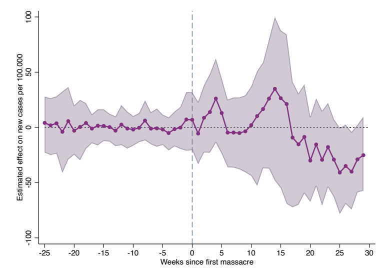
B. Age 15 to 29



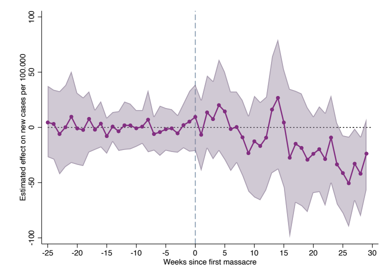
C. Age 30 to 44



D. Age 45 to 59



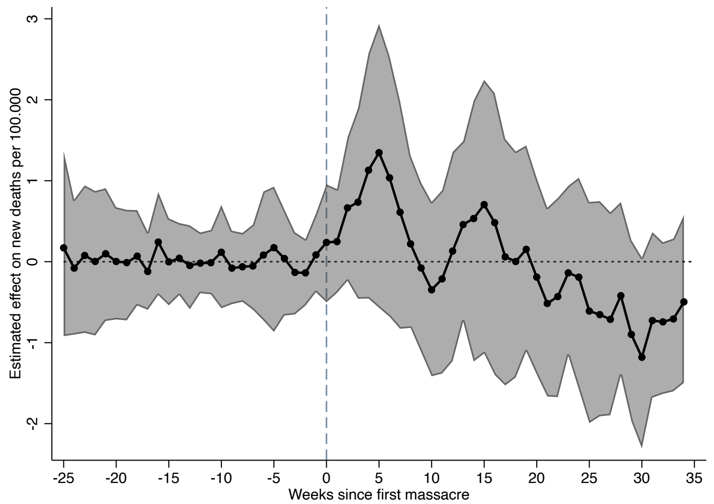
E. Age 60 to 74



F. Age more than 75

Notes: This graph shows the estimated difference in the number of new cases per 100.000 inhabitants between treated provinces and synthetic control pre- and post- the first massacre. The sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval.

Figure 9. **Effect of a massacre on COVID-19 related deaths**



Notes: This graph shows the estimated difference in the number of new deaths per 100.000 inhabitants between treated provinces and synthetic control pre- and post- the first massacre. The sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval.

Table 1. Discrete-Time Hazard Estimate of the Probability of Having at Least One Massacre

	Previous Cases	Adding Workplace Mobility	Adding Parks Mobility
	(1)	(2)	(3)
Time-varying covariates:			
Average cases $t-1$ and $t-2$	0.003	−0.000	0.001
	(0.005)	(0.006)	(0.005)
Average cases $t-3$ and $t-4$	−0.007	−0.003	−0.003
	(0.005)	(0.006)	(0.005)
Average percent change work mobility $t-1$ and $t-2$		0.009	
		(0.048)	
Average percent change work mobility $t-3$ and $t-4$		0.009	
		(0.046)	
Average percent change parks mobility $t-1$ and $t-2$			0.012
			(0.036)
Average percent change parks mobility $t-3$ and $t-4$			−0.005
			(0.037)
Fixed characteristics before 2018:			
Geographic			
Altitude (km)	−0.000	−0.000	−0.000
	(0.000)	(0.001)	(0.001)
Province area (100 km2)	−0.034	0.061	0.023
	(0.064)	(0.109)	(0.099)
Distance to main city (km)	0.006	0.001	0.001
	(0.005)	(0.006)	(0.007)
Density (inhabitants per km)	0.001*	0.001**	0.001**
	(0.001)	(0.001)	(0.001)
Basic socioeconomic			
Log populations	1.656***	1.481***	1.520***
	(0.337)	(0.451)	(0.393)
Share of women	22.656	−10.187	−2.370
	(31.250)	(42.193)	(48.067)
Rural share	3.668**	3.900*	5.151*
	(1.652)	(2.347)	(2.648)
Fiscal and state presence			
Total income per capita (Thousand CLP)	4.958	2.623	3.221
	(3.082)	(5.103)	(3.439)
Total expenditure per capita (Thousand CLP)	−5.944*	−4.673	−5.938
	(3.435)	(5.757)	(4.220)
Justice inefficiency index	0.740	6.237	8.395
	(6.512)	(7.296)	(8.591)
Total number of institutions	1.941	2.812	2.157
	(2.092)	(2.726)	(3.086)
Observations	3138	2261	2137
Duration dependence	✓	✓	✓

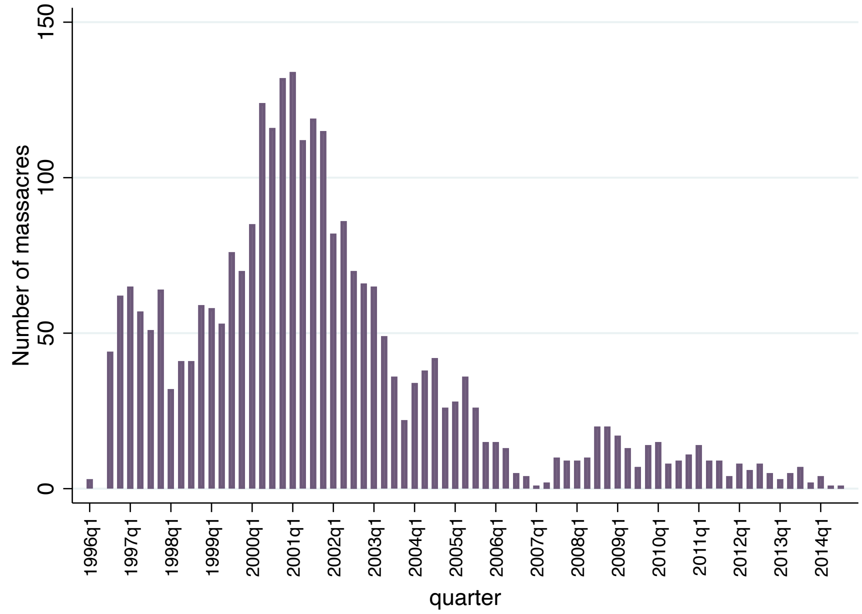
Continue...

	Previous Cases	Adding Workplace Mobility	Adding Parks Mobility
	(1)	(2)	(3)
Illegal resources			
Share of area suitable for coca	0.844	0.887	0.614
	(0.936)	(1.266)	(1.137)
Share area with gold exploration	3.888	0.884	1.611
	(3.619)	(5.168)	(5.406)
Share PNIS municipalities	1.353	0.710	−1.354
	(1.211)	(3.196)	(2.555)
Illegal trafficking routes	−19.096	−22.934	−27.319
	(15.191)	(18.650)	(18.022)
Violence and victimisation			
Farc presence	−3.027	−8.367	−3.936
	(4.339)	(12.475)	(7.392)
Other illegal group presence	−1.368	−0.575	−0.182
	(0.893)	(1.231)	(1.236)
Share expelled population	1.103	1.899	1.242
	(1.642)	(2.025)	(1.802)
Lands taking	0.133	0.042	0.173
	(0.376)	(0.531)	(0.481)
Lands abandoned	0.041	0.051	0.053
	(0.080)	(0.081)	(0.088)
Massacre victims: Guerilla	1.451	1.247	1.961
	(1.141)	(2.341)	(2.205)
Massacre victims: Paramilitary	5.823	−2.332	3.797
	(9.997)	(14.288)	(12.246)
Massacre victims: Bacrim	9.003**	10.234	10.771*
	(3.589)	(6.544)	(5.942)
Observations	3138	2261	2137
Duration dependence	✓	✓	✓

Notes: This table presents proportional hazard estimates for the sample of low-coca suitability provinces. Each column represents a separate regression. Column 2 adds previous work places mobility comparison. Column 3 adds previous parks mobility comparison. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

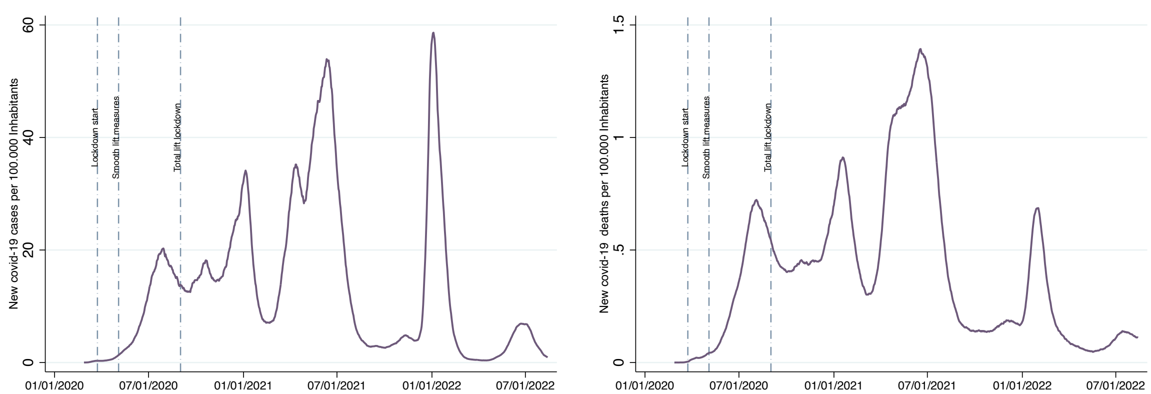
ONLINE APPENDIX

Figure A.I. **Massacres evolution 1996-2014**



Notes: This graph shows the quarterly evolution of COVID-19 in Colombia between 1996 and 2014. Source is Restrepo, Spagat, and Vargas (2004) original data and updated through 2014 by Universidad del Rosario.

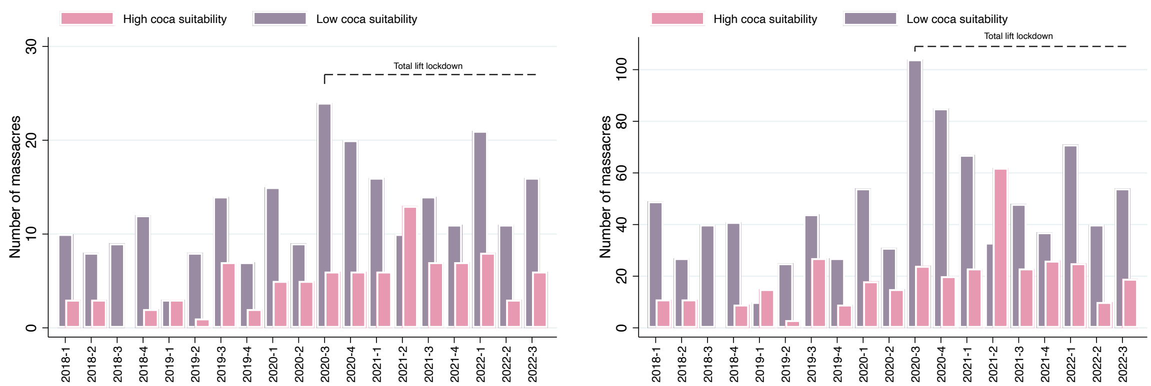
Figure A.II. **COVID-19 evolution**



A. New COVID-19 cases **B.** New COVID-19 deaths

Notes: This graph shows the evolution of COVID-19 in Colombia. The graph shows the number of new cases and deaths per 100.000 inhabitants. Numbers are the weekly moving average.

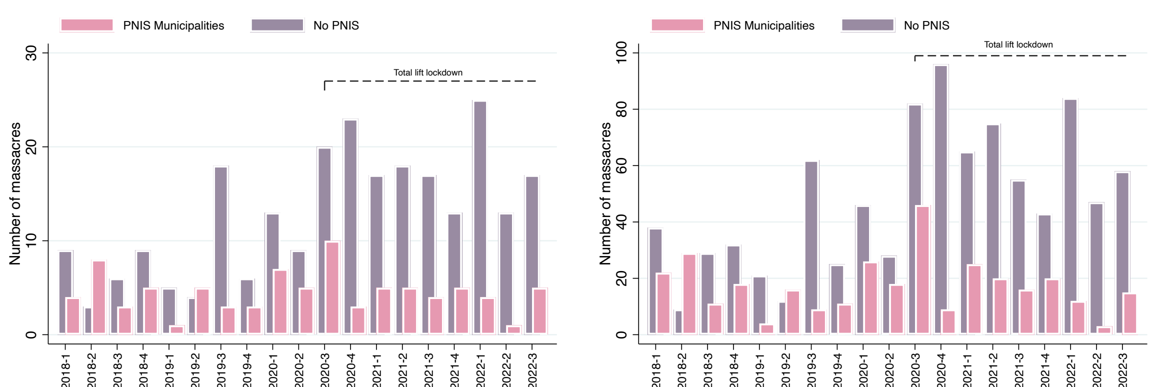
Figure A.III. **Massacres and victims evolution by coca suitability**



A. Total massacres **B.** Total victims

Notes: This graph shows the quarterly evolution of massacres between January 1^{st} 2020 and September 30^{th} 2022 according if the massacre occurred in a municipality with high coca suitability. Panel A shows the massacres, while Panel B shows the total number of civilians killed in those events.
Source: ACLED (Raleigh et al., 2010)

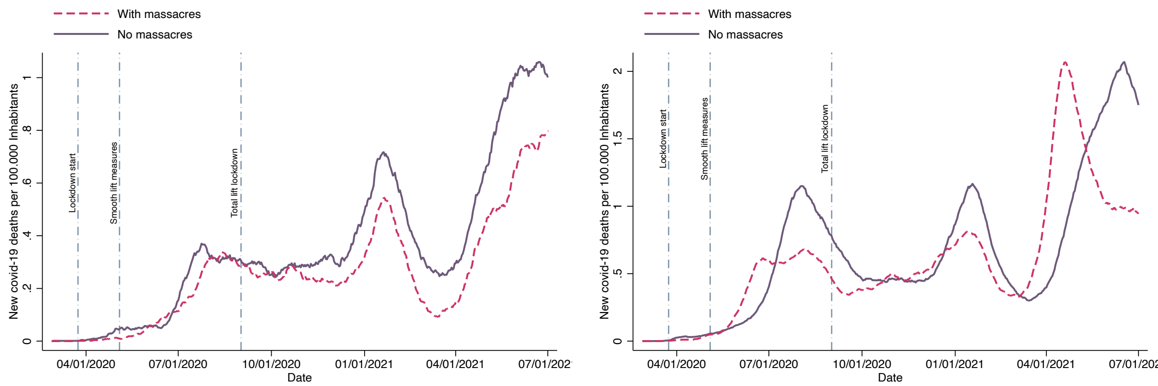
Figure A.IV. **Massacres and victims evolution by PNIS status**



A. Total massacres **B.** Total victims

Notes: This graph shows the quarterly evolution of massacres between January 1^{st} 2020 and September 30^{th} 2022 according if the massacre occurred in PNIS municipality. Panel A shows the massacres, while Panel B shows the total number of civilians killed in those events.
Source: ACLED (Raleigh et al., 2010)

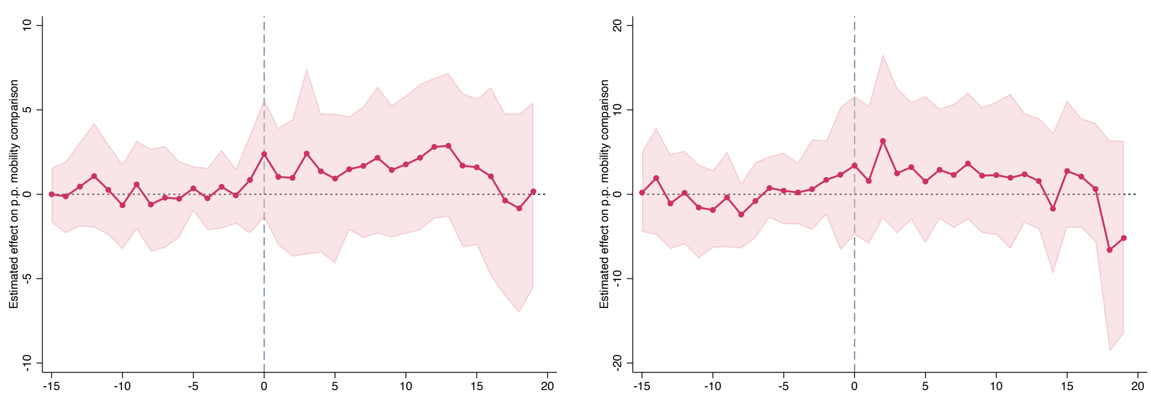
Figure A.V. **New deaths COVID by Occurrence of Massacres**



A. Small Provinces **B.** Big Provinces

Notes: This graph shows the evolution of new deaths in our sample (provinces with low coca suitability) by province size. We define small provinces if the total population is below the 75th percentile of population distribution in the sample. We show 15 days mobile average in death COVID-19 cases per 100.000 inhabitants

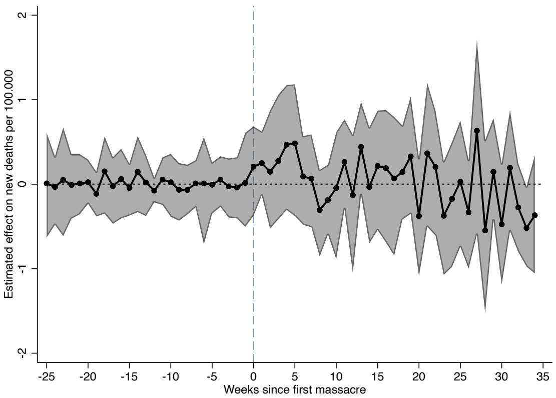
Figure A.VI. **Effect of a massacre on community mobility high coca suitable provinces sample**



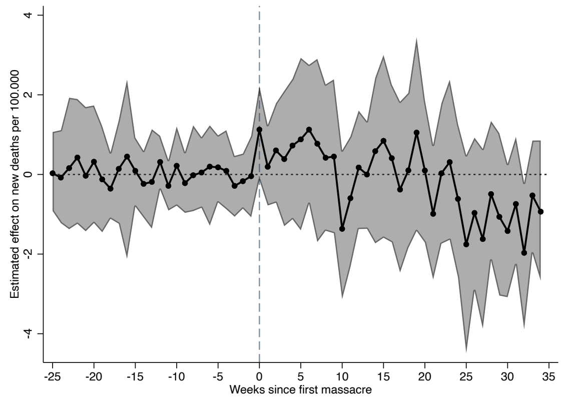
A. Workplaces **B.** Parks

Notes: This graph shows the estimated difference in percentage change of community mobility comparing to the first weeks of 2020 between provinces that have a massacre and synthetic control pre- and post- the first massacre. Sample includes only provinces with high coca suitability. The shaded region represents a 90% confidence interval.

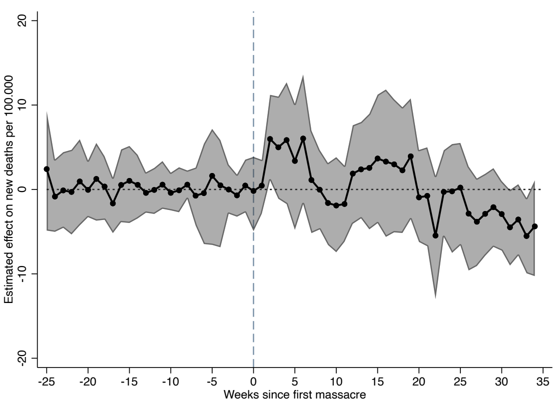
FIGURE A.VII. **Effect of a massacre on COVID-19 death by age**



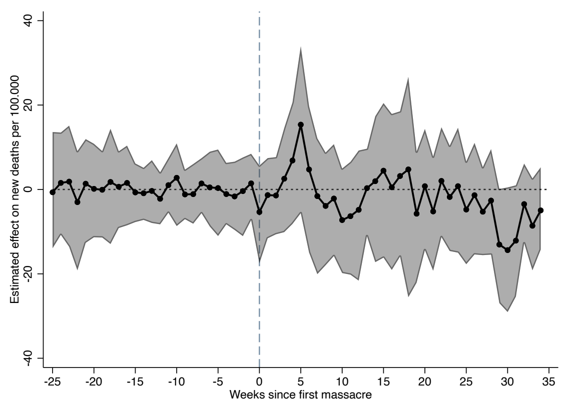
A. Age 30 to 44



B. Age 45 to 59



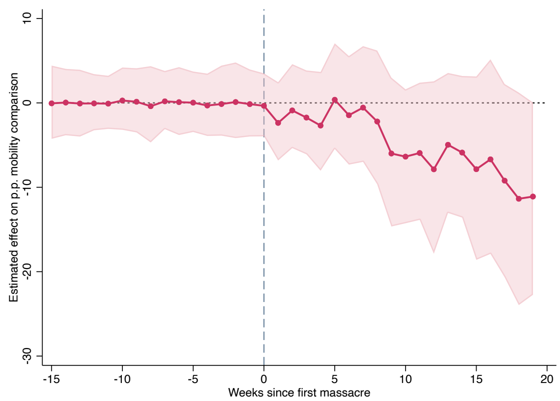
C. Age 60 to 74



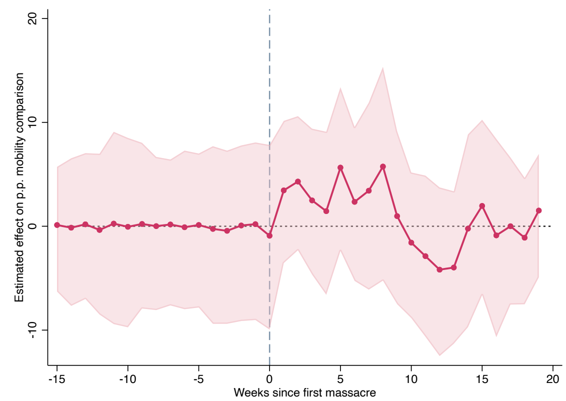
D. Age more than 75

Notes: This graph shows the estimated difference in the number of new deaths per 100.000 inhabitants between treated provinces and synthetic control pre- and post- the first massacre. The sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval.

Figure A.VIII. **Effect of a massacre in 2022 on community mobility**



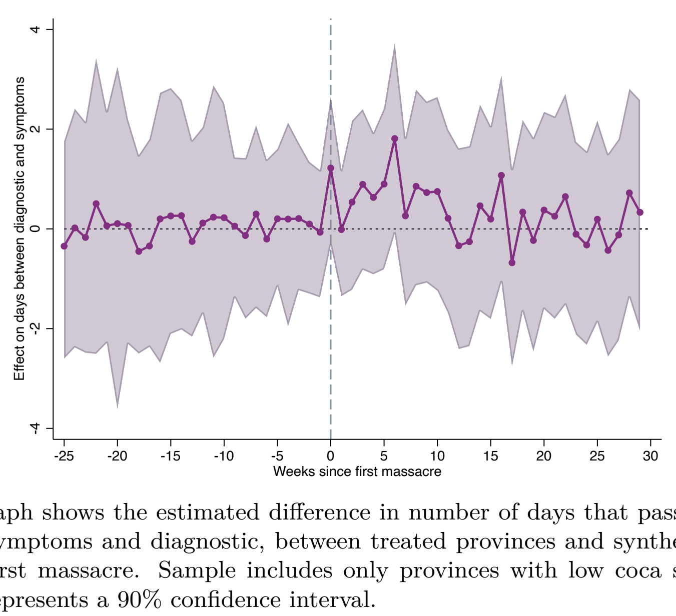
A. Workplaces



B. Parks

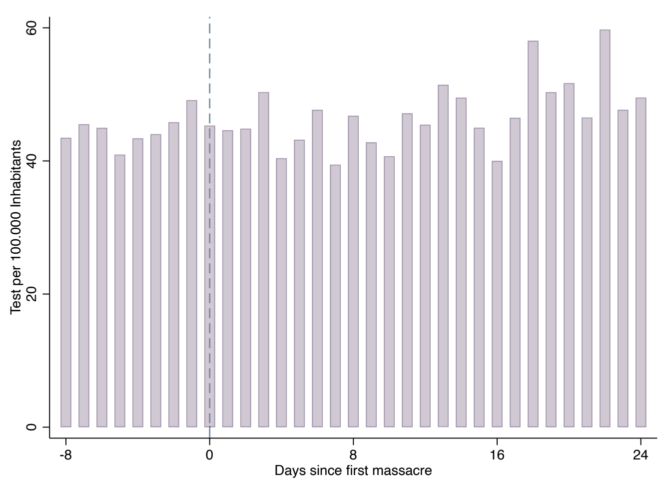
Notes: This graph shows the estimated difference in percentage change of community mobility comparing to the first weeks of 2020 between provinces that have a massacre in 2022 and synthetic control pre- and post- the first massacre. Sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval.

Figure A.IX. **Effect of a massacre on the gap between the day of first symptoms and diagnostic**



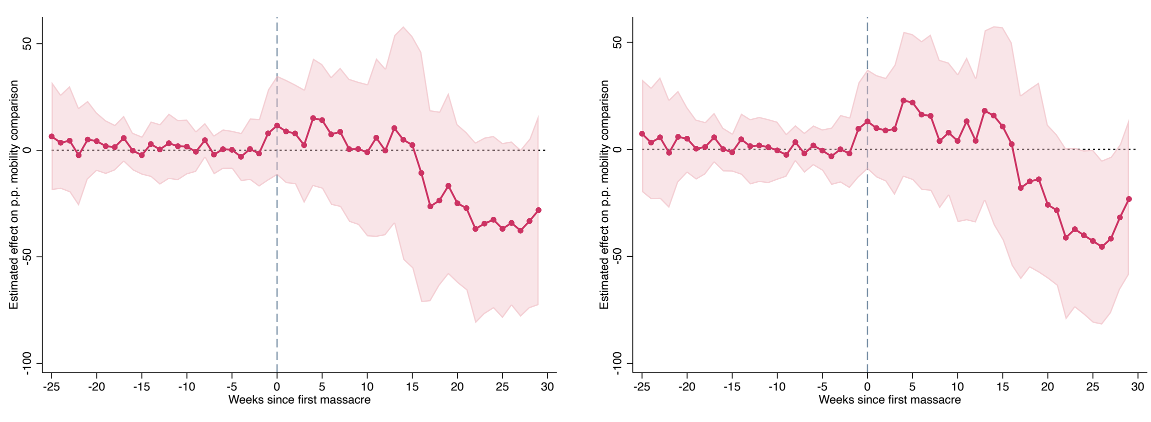
Notes: This graph shows the estimated difference in number of days that passed between the appearance of symptoms and diagnostic, between treated provinces and synthetic control pre- and post- the first massacre. Sample includes only provinces with low coca suitability. The shaded region represents a 90% confidence interval.

FIGURE A.X. **Test per 100.000 Inhabitants – Departments with massacres**



Notes: This graph shows the number of test conducted at departments that experienced a massacre in the days around the date of occurrence of a massacre.

FIGURE A.XI. **Effect of a massacre on COVID-19 transmission Regions with Google data**



A. Workplaces sample **B.** Parks sample

Notes: This graph shows the estimated difference in the number of new cases per 100.000 inhabitants between treated provinces and synthetic control pre- and post- the first massacre. The sample in the figure on panel A includes only provinces with complete information on workplace mobility. The sample in the figure on panel B includes only provinces with complete information on park mobility. The shaded region represents a 90% confidence interval.

Table A.I. **Variables and sources**

Variables	Definitions	Source
Number of massacres	Total number of massacres in the municipality.	The Armed Conflict Location & Event Data Project (ACLED) Raleigh et al. (2010)
Accumulated levels of infections	Total COVID-19 cases on one municipality	Instituto Nacional de Salud
Mobility at workplaces	Daily municipality movement variation at workplaces comparing visiting time in relation to a baseline day.	Google community mobility report -Google
Mobility at parks	Daily municipality movement variation at parks comparing visiting time in relation to a baseline day. Parks include places like local parks, national parks, public beaches, marinas, dog parks, plazas, and public gardens.	Google community mobility report -Google
Altitude	Average altitude of the municipality in meters above sea level.	Instituto Agustín Codazzi
Area	Area of municipality in square kilometres.	Instituto Agustín Codazzi
Distance to main city	Lineal distance to the Department capital for each municipality.	CEDE calculations based on Instituto Agustín Codazzi
Population density	Number of inhabitants per municipality square kilometre.	Instituto Agustín Codazzi, DANE.
Municipality total income	Total municipal GDP in Colombian pesos in 2018.	Sánchez, España et al. (2013) and DANE, 2005 census.
Total population	Total population of municipality.	DANE
Share of women	Share of female population in the municipality.	DANE
Share rural population	Share of population outside urban centres in the municipality.	DANE
Municipality total income	Total municipal income in Colombian pesos in 2018.	Sánchez, España et al. (2013) and DANE, 2005 census.
Municipality total expenditure	Total municipal expenditure in Colombian pesos in 2018.	Sánchez, España et al. (2013) and DANE, 2005 census.
Justice inefficiency index	Ratio of complaints against functionaries in the judicial branch to total complaints. Measured from 2000 to 2010	Inspector General (Procuraduria).
Number of institutions	Total number of municipality police post, courts registry offices, public phones services offices, health center and hospitals, schools, libraries, fire stations, public mail service offices, jails and tax collection offices. Measured in 1995	Fundación Social - Colombian NGO available in Acemoglu, García-Jimeno, and Robinson (2015)

Continue...

Variables	Definitions	Source
Share of area suitable for coca	Ecological time-invariant coca suitability measure using municipal geographic and weather characteristics.	Mejía and Restrepo (2015)
Area with gold exploration	Share of municipality area conceded for gold mining.	Instituto Agustín Codazzi
PNIS municipality	Indicator if the municipality some families participated in the coca substitution program.	United Nations Office on Drugs and Crime (UNODC).
PNIS municipality	Indicator if the municipality some families participated in the coca substitution program.	United Nations Office on Drugs and Crime (UNODC).
Illegal trafficking routes	Route optimization from rebel unit location and drug transit points using road networks	Raw data from Ministry of Defence. Calculation by Wright (2016)
FARC presence	Presence of FARC. Municipality with activities (e.g. attacks , clashes) of FARC between 2011 and 2012	Prem et al. (2022)
Other illegal groups presence	Presence of other illegal groups. Municipality with activities (e.g. attacks , clashes) of other groups not FARC between 2012 and 2014	Prem et al. (2022)
Share of expelled population	Total number of expelled population between 1984 and 2012.	Sistema de Información Geográfica para la Planeación y el Ordenamiento Territorial – SIGOT
Lands taking	Share of land area grabbing by violence under the register of Colombia authorities	Unidad Administrativa Especial de Gestión de Restitución de Tierras Despojadas UAE-GRTD
Lands abandoned	Share of land area abandoned after violence under the register of Colombia authorities	Unidad Administrativa Especial de Gestión de Restitución de Tierras Despojadas UAE-GRTD
Massacre victims: guerilla	Victims of massacres by guerilla groups 2000-2012	Universidad del Rosario and Restrepo, Spagat, and Vargas (2004)
Massacre victims: paramilitary	Victims of massacres by paramilitary groups 2000-2012	Universidad del Rosario and Restrepo, Spagat, and Vargas (2004)
Massacre victims: Bacrim	Victims of massacres by criminal emergent groups 2000-2012	Universidad del Rosario and Restrepo, Spagat, and Vargas (2004)

Notes: This table shows the source of variables we used at the municipality level (the minor level of disaggregation of the data). In our analysis, we aggregated these variables at the national level.

Table A.II. Descriptive Statistics: Time-invariant variables

	Mean	Std. Dev.	Min	Max
Geographic				
Altitude (km)	0.994	0.948	0.0	2.9
Province area (100 km2)	64.896	123.335	0.9	1023.9
Distance to main city (km)	78.444	59.860	0.0	325.5
Density (inhabitants per km)	149.411	492.627	0.2	3670.0
Basic socioeconomic				
Log populations	11.961	1.027	9.0	15.2
Share of women	0.498	0.015	0.4	0.5
Rural share	0.473	0.203	0.0	0.9
Fiscal and state presence				
Total income per capita (Thousand CLP)	1384.380	352.285	427.0	2497.3
Total expenditure per capita (Thousand CLP)	1450.031	376.034	400.9	2633.1
Justice inefficiency index	0.076	0.044	0.0	0.2
Total number of institutions	0.233	0.193	0.0	1.5
Illegal resources				
Share of area suitable for coca	0.375	0.314	0.0	1.0
Share area with gold exploration	0.027	0.056	0.0	0.3
Share PNIS municipalities	0.056	0.178	0.0	1.0
Illegal trafficking routes	0.009	0.025	0.0	0.2
Violence and victimisation				
Farc presence	0.013	0.073	0.0	0.6
Other illegal group presence	0.445	0.398	0.0	1.0
Share expelled population	0.173	0.215	0.0	1.1
Lands taking	0.352	0.640	0.0	4.0
Lands abandoned	1.759	2.296	0.0	11.1
Massacre victims: Guerilla	0.067	0.180	0.0	1.3
Massacre victims: Paramilitary	0.026	0.033	0.0	0.2
Massacre victims: Bacrim	0.034	0.076	0.0	0.5

Notes: The occurrence of massacres is measured as March 31^{st} 2021. COVID-19 variables measured as September 30^{th} 2021. Control variables measured before 2018.

TABLE A.III. Descriptive Statistics by massacres

	No Massacre	Massacre
Geographic		
Altitude (km)	1118.163	721.357
	(1001.701)	(763.309)
Province area (100 km2)	66.296	61.824
	(147.297)	(34.344)
Distance to main city (km)	76.325	83.093
	(55.607)	(68.905)
Density (inhabitants per km)	106.654	243.237
	(262.271)	(789.918)
Basic socioeconomic		
Log populations	11.730	12.468
	(0.957)	(1.004)
Share of women	0.497	0.500
	(0.015)	(0.013)
Rural share	0.486	0.444
	(0.195)	(0.220)
Fiscal and state presence		
Total income per capita (Thousand CLP)	1390.932	1370.002
	(362.670)	(332.857)
Total expenditure per capita (Thousand CLP)	1461.974	1423.823
	(385.277)	(358.789)
Justice inefficiency index	0.075	0.077
	(0.045)	(0.040)
Total number of institutions	0.228	0.244
	(0.156)	(0.258)
Illegal resources		
Share of area suitable for coca	0.340	0.452
	(0.314)	(0.306)
Share area with gold exploration	0.018	0.048
	(0.052)	(0.058)
Share PNIS municipalities	0.034	0.102
	(0.157)	(0.212)
Illegal trafficking routes	0.010	0.008
	(0.026)	(0.022)

Continue...

	No Massacre	Massacre
Violence and victimisation		
Farc presence	0.005	0.029
	(0.047)	(0.110)
Other illegal group presence	0.406	0.531
	(0.399)	(0.387)
Share expelled population	0.124	0.278
	(0.194)	(0.223)
Lands taking	0.265	0.543
	(0.518)	(0.825)
Lands abandoned	1.051	3.312
	(1.457)	(2.970)
Massacre victims: Guerilla	0.055	0.094
	(0.189)	(0.156)
Massacre victims: Paramilitary	0.018	0.045
	(0.022)	(0.044)
Massacre victims: Bacrim	0.024	0.055
	(0.072)	(0.082)

Notes: The occurrence of massacres is measured as March 31^{st} 2021. COVID-19 variables measured as September 30^{th} 2021. Control variables measured before 2018.

Table A.IV. Correlation test per 100 inhabitants with province characteristics

	All Provinces	Small Provinces	Big Provinces
	(1)	(2)	(3)
Geographic			
Altitude (km)	0.000	−0.001	0.003**
	(0.002)	(0.002)	(0.002)
Province area (100 km2)	−0.001***	−0.001***	−0.002*
	(0.000)	(0.000)	(0.001)
Distance to main city (km)	−0.107***	−0.078***	−0.090*
	(0.018)	(0.026)	(0.050)
Density (inhabitants per km)	0.006***	0.038*	0.004*
	(0.001)	(0.020)	(0.002)
Basic socioeconomic			
Log populations	7.176***	3.910***	8.378***
	(0.854)	(1.038)	(2.488)
Share of women	561.076***	293.077***	898.481***
	(85.016)	(103.296)	(251.904)
Rural share	−36.669***	−26.850***	−46.092**
	(5.536)	(7.986)	(18.927)
Fiscal and state presence			
Total income per capita (Thousand CLP)	0.010**	0.008	0.015**
	(0.005)	(0.006)	(0.007)
Total expenditure per capita (Thousand CLP)	0.007**	0.004	0.014**
	(0.004)	(0.004)	(0.006)
Justice inefficiency index	37.670	5.595	235.297***
	(35.128)	(34.614)	(89.886)
Total number of institutions	8.219	−4.013	34.731
	(7.387)	(3.256)	(26.616)
Illegal resources			
Share of area suitable for coca	−1.410	−0.944	−9.574
	(3.050)	(2.492)	(14.758)
Share area with gold exploration	5.651	10.059	−114.983
	(22.607)	(15.551)	(131.628)
Share PNIS municipalities	−3.582	−1.329	−48.085**
	(4.530)	(2.498)	(24.087)
Illegal trafficking routes	45.237	17.355	36.040
	(39.152)	(28.637)	(82.550)
Observations	116	87	29

Continue...

	All Provinces	Small Provinces	Big Provinces
	(1)	(2)	(3)
Violence and victimisation			
Farc presence	-4.440^{*}	-3.423^{***}	-294.940
	(2.567)	(0.686)	(309.648)
Other illegal group presence	7.273^{**}	-3.801^{*}	6.907
	(3.187)	(2.008)	(9.407)
Share expelled population	-13.380^{***}	-2.531	-43.222^{*}
	(4.686)	(2.177)	(22.663)
Lands taking	3.539	-1.328	3.646
	(2.675)	(1.184)	(3.638)
Lands abandoned	-0.262	-0.075	-2.721
	(0.440)	(0.253)	(2.274)
Massacre victims: Guerilla	-7.795^{**}	-3.430^{*}	-34.414
	(3.163)	(1.897)	(75.072)
Massacre victims: Paramilitary	-7.698	6.972	-152.490
	(23.712)	(14.346)	(143.954)
Massacre victims: Bacrim	3.947	3.259	74.135
	(11.361)	(6.917)	(239.581)
Observations	116	87	29

Notes: This table presents univariate regressions based on province characteristics controlling by department fixed effects. The occurrence of massacres is measured as March 31^{st} 2021. Column 1 presents estimated coefficient and standard errors from a regression for the number of test per capita in all provinces. Column 2 presents the same regression for small provinces and column 3 presents the regression for big provinces. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Appendix B. Qualitative evidence: Massacres and COVID-19

This section presents qualitative evidence of event descriptions in Raleigh et al. (2010). José Miguel Vivanco, Americas director at Human Rights Watch, stated that armed groups in different communities in Colombia have used violence to enforce their own regulations to curb the spread of Covid-19. He also highlighted that this harsh enforcement of control demonstrates the longstanding failures of the state to provide adequate protection to vulnerable communities in remote regions of the country.

- On April 27^{th}, 2020, armed men from a FARC Dissident group threw a grenade, shot and killed three men, and injured four others in Cauca. According to reports, a flyer signed by the FARC circulated in the previous days in which they threatened people who did not respect the quarantine imposed to prevent the spread of coronavirus.
- On May 14^{th}, 2020, unidentified armed individuals killed three men inside a house in Cauca. The attack's motive is unknown, but in previous days, neighbors received death threats for those who broke the obligatory isolation implemented during the coronavirus outbreak.
- On August 10^{th}, 2020, two students, aged 12 and 17, were killed in the town of Leiva (Nariño) as they were on their way to school to hand in homework, as there were no in-person classes due to the Covid-19 quarantine.