When the State steps down: evidence from Police Strikes in Brazil.*

André Mancha[a]

[a] *Insper - Institute of Education and Research, Rua Quata, 300, Sao Paulo, Sao Paulo, Brazil*

Abstract

Criminal gangs exert a central role in escalating violent crimes in weak states. In this paper, I investigate how criminal gangs exploit police strikes to attack rival groups. To shed light on the mechanism behind these gang conflicts, I devise a theoretical model and test its implications using a novel database combining violent deaths, police strikes, reported gang presence, and victims' identification. In the first days of a police strike, homicides increase 45% on average in Brazilian states, and in a differences-in-differences design, I find that deaths of suspected gang members account for at least 66% of the deaths in neighborhoods disputed by organized criminal groups. Facing the state's absence, a drastic shift in the probability of police intervention led criminal gangs to intensify conflicts in contested turfs.

Keywords: Economics of Crime, Criminal Gangs, Police Strikes

1. Introduction

Large-scale violence involving organized crime presents a significant challenge to law enforcement agencies, and the success in countering such criminal activities depends on how state agents and police forces interact with drug trade organizations (Trejo and Ley, 2020, Arias, 2006). However, the effectiveness of state interventions in reducing violence remains unclear, as they may unintentionally exacerbate violent outcomes by stimulating rival gangs' attempts to gain control of territories, especially in the aftermath of a police crackdown (Dell, 2015). Moreover, while previous

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research has predominantly focused on the effects of increased police presence on crime (Magaloni et al., 2020), little is known about the consequences of abrupt reductions in policing on criminal organizations. Specifically, it is unknown whether criminal gangs would exploit a decrease in police surveillance to regain control over drug trafficking turfs or to initiate violent attacks against rival groups.

This paper fills this gap in the literature by investigating the link between police surveillance and gang conflicts, focusing on the impact of policing on gang-related homicides in Brazilian states. Using police strikes as a natural experiment, I leverage the exogenous variation in surveillance to identify the causal impact of police presence on violent crime in areas where criminal gangs are competing for territory. Illegal markets are characterized by difficulties in assigning property rights and enforcing agreements (Schelling, 1971, Buchanan, 1973), which frequently result in violence being the primary option for criminals seeking to protect and expand their turf (Magaloni et al., 2020). In this setting, the threat of police intervention in gang conflicts may discourage some disputes that would otherwise have occurred.

Given Brazil's position as a top supplier of cocaine to Europe (REUTERS, 2020), controlling drug trafficking routes is critical to the success of any drug trade organization (DTO) (Calderón et al. (2015), Lessing (2017)). Specifically, the North and Northeast regions of Brazil are particularly strategic to DTOs as they serve as logistic hubs for drugs produced in neighboring countries. In this context, the impact of gang conflicts and increased levels of violence in disputed areas is a pressing concern for state authorities. In this paper, I focus on the conditions that police strikes may escalate the violent outcomes of drug trafficking disputes, specifically in cases where DTOs perceive a reduction in police surveillance as an opportunity to attack their rivals aiming for a hegemonic position in contested areas.

I test the link between reduced police surveillance and gang-related homicides with a novel dataset combining daily homicides and police strike events from 2000 to 2020. I focus on homicides following police strikes across states in Brazil to investigate if violent deaths increased more in regions disputed by criminal gangs. Regarding the identification of gang-disputed territories, I leverage media reports and socioeconomic information to define areas where there is arguably a high incidence of gang conflicts. For the state of Ceará, I assess more granular data at the district level that allows for identifying areas with reported gang presence within a municipality and also checking the criminal records of victims.

Overall, Brazilian states affected by Military Police strikes report 45% more homicides in these events, and deaths are mostly caused by firearms used in public spaces. Furthermore, I show in a differences-in-difference approach that gang-disputed territories in Ceará are disproportionately affected with a 69% increase in daily homicides, for which suspected gang members account for at least 66% of the victims. There is no evidence of increases in other types of death or a previous upward trend in homicides before the strike, which rules out the possibility of a generalized increase in violence before the event. Last, I do not observe the same increase in violent deaths in Ceará following a police strike that occurred in the context of a single hegemonic criminal gang, which reinforces the relevance of gang competition to understanding a huge increase in homicides during these events.

To shed light on the mechanisms driving my results, I present a model drawing from previous literature on conflicts (Powell, 2006) that demonstrates how criminal gangs start a war when there are shifts in the expected payoff of confrontation. I use my theoretical model to investigate when DTOs decide to attack a rival following police strikes, which in this framework decreases confrontation losses given a reduction in the probability of police intervention. If a criminal group chooses to accommodate instead of fighting, the rival can use the opportunity to attack first. Therefore, a larger expected payoff of confrontation and the inability to commit make gangs choose to fight rather than be accommodating.

My findings contribute to the literature on state presence and organized crime (Arias, 2006, Calderón et al., 2015, Dell, 2015, Lessing, 2017, Magaloni et al., 2020, Blattman et al., 2021) by providing new evidence on the impact of police patrols on crime. I leverage a natural experiment to present robust evidence that reductions in police patrols can have a significant effect on crime (Andenaes, 1974, Takala, 1979, White, 1988, Sherman and Eck, 2003, Cardoso and Resende, 2018, Piza and Chillar, 2021). Specifically, I show that this effect may be distinct from the traditional deterrence and incapacitation effects of policing (Becker, 1968, Ehrlich, 1981), as reductions in patrols may have broader impacts on crime through other channels. Therefore, I extend the existing literature by highlighting that reduced police presence may trigger violent gang conflicts when DTOs pose a serious threat to the state. Overall, this paper shed light on the relevance of considering the broader socioeconomic context in which changes in police surveillance occur[1].

Last, my findings also contribute to a broader literature on the effect of police on crime (Levitt, 1995, 2002, McCrary, 2002, Di Tella and Schargrodsky, 2004, Klick and Tabarrok, 2005, Draca et al., 2011), specifically in the context of organized criminal groups. While previous research has used instrumental variables and terrorist attack-related events to examine the impact of increased policing on crime, they have not addressed the challenges posed by criminal organizations. These studies

[1]Similarly, White (1988), shows that the social tension between the upper and working class contributed to the increased violence during the Boston police strike in 1919.

have typically focused on contexts where gang conflicts are uncommon, such as after a terrorist attack where police deployment is concentrated in specific locations. In contrast, my findings provide rigorous empirical evidence about the effect of police presence on crime in an environment of intense gang confrontation and lethality. My research offers new insights into the role of police in deterring property and violent crimes in these complex settings.

The remainder of this paper is organized as follows. Section 2 presents an overview of police forces and criminal gangs in Brazil. Section 3 introduces the conceptual framework and some comparative statistics exercises. I introduce the data and describe the empirical strategy in Section 4. Sections 5 and 6 present the main results, such as sensitivity and robustness checks. Section 7 concludes.

2. Criminal Gangs, Police Strikes, and Violent Deaths in Brazil

2.1. Gangs at War (Brazil, 2016-2020)

The Brazilian drug trade is dominated by two criminal organizations, "*Primeiro Comando da Capital*" (PCC) and "*Comando Vermelho*" (CV), which have historically hold a non-compete agreement. However, in mid-2016, PCC started an expansionary plan to control drug trafficking on the Brazil-Paraguay border, disrupting the agreement with CV and inciting a series of gang conflicts throughout the country (ELPAIS, 2016). To keep control of strategic regions, PCC and CV formed alliances with local gangs in the North and Northeast of Brazil, such as the "*Família do Norte*" (FDN) and "*Guardiões do Estado*" (GDE). The case of GDE in Ceará is noteworthy as its rapid growth was supported by PCC[2].

The growth of GDE and increased competition in drug trafficking faced resistance from CV, leading to intense conflicts in peripheral areas of Fortaleza, the state capital. This turf war has had devastating consequences for the citizens of Ceará, as the gangs regulate district traffic hours, forcibly remove people from their homes, and punish civilians suspected of being informants or associated with rival gangs. As a result of these gang conflicts, as both groups have recruited a large number of soldiers inside and outside of prisons, violent deaths have sharply increased in recent years (FOLHA, 2018).

[2]Documents intercepted in an investigation conducted by the State Secretary of Penitentiaries (link) show that the constitution of GDE occurred on January 1, 2016, and it estimates that almost 20 thousand prisoners joined the criminal organization (about 70% of the prisoners of Ceará) in a process called *"batismo"* (baptism). Even as an independent group, the gang leadership has settled a temporary agreement to have PCC as an ally and drug supplier.

2.2. Strikes of Police Forces in Brazil (2000-2020)

The Brazilian public security system is a complex structure comprising various branches of law enforcement, including the Federal Police, State Police, and Municipal Guards. The State Police is responsible for street patrol and criminal investigations, with the Military Police handling surveillance and repression of criminal acts and the Civil Police conducting investigations.

According to the Federal Constitution, police forces, including the Armed Forces and Military Police, are prohibited from going on strike. This prohibition was extended to the Federal and Civil Police by a Supreme Court ruling in 2017. The reasoning is that police forces provide an essential service to society that cannot be interrupted, as it would expose civilians to danger. Despite this legal restriction, there have been numerous police strikes in different Brazilian states since 2000, primarily demanding improved wages, benefits, and working conditions. Strike-participating police officers may face administrative prosecution and military crimes, but most are eventually pardoned as part of agreements to restore police patrols.

Moreover, the occurrence of police strikes in Brazil is set against a backdrop of high levels of criminal activity and a sky-high rate of homicides. In 2020, the country had over 50,000 intentional violent deaths, an average rate of 23.6 homicides per 100,000 inhabitants (FBSP, 2021). Brazilian cities have been identified as some of the most violent places in the world regarding homicides per 100,000 people, with Caucaia/CE, Feira de Santana/BA, and Cabo de Santo Agostinho/PE being particularly concerning. Although the motivations behind most homicides are unclear, there is some evidence pointing to the interplay between gang conflicts and violent deaths (da Silva Lopes and Ferreira, 2021).

3. Conceptual Framework

This section presents a conceptual framework to explain how a decline in the probability of police intervention increases the expected payoff in gang conflicts, leading criminals to choose violence over accommodation. In periods of reduced police patrolling, gangs may use violence to expand their territories. Despite the high costs of such conflicts, the absence of police intervention creates a strong incentive to conquer contested drug-trafficking territories. Therefore, sudden shifts in surveillance, such as police strikes in Brazil, can have a significant effect on increasing violent deaths by fueling the escalation of criminal gang disputes. Understanding the dynamics of gang conflicts in the absence of effective law enforcement can provide valuable insights into designing policies to reduce gang-related violence.

3.1. The conceptual setting

In areas where multiple criminal organizations coexist, conflicts over drug trafficking control are almost inevitable. The absence of enforceable property rights and contracts prevents gangs from committing to a stable territorial division (Levitt and Venkatesh, 2000). These groups may use violence to attack rivals and expand their turfs, which may lead to police intervention in these contested territories. Specifically, the military police respond to shootings in gang turfs by mobilizing officers to prevent further violence and protect civilians. However, during periods of reduced police capacity, criminals may perceive a lower probability of intervention and exploit the opportunity to attack their rivals without police interference.

The occurrence of police strikes in Brazil leads to a significant reduction in police patrolling, which is highly visible to criminals due to widespread media coverage. Despite their short duration of a few days on average, these strikes can have a profound impact on the incentives of criminal gangs fighting for the control of drug trafficking. Consequently, it is expected that such strikes may trigger an increase in gang conflicts within territories contested by these groups. This, in turn, is likely to result in a higher incidence of violent deaths in these regions, particularly among individuals associated with criminal activity and drug trafficking.

3.2. Theoretical Model

I propose a novel model that builds on the works of Fearon (1995) and Powell (2006) to analyze the dynamics of criminal gang conflicts. They focus on civil wars and ethnic conflicts, where the inability to commit to a territorial division may lead to war when there are abrupt shifts in the balance of power. I extend the model proposed by Powell (2006) for the context of criminal gangs and to account for the role of the police as a third player in gang conflicts. I show how this third player affects the decision to start a war, even when there is no change in the balance of power across gangs. My model emphasizes the relevance of exogenous shifts in the probability of police intervention that may trigger violent gang conflicts[3].

In the context of drug trafficking, two gangs, "A" and "B" compete over a flow of benefits or "a pie" valued "V" within a given area. The Military Police, represented by a player "C" intervenes when violent gang conflicts occur. In this setting, gangs A and B share the pie into Q_A and Q_B, respectively, where $Q_A + Q_B = V$, excluding the possibility of a Pareto improvement. In each period, gangs can choose to use violence to secure a payoff $D_g(t)$, but this action is costly and depletes the gang's

[3]In Appendix B I show extensions of the model to account for multiple periods and the possibility of bargaining.

resources, including weapons, soldiers, and supplies. If in time t a gang decides to break the original status quo division and use violence to fight for a monopolistic position it obtains:

$$\begin{aligned} D_g(t) &= (p_g * V) + (1 - p_g) * 0 - L_g - (p_C * L_C) \\ &= (p_g * V) - L_g - (p_C * L_C) \end{aligned} \tag{1}$$

Where p_g is the probability that a gang $g = A,\ B$ achieves a monopoly over the contested territory after spending the resources L_g. For the sake of simplicity, I assume $p_A + p_B = 1$. If A chooses to run after the beginning of a war, the gang reduces confrontation damages, but it also loses the future flow of trafficking rents. To simplify this scenario, I assume a zero payoff when gang g is defeated with probability $(1 - p_g)$, no matter if this gang chooses to fight or run away. Last, I consider a probability p_C of police intervention that causes additional losses in criminal conflicts.

Therefore, gang g obtains at least $D_g(t)$ if it decides to fight, which is the minimum payoff in any equilibrium. Under these conditions, a gang decides to attack the rival when the expected payoff of a conflict is larger than the benefits from the current *status quo* division:

$$D_g(t) > Q_g(t) \tag{2}$$

Regarding the possible equilibrium in a setting with criminal gangs $g = A,\ B$, Equation 2 indicates four possibilities to a given probability of police intervention p_C:

1. $(D_A(t) \leq Q_A(t);\ D_B(t) \leq Q_B(t)) \rightarrow (A$ chooses *"Peace"*; B chooses *"Peace"*$)$
2. $(D_A(t) \leq Q_A(t);\ D_B(t) > Q_B(t)) \rightarrow (A$ chooses *"Peace"*; B chooses *"War"*$)$
3. $(D_A(t) > Q_A(t);\ D_B(t) > Q_B(t)) \rightarrow (A$ chooses *"War"*; B chooses *"War"*$)$
4. $(D_A(t) > Q_A(t);\ D_B(t) \leq Q_B(t)) \rightarrow (A$ chooses *"War"*; B chooses *"Peace"*$)$

The effective deterrence of gang conflicts is largely dependent on the parameters of confrontation costs (L_A, L_B) and the probability of police intervention (p_C) in my model. When these parameters reach a certain threshold, the majority of the time, both gangs A and B will choose to maintain *"Peace"*. To investigate the effect of police strikes on the behavior of criminal gangs, I focus on the conditions that shifts in p_C may stimulate one or both gangs to choose for attacking their rivals. By examining this mechanism, I aim to shed light on the interplay between police and gang violence.

3.2.1. The Decision to Start a War

In areas where gangs hold significant power and influence, military police strikes can have a deep impact on the dynamics of criminal activity. By reducing the perceived threat of police intervention, represented by the variable p_C, these strikes decrease potential losses in gang conflicts. Combining Equation 1 and 2, it is possible to assess how changes in the probability of police intervention p_C trigger violent conflicts:

$$\begin{aligned} (p_g * V) - L_g - p_C * L_C &> Q_g \\ p_g * \frac{V}{L_C} - \frac{(L_g + Q_g)}{L_C} &> p_C \end{aligned} \tag{3}$$

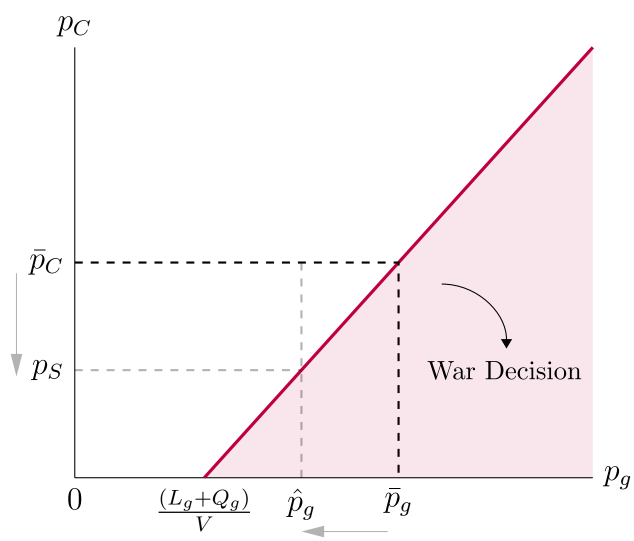
Equation 3 indicates the conditions under which a gang will initiate a conflict, given a particular combination of victory probability (p_g), conflict losses (L_g, L_C), and turf control (Q_g). In light of this equation, Figure 1 offers a visual representation of the impact of police intervention on the decision-making process of gangs A and B. Given the probability of police intervention $\bar{p}_C$, the decision to engage in war is contingent on a victory probability surpassing $\bar{p}_g$.

Hence, in a scenario where two rival gangs, A and B, share equal territorial control and face identical expected conflict losses, the gang with a larger p_g is predisposed to initiate a conflict with the opponent at a specific level of police intervention. This feature is illustrated by the shaded region in Figure 1, which depicts the decision threshold for a gang to start a war, given the probability of police intervention. At certain combinations of variables ($\bar{p}_C, L_g, Q_g$), if a criminal gang with $\bar{p}_g$ chooses to initiate a conflict, then any rival gang with $p_g > \bar{p}_g$ would also choose war. These findings suggest that gang violence is affected not only by the level of police intervention but also by the relative power distribution and strategic calculations of both gangs

3.3. Police Strikes

How do shifts in the probability of police intervention affect the decision of a criminal gang to start a war? In this paper, I am interested in the response of drug trade organizations (DTOs) to police strikes that arguably decreased conflict losses. I show in Figure 1 that a decrease in the probability of police intervention to p_S results in a corresponding decrease in the minimum probability of victory necessary for a gang to decide to initiate a war. Consequently, given the same parameters, (L_g, Q_g), gangs that would not have initiated a war under the standard level of police intervention $\bar{p}_C$ may now choose to engage in conflict following a police strike.

Figure 1: A Theoretical Model for Gang Conflicts



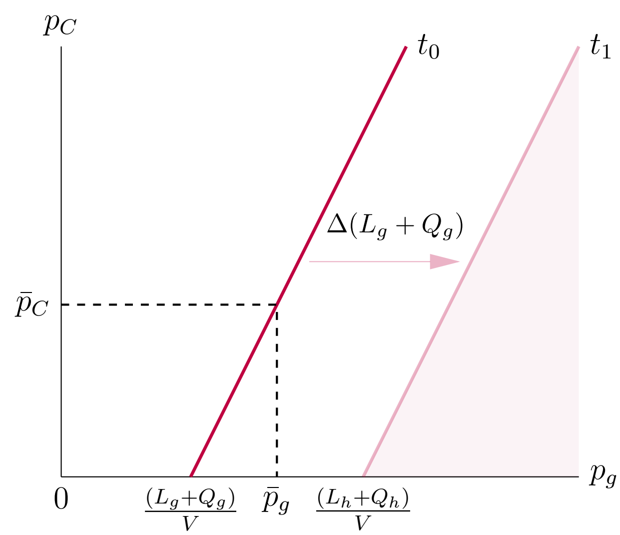
Notes: The dashed area shows when a gang decides to start a war. **(I.)** To some $(\bar{p}_C, L_g, Q_g)$, if a gang g with probability of victory p_g starts a war, any gang with $p_h > p_g$ also decide by the conflict. **(II.)** A decrease in the probability of police intervention from $\bar{p}_C$ to p_S reduces the minimum probability of victory for which a gang g decides to start a war.

Equation 3 and Figure 1 provide some insights regarding the mechanisms that drive increased gang conflicts following reductions in police patrolling. A police strike amplifies the perceived gains from engaging in a conflict, compelling gangs to attack the rival even in situations where territory is evenly split. Furthermore, if the decrease in the probability of police intervention reaches a lower critical threshold, and criminal organizations suffer comparable losses in conflicts, even groups with a small probability of victory will choose to start a war.

3.3.1. Comparative Statics

Now I will show some comparative statics exercises. First, I present the effect of a shift in conflict losses and turf control on the decision of a gang to start a war, and second, the possible equilibrium following police strikes when the distribution of power between gangs is unequal. In both exercises I consider only the case of an interior solution, that is, when $(p_c, p_g, L_g, Q_g, V) > 0$.

Figure 2: Shifts in Conflict Losses and Territory Control



Notes: The dashed area shows when a gang decides to start a war after a positive shift in conflict losses and territory control. **(P3)** The higher the conflict costs fewer the combinations of p_c and p_g that trigger a conflict.

3.3.2. Shifts in Conflict Losses and Turf Control

Figure 2 illustrates the link between gang violence, police intervention, and conflict losses. Specifically, the graph demonstrates that in t_0 a gang with a probability of victory $\bar{p}_g$ will initiate a conflict if the probability of police intervention falls below $\bar{p}_c$. However, an increase in conflict costs, represented by $\Delta(L_g + Q_g)$, shifts the curve to the right in t_1. As a result, the same combination of $\bar{p}_g$ and $\bar{p}_c$ no longer triggers a war. Thus, as potential losses in confrontation and/or territorial control increase, conflicts become unlikely following police strikes. This shift can be so significant that even a gang with a high probability of victory will not choose to initiate a war. Consequently, when conflicts become too costly, fewer combinations of p_c and p_g will lead to violence, and reductions in police intervention may not be sufficient to incite a conflict between criminal gangs.

3.3.3. Possible Equilibrium following Police Strikes

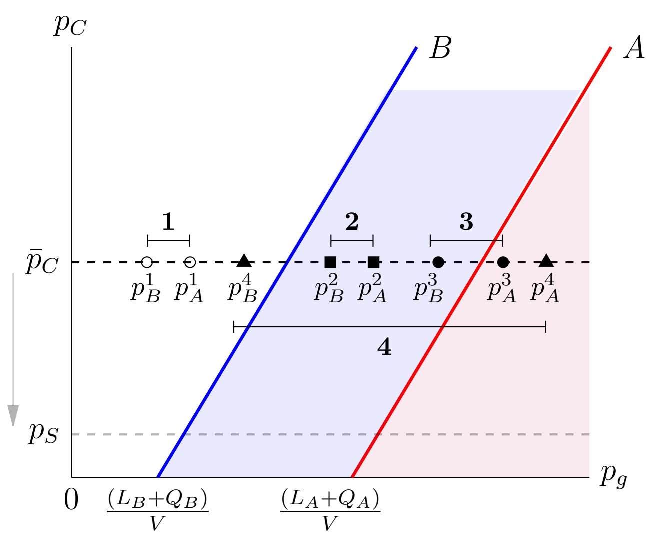
How an unequal territorial division affects the possible equilibrium between criminal gangs following police strikes? Suppose that gang A is more powerful than gang B, which means a higher probability of victory ($p_a > p_b$) and a larger share of the disputed turf ($Q_a > Q_b$). Assuming equal losses in confrontation, i.e., $L_a = L_b$, the distribution of p_a and p_b defines which gang will start a war following shifts in the probability of police intervention $\bar{p}_C$.

Figure 3 presents the four possible scenarios of confrontation. The blue-shaded area shows when gang B starts a war, and the red-shaded area is similar to gang A. Assuming a probability of police intervention equal to $\bar{p}_C$, there are some values (p_A^1, p_B^1) for which no shift in police intervention makes both gangs decide to start a war (**scenario 1**). When the probabilities are (p_A^2, p_B^2), Gang B decides to start a war (**scenario 2**) whereas to (p_A^3, p_B^3) both gangs will choose the confrontation (**scenario 3**). Last, when the probabilities of victory are (p_A^4, p_B^4), gang A will decide to start a war (**scenario 4**).

Last, I show in Figure 3 that a decrease in the probability of police intervention from $\bar{p}_C$ to p_S increases the number of combinations that the decision to start a war is binding to both gangs to any set of parameters $(p_c, p_g, L_g, Q_g, V) > 0$. Thus, when the probability of confrontation with police decreases abruptly in police strikes, even gangs with few chances of victory and small turf control will decide to start a war. This is the more significant result of the model that reveals why a police strike potentially triggers violent conflicts between criminal gangs.

With such theoretical results, I now proceed to discuss the data and empirical strategy to assess the effect of reducing police patrolling on violent deaths and specifically on homicides in territories with documented criminal gang conflicts.

Figure 3: Distribution of Power and Conflicts



Notes: The blue dashed area shows when gang B decides to start a war and the red shaded area the same to Gang A. **(I.)** Assuming the unequal distribution of power between gangs, i.e., $p_A > p_B$ and $Q_A > Q_B$, and the same conflict losses $L_A = L_B$, the distribution of (p_A, p_B) defines which gang will start a war. **(II.)** To any set of parameters $(pc, pg, Lg, Qg, V) > 0$, a decrease in the probability of police intervention increases the number of combinations that lead to war.

4. Data and Empirical Strategy

4.1. Data

I exploit the quasi-experiment of police strikes between 2000 and 2020 to investigate the effect of a sharp reduction in policing on violent crime. I collected daily homicide data from 5,568 municipalities in 26 states and the federal district of Brazil, and I focus on violent deaths as defined by the International Statistical Classification of Diseases and Related Health Problems (ICD-10): aggression (X85-Y09) and legal intervention (Y35-Y36), sourced from the Ministry of Health Mortality Information System (SIM-DataSUS). For the state of Ceará, I access more detailed records provided by the state security secretary covering the period 2014-2020, with information on the district where the deaths occurred and the identification of the victims. Regarding the timing of police strikes, I used data from the Interunion Department of Statistics and Socioeconomic Studies (DIEESE)[4] based on reports from media, labor unions, and class associations.

Table 1 shows that the average number of homicides during Military Police strikes is higher than the average from 2000 to 2019. On the other hand, deaths during Civil Police strikes are not distinguishable from the average in the sample. Table 2 provides an overview of police strike statistics in Brazil. The duration of Civil Police strikes is notably longer compared to those of the Military Police. This disparity is partially attributed to the Supreme Court's extension of the strike veto to the Civil Police only in 2017. Figure A.17 highlights that most Military Police strikes last less than seven days.

Table 1: Daily Homicides Brazil - (2000-2019)

	Mean	Std. Err.	[95% Conf.	Interval]
Full Sample	1.462	0.0016	1.459	1.465
Military Police Strikes	1.757	0.0720	1.615	1.898
Civil Police Strikes	1.455	0.0088	1.437	1.475

Note: the average number of daily violent deaths across states of Brazil using the International Classification of Disease (ICD) codes X85-Y09, and Y35-Y36. *Source:* SIM - DataSUS.

Last, I use the personal identification of victims in the state of Ceará to examine any prior involvement in illicit activities. The state's Judiciary has an online platform that provides access to criminal case records filed in the courts. The system allows

[4]The report "Balanço das Greves" is available here. For this paper, I request to DIEESE more detailed records of all Civil and Military Police strikes between 2000 and 2020.

Table 2: Police Forces Strikes (2000-2020)

Police Force	**Events**	**Duration (Mean)**	**Duration (Std. Dev.)**
Military	29	8.52	6.04
Civil	194	20.46	29.85

Note: Strikes are measured as the length in days of reduced patrolling reported by newspapers, unions, and employee associations. *Source:* Balanço das Greves - DIEESE.

searching for records using personal names or case codes. My analysis draws on a database of 27,307 records obtained by consulting victims' names in the Judiciary's system. The database shows relevant information about each case, including the start and termination dates, as well as relevant tags that indicate the subject matter of each case. The parties involved in each case are identified by their full names, including defendants and plaintiffs.

I developed an indicator to measure engagement in illegal activities using three specifications for suspected criminals. Table 3 shows the tags used to track drug trafficking, violent crimes, and civil prosecution. At least 53% of individuals identified in the data have prior criminal records. When considering only violent and gang-related crimes, this percentage decreases, yet still stands at 39%. I excluded repeated names to mitigate over-identification, even when deaths occurred at different dates or locations. It is important to note that not all individuals involved in illegal activities have records in the Judiciary System. Thus, my results are a lower-bound estimate of the number of suspected criminals killed in Ceará. Table 4 presents a comparative analysis of the incidence of violent deaths across districts in Fortaleza. I compare the full dataset with a reduced sample comprised of only suspected gang members before and after the GDE foundation in 2016. The results highlight significant heterogeneity among the districts, with some experiencing a substantial decrease in homicides post-GDE (e.g., District 5 reported a 17% decrease), while others saw an increase (e.g., District 13 saw a 16% growth). This heterogeneity in violent deaths across districts after 2016 suggests that gang conflicts may disproportionately impact certain regions of Fortaleza.

4.2. Empirical Strategy

4.2.1. Identifying Gang Turfs in Ceará

Determining the location of gang turfs is a challenging task. Despite the lack of official documentation outlining the headquarters of these criminal organizations, local media in Ceará covers the districts where police and community reports indicate

Table 3: Identifying Suspected Criminals

Suspected Criminals (1) n = 14.423	Robbery, Theft, Drug Trafficking, Criminal Gang Member, Illegal Gun Possession, Domestic Violence, Falsification, Fraud, Traffic Transgression and Stolen Goods.
Suspected Criminals (2) n = 12.694	Robbery, Theft, Drug Trafficking, Criminal Gang Member, Illegal Gun Possession, Domestic Violence and Stolen Goods.
Suspected Criminals (3) n = 10.675	Robbery, Drug Trafficking and Criminal Gang Member.

Notes: In the full sample there are 27.307 registers with personal identification. At least 14.423 (53%) of them present a previous criminal record in the State Judiciary System.

Table 4: Violent Deaths by District - Full Sample and Suspected Criminals

		Homicides (Full Sample)		**Homicides (Susp. Criminals)**	
		Pre	Post	Pre	Post
District 1	Mean	1.673	1.366	0.775	0.611
	Std. Err.	(0.041)	(0.040)	(0.035)	(0.035)
District 2	Mean	1.806	1.505	0.770	0.620
	Std. Err.	(0.045)	(0.032)	(0.035)	(0.024)
District 3	Mean	1.383	1.377	0.718	0.609
	Std. Err.	(0.044)	(0.035)	(0.039)	(0.030)
District 4	Mean	1.669	1.244	0.757	0.562
	Std. Err.	(0.048)	(0.030)	(0.033)	(0.031)
District 5	Mean	1.671	1.391	0.745	0.611
	Std. Err.	(0.046)	(0.038)	(0.036)	(0.029)
District 6	Mean	1.093	1.345	0.500	0.572
	Std. Err.	(0.037)	(0.037)	(0.066)	(0.030)
District 7	Mean	1.414	1.389	0.540	0.570
	Std. Err.	(0.036)	(0.037)	(0.034)	(0.024)
District 8	Mean	1.592	1.486	0.679	0.672
	Std. Err.	(0.042)	(0.034)	(0.035)	(0.028)
District 9	Mean	1.475	1.345	0.566	0.585
	Std. Err.	(0.042)	(0.026)	(0.036)	(0.022)
District 10	Mean	1.517	1.254	0.523	0.501
	Std. Err.	(0.045)	(0.028)	(0.033)	(0.028)
District 11	Mean	1.528	1.666	0.593	0.684
	Std. Err.	(0.041)	(0.033)	(0.035)	(0.022)
District 12	Mean	1.366	1.692	0.546	0.731
	Std. Err.	(0.035)	(0.035)	(0.033)	(0.024)
District 13	Mean	1.338	1.559	0.537	0.655
	Std. Err.	(0.041)	(0.036)	(0.039)	(0.024)

Notes: The average violent deaths registered across districts of Ceará reported by the Security Secretary. Suspected criminals' deaths reported using Specification 3 presented in Table 3. *Source:* SSPDS-CE.

the presence of such groups[5]. These areas are typically the peripheries of Fortaleza, characterized by their strategic location near major roadways that provide access to the Port of Ceará, a crucial conduit for the export of illicit drugs to Europe (VEJA, 2021). Additionally, these neighborhoods are often characterized by poverty and higher levels of violence compared to other districts of the metropolitan region of Ceará.

To identify criminal gang areas in Ceará, I combined qualitative information from local news sources and socioeconomic indicators, including average income, violent deaths, and the proportion of slum areas within the respective territories. Furthermore, I have identified districts where local media reports the presence of criminal gangs and where the aforementioned socio-economic indicators fall below the median values for the urban area of Fortaleza. In my setting, districts 6, 11, 12, and 13 are assumed as potential criminal gang turfs and are depicted in red in Figure A.4. The remaining areas are considered non-disputed districts (”*control group*”). Despite the challenges associated with objectively measuring criminal gang presence, I assume that these areas present a larger probability of being disputed by criminal organizations.

To provide additional evidence about the incidence of gang conflicts in these districts, I show in Figure A.5 the results of a t-test comparing the monthly homicides of suspected gang members before and after the entry of GDE and increased gang competition. My results show a significant increase in homicides in these arguable gang turfs, while most other districts saw a large and significant decrease. This suggests a possible reallocation of gang-related conflicts and criminals to the territories disputed by GDE and CV. Table 5 shows that districts 11, 12, and 13, present some of the lowest income levels and highest homicide rates in Ceará. By leveraging the heterogeneity between these areas, I will exploit the variation in violent deaths across gang territories and districts of the ”*control group*” in the metropolitan region.

4.2.2. Polices Strikes, Homicides and Gang Related deaths

To assess the effect of police strikes on violent deaths, I use two identification strategies. The first approach leverages the natural experiment created by 29 Military Police strikes, and 194 Civil Police strikes since 2000 in different states of Brazil. The reduction in policing during these strikes provides a unique opportunity to assess the effect of law enforcement on violent deaths. Furthermore, I examine the heterogeneity in the effect of police strikes across the type of police force (Military and Civil) and

[5] I collected data from different sources, but especially the newspaper *”O Povo”*. One of these articles is available at this link

Table 5: Socioeconomic Variables by District

District	**Population**	**% Non White**	**% Men**	**Avg. Hous. Income**	**Hom.'000 people (avg. 2017-20)**
District 1	173,761.00	47.3%	45.7%	R$ 6,341.36	37.84
District 2	214,388.00	70.0%	49.0%	R$ 1,149.90	86.06
District 3	205,137.00	68.6%	48.6%	R$ 1,454.04	69.10
District 4	164,268.00	60.3%	46.5%	R$ 2,455.80	47.03
District 5	313,642.00	58.0%	46.8%	R$ 2,461.27	35.07
District 6	362,681.00	62.3%	47.4%	R$ 1,863.39	36.33
District 7	265,925.00	62.9%	48.2%	R$ 2,639.19	48.42
District 8	236,970.00	68.2%	48.1%	R$ 1,334.49	44.20
District 9	233,811.00	66.7%	48.5%	R$ 1,449.47	65.44
District 10	176,767.00	50.5%	46.1%	R$ 4,797.70	30.83
District 11	405,347.00	69.5%	48.4%	R$ 1,162.96	92.45
District 12	453,354.00	71.0%	48.8%	R$ 981.37	86.85
District 13	436,962.00	70.1%	49.9%	R$ 1,447.73	68.77

Notes: Data regarding population, race, gender, and income obtained from CENSO-2010. Average income by household reported in 2010 BRL. The average number of homicides by district reported by the Security Secretary. *Source:* IBGE, CENSO-2010 and SSPDS-CE.

the states that have or do not have ongoing gang conflicts. Specifically, I will focus on comparing the increase in violent deaths in Ceará with other states in Brazil. In my setting, some states are unaffected by Military or Civil Police strikes in the period of analysis. Thus, the identification of the effect of police strikes comes from the exogenous variation in homicides caused by police strikes, both across states that are affected and not affected and before and after each strike event.

The panel data structure allows controlling for unobserved time and location-fixed effects, which may be correlated with strike occurrences. The high frequency of the data enables us to precisely determine the start date of each strike, further reinforcing the exogeneity of the variation in policing. The random timing of police strikes minimizes the influence of other confounding factors, such as changes in unemployment or state-level budget cuts, which may not affect crime rates in the very short term. I also include state-fixed effects to control for unobservable crime determinants invariant at the state level. The equation to estimate the police effect on homicides across states in Brazil is:

$$homicides_{it} = \alpha_i + \beta_1 * \text{PM}_{strike_{it}} + \beta_2 * \text{PC}_{strike_{it}} + \phi_t + \mu_{it} \tag{4}$$

Where the subscripts i and t respectively denote state and date; $\text{PM}_{strike_{it}}$ and $\text{PC}_{strike_{it}}$ are dummies equal to one during the military and civil police strike days in the state i; ϕ is a set of time-fixed effects that includes the year, month, and weekday dummies; α are state-fixed effects. The dependent variable, homicides, represents the daily number of violent deaths in a specific state. The SIM-DataSUS provides information on various demographic factors, including gender, age, and cause of death, making it possible to assess the heterogeneous effect of police strikes on different specifications of the dependent variable in the Equation 4.

A possible inference concern is the potential serial correlation in the dependent variable over time in this framework. The standard solution is to estimate standard errors allowing for within-cluster auto-correlation. However, the validity of robust cluster estimators depends on the number of clustering units, and settings with few clusters generally lead to biased estimators (Cameron and Miller, 2015, Angrist and Pischke, 2008). As my quasi-experimental setting shows few clusters ("states"), I estimate bootstrap standard errors to overcome a potential auto-correlation.

The identification strategy relies on two key assumptions. The first is that the start date of a police strike is unpredictable and thus exogenous to criminals. Therefore, the decision of police officers to go on strike that day is not related to other factors that can affect violent deaths in the short run. In this case, strikes represent a quasi-experiment that breaks the simultaneity between crime and police presence. The second crucial hypothesis is that the increase in violent deaths during strike days is exclusively due to the sudden reduction of police officers in the streets and not other confounding factors.

In my second empirical analysis, I exploit the variation in homicides across districts of Ceará following a police strike. Specifically, I use a differences-in-differences model to estimate the effect of reducing police patrols on violent deaths, focusing on gang turfs. This analysis aims to test if a drastic reduction in police leads to increased violent deaths in these contested territories. By incorporating data on the victim's criminal background, I shed light on the extent to which the increase in deaths can be attributed to individuals with prior criminal records. A significant increase in gang-related deaths would support my theoretical model's hypothesis that reducing police surveillance allows criminal gangs to engage in violent confrontations with their rivals.

I include a series of time-fixed effects to absorb all common shocks in the evolution of homicides across districts, and I also include location-fixed effects to control unobservable crime determinants invariant at the district level. In this setting, gang turfs are the "*treatment group*", while the remaining districts are the "*control group*". I obtain the difference-in-differences estimator of the effect of a police strike on homicides in gang turfs using the following model:

$$homicides_{jt} = \alpha_j + \beta_1 * \mathrm{PM}_{strike_t} + \beta_2 * (\mathrm{PM}_{strike_t} * Area_j) + \phi_t + \mu_{jt} \qquad (5)$$

Where the subscripts j and t respectively denote districts and date; $Area_j$ is a dummy equal to one if the district is a gang turf as specified in the previous section; PM_{strike_t} is a dummy equal to one during the military police strike days; ϕ is a set of time-fixed effects that includes the year, month, and weekday dummies; α are district-fixed effects. The dependent variable *homicides* indicates the number of daily homicides in a given district. Similarly to the state-level approach, I evaluate the heterogeneous effect of the police strike using the information on victims' gender and age. I estimate bootstrap cluster-robust standard errors to calculate the confidence intervals and alleviate inference concerns regarding a few clusters (Cameron and Miller, 2015).

In this framework, the identification strategy relies on the hypothesis that gang turfs and districts of the "*control group*" present parallel trends in violent deaths before the police strike. Therefore, the coefficient β_2 represents the increase in homicides caused by a Police Strike in criminal gang turfs. The second hypothesis is that the increase in violent deaths following a police strike is exclusively due to conflicts in criminal gang turfs and not other confounding factors.

4.2.3. Event Study

Regarding the possibility that strikes occur precisely in periods of growing violence, I employ an Event Study to assess the dynamic effects of police strikes on crime by analyzing the trends in homicides before, during, and after the event. By including a variable that indicates the number of days before and following the start of a strike, I test if there is evidence of a pre-trend in homicides and if the increase in violent deaths results from the strike. I use the Event-Study specification presented in Clarke and Tapia-Schythe (2021):

$$homicides_{it} = \alpha_i + \sum_{j=2}^{J} \beta_j (Lag_j)_{it} + \sum_{k=1}^{K} \gamma_k (Lead_k)_{it} + \phi_t + \mu_{it} \tag{6}$$

Where lags and leads to the beginning of a strike are defined as follows:

$$\begin{aligned}
(Lag_J)_{it} &= 1[t \leq Strike_i - J] \\
(Lag_j)_{it} &= 1[t = Strike_i - j] \; for \; j \in (1, ..., J-1) \\
(Lag_k)_{it} &= 1[t = Strike_i + k] \; for \; j \in (1, ..., K-1) \\
(Lag_K)_{it} &= 1[t \geq Strike_i + K]
\end{aligned}$$

5. The Effect of Police Strikes on Violent Crime

5.1. Police Strikes and Violent Deaths

I begin by showing the results of Equation 4, using total homicides and deaths by gender as dependent variables. Table 6 presents the point estimates for the effect of military police (β_1) and civil police (β_2) strikes on homicides. My findings indicate that a decrease in police patrols leads to a significant increase in total homicides, particularly among men. The outcomes are only significant in the case of military police strikes, suggesting that surveillance and regular street patrols play a crucial role in deterring crime. The β_1 coefficient is equivalent to a 45% increase in daily homicides compared to the average.

Table 6: The effect of Police strikes on violent deaths - Baseline and Gender Results

	Dependent Variable	β_1	**95% Confidence Interval**	
			Lower	Upper
Military Police Strikes	Total Homicides	2.934	0.880	4.988
	Homicides (Men)	2.829	0.825	4.833
	Homicides (Women)	0.104	-0.022	0.230
	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
Civil Police Strikes	Total Homicides	0.364	-0.030	0.758
	Homicides (Men)	0.331	-0.053	0.715
	Homicides (Women)	0.032	-0.002	0.066

Notes: The coefficients β_1 and β_2 show the change in the number of violent deaths during Military and Civil Police strikes respectively. All errors are clustered at the state level.

Regarding the leading cause of death, I present in Table 7 that firearms drive the increase in violent deaths during police strikes. Additionally, I show in Table 8 that individuals between the ages of 15 to 45 years old are most commonly the victims, although these results should be evaluated with caution due to the significant amount of missing information on age in the SIM-DataSUS. Last, Table A.16 highlights that hospitals and public spaces, such as streets and avenues, are the most frequently reported locations. The results are suggestive evidence of the profile of victims, young men killed by firearms in the streets of states affected by police strikes.

In summary, a decrease in police presence leads to a significant increase in violent deaths. This effect occurs only in strikes of the military police, which last an average of eight days, and I do not find a similar increase in deaths following strikes of the civil police in Brazil. The magnitude of my results is larger than estimates of a 16% increase in homicides by Cardoso and Resende (2018), which is probably a consequence of using high-frequency data to reach a more precise identification of the

Table 7: The effect of Police strikes on violent deaths - Cause of Death

	Dependent Variable	β_1	**95% Confidence Interval**	
			Lower	Upper
Military Police Strikes	Firearms	2.776	0.884	4.668
	White arms	0.116	-0.032	0.264
	Body Injuries	0.011	-0.028	0.050
	Car Crash	-0.008	-0.012	-0.003
	Legal Intervention	-0.002	-0.050	0.046
	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
Civil Police Strikes	Firearms	0.326	0.038	0.614
	White arms	0.000	-0.039	0.039
	Body Injuries	-0.002	-0.013	0.010
	Car Crash	0.004	-0.004	0.012
	Legal Intervention	0.025	-0.031	0.082

Notes: The coefficients β_1 and β_2 show the change in the number of violent deaths during Military and Civil Police strikes respectively. All errors are clustered at the state level.

Table 8: The effect of Police strikes on violent deaths - Homicides by Age

	Dependent Variable	β_1	**95% Confidence Interval**	
			Lower	Upper
Military Police Strikes	Homicides (<15)	0.116	-0.007	0.239
	Homicides (15 - 25)	0.681	0.055	1.307
	Homicides (26 - 45)	0.671	0.225	1.117
	Homicides (>45)	0.179	0.073	0.285
	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
Civil Police Strikes	Homicides (<15)	0.009	-0.012	0.031
	Homicides (15 - 25)	0.141	-0.006	0.288
	Homicides (26 - 45)	0.132	-0.007	0.271
	Homicides (>45)	0.026	-0.014	0.065

Notes: The coefficients β_1 and β_2 show the change in the number of violent deaths during Military and Civil Police strikes respectively. All errors are clustered at the state level.

effect of police strikes on homicides. My findings contribute to the literature about the effect of police on violent crime (Evans and Owens, 2007, Levitt, 2002), providing evidence of an adverse effect of decreasing police presence on violent deaths.

5.2. Police Strikes in Ceará

I proceed to examine the heterogeneous effects of police strikes on violent deaths across states in Brazil. My results indicate a 45% increase in daily homicides caused by military police strikes in Brazil, considering 29 of these events across different states. However, some states ins Brazil, such as Ceará, are heavily impacted by disputes over the control of drug trafficking. My theoretical model shows that in the context of gang confrontation, police strikes can trigger violent and lethal conflicts. Therefore, to assess the heterogeneous effect of police strikes in different criminal contexts in Brazil, I present the estimates of Equation 4 by state. The findings presented in Table 9 reveal that following a military police strike, the increase in homicides in Ceará was 2.5 times greater than my baseline results. This disparity was largely driven by an increase in male fatalities, but there was also a noticeable rise in female deaths.

To account for the different population sizes of Brazilian states, I provide a back-of-envelope calculation in the final column of Table 9. The impact of police strikes on violent deaths in Ceará (CE) is equivalent to 90% of the average daily homicides in the state, representing the highest proportional increase among all states in Brazil that experienced military police strikes between 2000 and 2020. Additionally, I combine these findings with information on the presence of drug trade organizations (DTOs) in each state. I use data from the *"Anuário Brasileiro de Segurança Pública"* (GAZETA, 2019), which reports the number of DTOs per state. Figure A.12 displays the estimates from the final column in Table 9 by the number of DTOs, revealing a positive correlation between the presence of criminal gangs and the rise in fatalities following police strikes.

Lastly, as discussed in Subsection 2.1, DTOs initiated a series of violent confrontations across different states in Brazil starting in 2016. To assess further insights into the relationship between gang conflicts and the increase in homicides during strikes, I compare the change in fatalities before and after 2016. Figure A.14 illustrates that military police strikes after 2016 exhibit an effect that is 17% larger on homicides compared to events that occurred prior to this year. This evidence further highlights the role of criminal confrontations in the escalation of homicides during police strikes.

My findings demonstrate the considerable variation across states and the relevance of taking into account the social context in which police strikes occur. In regions where criminal gangs are prevalent, a sudden reduction in police presence can incite violent confrontations, enabling rival gangs to engage in conflict without state intervention. For the state of Ceará, the results suggest that a police strike may be a catalyst for the gang conflict mechanism described in the theoretical model. As the probability of police intervention (p_c) decreases dramatically, the expected reward of attacking a rival (D_g) increases significantly, resulting in gangs choosing to engage in conflict rather than leaving themselves vulnerable to attack.

5.3. Robustness

In this section, I present additional evidence regarding the validity of my results by exploiting previous trends and alternative specifications.

Parallel Trends. To address potential threats to my research design, I run an event study using Equation 6 to assess the robustness of the findings. The results of this exercise indicate that a military police strike leads to a 65% increase in homicides on days 2 and 3 compared to the daily average (Figure A.6), and there is no previous trend of growing violence before the events[6].

Heterogeneity. To examine the heterogeneity of the effect by the length of a military strike, I aggregated these events into three groups. The findings suggest a larger effect on violent deaths for strikes lasting more than 11 days, with no clear evidence of a previous trend in homicides in all groups (Figure A.13).

Unrelated Criminal Deaths. I run a falsification test using pedestrian, cyclist, and biker traffic deaths as a dependent variable. The results in Table 10 show no significant increase in fatalities not directly related to decreased police patrols or caused by criminal activities. Overall, these results provide evidence of the effect of military police strikes on homicides.

Alternative specification. Given that the number of homicides is count data with non-negative integer values, a Poisson regression model is often suggested as a more appropriate method to estimate the causal effect of police on crime. To address the relatively low incidence of homicides compared to other offenses, I run a Poisson regression model with fixed effects and standard errors clustered at the state level as a robustness test. The estimates from this model are the effect of a 1-day strike on the logarithm of the daily number of homicides, expressed as a percentage. The results of this Poisson regression model, presented in Table 11, indicate a 42% increase in daily homicides during Military Police strikes, which is consistent with my baseline results.

[6] I also tested the specification proposed by Sun and Abraham (2021). The results are qualitatively similar and are displayed in Figure A.11

Table 9: The effect of Police strikes by State

	Total Homicides (β_1)	**Homicides (Men)**	**Homicides (Women)**	**Mean**	(β_1 / **Mean**)
Baseline	2.934***	2.829***	0.104*	6.45	0.45
	(1.027)	(1.002)	(0.063)		
AL	0.001	0.200	-0.198***	4.53	0.00
	(0.303)	(0.280)	(0.026)		
AM	1.704***	1.132**	0.572	3.22	0.53
	(0.524)	(0.491)	(0.034)		
BA	9.288***	8.939***	0.350***	12.67	0.73
	(0.307)	(0.294)	(0.015)		
CE	6.954***	6.577***	0.377***	7.76	0.90
	(0.358)	(0.336)	(0.025)		
ES	3.440***	3.200***	0.239***	4.46	0.77
	(0.626)	(0.589)	(0.037)		
MA	1.139***	1.238***	-0.098***	4.37	0.26
	(0.340)	(0.317)	(0.025)		
PA	3.867***	3.337***	0.531***	7.71	0.50
	(0.348)	(0.330)	(0.025)		
PB	1.202***	1.208***	-0.005	3.32	0.36
	(0.249)	(0.236)	(0.017)		
PE	3.275***	3.198***	0.077	11.22	0.29
	(0.880)	(0.827)	(0.054)		
PI	0.954**	0.979**	-0.024	1.90	0.50
	(0.402)	(0.379)	(0.026)		
PR	-2.333*	-2.491**	0.158**	7.89	-0.30
	(1.171)	(1.107)	(0.066)		
RN	1.901***	1.904***	-0.002	3.30	0.58
	(0.444)	(0.413)	(0.032)		
RO	0.000	0.136	-0.136***	1.99	0.00
	(0.388)	(0.365)	(0.025)		
RR	0.957***	1.073***	-0.116***	1.36	0.70
	(0.315)	(0.297)	(0.023)		
SC	1.424***	1.516***	-0.091	2.49	0.57
	(0.316)	(0.302)	(0.019)		
SE	-0.652	-0.779	0.127*	2.64	-0.25
	(1.315)	(1.245)	(0.0716)		
TO	0.588	0.477	0.112	1.67	0.35
	(1.313)	(1.240)	(0.0747)		

Notes: The coefficient β_1 shows the change in the number of violent deaths during Military Police strikes across states in Brazil. All errors are clustered at the state level.

Table 10: Falsification Test - Deaths in Traffic Accidents

	Dependent Variable	β_1	**95% Confidence Interval**	
			Lower	Upper
Military Police Strikes	Pedestrians	0.099	-0.039	0.238
	Cyclists	0.018	-0.031	0.067
	Bikers	-0.007	-0.111	0.096

	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
Civil Police Strikes	Pedestrians	0.024	-0.031	0.078
	Cyclists	0.001	-0.015	0.016
	Bikers	-0.002	-0.065	0.060

Notes: The coefficients β_1 and β_2 show the change in the number of traffic accident deaths during Military and Civil Police strikes respectively. All errors are clustered at the state level.

Table 11: TWFE x Poisson Estimates

	TWFE	**Poisson**
Military Police Strikes (β_1)	2.934***	0.420***
	(2.73)	(6.14)
Civil Police Strikes (β_2)	0.364*	0.050*
	(1.84)	(2.43)

Notes: The coefficients β_1 and β_2 show the change in the number of violent deaths during Military and Civil Police strikes respectively. All errors are clustered at the state level. t-statistics in parenthesis. *p<0.1,**p<0.05,***p<0.01

6. The Effect of Police Strikes on Gang Related Deaths

6.1. Police Strikes and Gang-related Homicides in Ceará

I argue - and show formally in Section 3 - that an abrupt reduction in the probability of police intervention increases the expected payoff of gang conflicts, thus inciting violent disputes over contested territories. In the previous section, I presented evidence from Ceará, where two gangs compete in drug trafficking, that the rise in homicide rates during police strikes is substantially larger compared to other states in Brazil. Nonetheless, it remains necessary to show that this spike in fatalities occurred specifically in gang territories and not in areas unrelated to drug trafficking.

In this section, I examine the effect of military police strikes on violent deaths across gang territories in Ceará. To do this, I employ a difference-in-differences specification outlined in Equation 5 to assess the change in homicide rates in areas with documented criminal activity, as described in Section 4.2.1. Furthermore, to shed light on the nature of these deaths, I decompose the total increase in homicides based on victims' prior criminal records and quantify the proportion of suspected criminals killed. According to my theoretical model, I expect a larger increase in deaths in gang turfs compared to other districts following a military police strike. Furthermore, if the analysis reveals a prevalence of victims with prior criminal records, it would provide robust evidence of gang-related homicides.

Table 12 reports the results from the estimation of Equation 5 using total homicides and deaths by gender as the dependent variable. I highlight the overall effect of the military police strike in Ceará (β_1) and the differences-in-differences point estimates to criminal gang turfs (β_2). My findings demonstrate that in contexts of gang competition, the escalation of violent deaths during a military police strike is primarily concentrated in contested territories. This implies that the decrease in police patrols triggered violent confrontations in gang territories, and disputes between organized criminal groups are a critical factor in explaining the rise in violence in the metropolitan area of Fortaleza. The β_2 coefficient corresponds to a 69% increase in daily homicides compared to the average.

Consistent with my identification strategy, the results in Table 13 suggest that the deaths of suspected criminals drive the increase in homicides, as demonstrated by using the three specifications presented in Table 3. These results indicate that 66% of violent deaths during the Military Police strike are attributed to suspected criminals. Moreover, I show in Figure A.16 that in police strikes there is a shift in the ratio of suspected criminal deaths in total homicides by districts, supportive evidence that strikes have a large effect on the dynamics of violent deaths involving criminals in Ceará.

These findings have important implications for understanding the mechanisms driving the increase in homicides during police strikes in contexts of drug trafficking competition. They support my conceptual model of gang conflicts, which highlights the role of criminal disputes in driving violent conflict, and demonstrate the importance of accounting for this socioeconomic context when evaluating the impact of police strikes on violent crime.

Table 12: The effect of Police strikes on gang-related homicides - Total and Gender

	Dependent Variable	β_1	**95% Confidence Interval**	
			Lower	Upper
PM_{Strike}	Total Homicides	0.159	-0.161	0.479
	Homicides (Men)	0.216	-0.092	0.524
	Homicides (Women)	-0.056	-0.117	0.005

	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
$PM_{Strike} * GangTurfs$	Total Homicides	1.023	0.205	1.841
	Homicides (Men)	0.887	0.239	1.535
	Homicides (Women)	0.136	-0.128	0.400

Notes: The coefficient β_1 shows the change in the number of violent deaths during the Military Police strike in Ceará. β_2 reports the effect on violent deaths in gang territories. All errors are clustered at the district level.

Table 13: The effect of Police strikes on gang-related homicides - Suspected Criminals Deaths

Variables	**Total Homicides**	**Suspected Criminals (1)**	**Suspected Criminals (2)**	**Suspected Criminals (3)**
$PM_{Strike} * GangTurfs$	1.023***	0.678***	0.608***	0.502*
	(0.378)	(0.252)	(0.231)	(0.261)

Notes: $PM_{Strike} * GangTurfs$ reports the effect of police strikes on violent deaths in gang territories. The decomposition of suspected criminals from total homicides follows the three specifications presented in Table 3. All errors are clustered at the district level. *p<0.1,**p<0.05,***p<0.01

6.2. Robustness

Gang Conflicts. My findings show that gang competition drives the escalation of violence during police strikes. This result is supported by my conceptual model of gang conflicts, which demonstrates how criminal organizations exploit a reduction in the probability of police intervention to attack their rivals. However, this raises the question regarding a possible increase in violent deaths during police strikes when there is no competition for drug trafficking in a state. My analysis suggests that in such cases, rapid and temporary shifts in the probability of police intervention are unlikely to trigger conflicts since a single gang holds the monopoly of drug trafficking.

To test this hypothesis, I performed a robustness test using a police strike that occurred in 2011 in the state of Ceará, Brazil, when the Comando Vermelho (CV) held a dominant position in drug trafficking. By comparing the increase in violent deaths during the 2011 strike with the 2020 strike, when the GDE had emerged as a significant challenger to the CV's control of strategic routes and territories in the state, I examine how different scenarios of gang competition affect homicides. Although detailed victim identification data were not available before 2014, my analysis of data from SIM-DataSUS controlling for location and time-fixed effects demonstrate in Figure A.10 that the increase in violent deaths during the 2020 strike was larger than during the 2011 strike, particularly in the metropolitan area of Ceará[7]. These results suggest that the police strike triggers more violence in contexts of gang competition than in scenarios where a single gang controls drug trafficking.

Parallel Trends. My results provide evidence of a statistically significant increase in deaths during the strike, however, it is important to acknowledge that these findings may be confounded by pre-existing factors. Specifically, a violation of the parallel trend assumption could lead to spurious correlations, potentially undermining the validity of the estimates. To address this concern, I run an Event Study using Equation 6. The results presented in Panel (a) of Figure A.9 provide strong support for the argument that gang conflicts drive the increase in deaths, as there was no significant rise in homicides in gang turfs prior to the police strike in 2020.

Furthermore, I observe a larger increase in deaths of suspected criminals (Figure A.9 - Panel (b)) compared to homicides of individuals without criminal records in the state judiciary (Figure A.9 - Panel (c)). This finding offers supportive evidence of a higher incidence of deaths likely related to criminal gangs, particularly considering that my measure of crime involvement represents a conservative estimate, as it is possible that some of the individuals killed during police strikes may be criminals without criminal records in the state judiciary.

Gang Districts. Another potential concern for the identification strategy is the specification of "treated" and "control" districts within the differences-in-differences framework. It is possible that criminal gang activity exists in districts not included in the treated group presented in Figure A.4, and my findings reflect increased violence due to factors unrelated to criminal gang turfs or drug trafficking competition in Fortaleza. To address this concern, I conduct a falsification test by randomizing

[7] The metropolitan area considers the following cities: Fortaleza, Caucaia, Maracanaú, Aquiraz, Cascavel, Eusébio, Pindoterama, Guaiúba, Pacatuba, Horizonte, Itaitinga e Pacajus

the "treated group" while keeping the number of selected districts constant. The results of this placebo test are reported in Table 14, revealing no significant effect on homicides. Figure A.8 provides additional insights into the dynamics of homicides in this placebo test.

To further enhance the credibility of this falsification test, I examine the distribution of the coefficient β_2 from Equation 5 across all possible combinations of districts as the treatment group. Figure A.15 demonstrates that the majority of combinations yield zero or negative effects for the military police strike, with only a few showing values closer to the estimates of $\beta_2 = 1.023$ from my baseline specification. This analysis ensures robustness to the identification strategy by reinforcing that the observed impact of the military police strike on homicides is not merely driven by chance or the specific selection of treated districts.

Table 14: The effect of Police strikes on gang-related homicides - Falsification Test (Gang Turfs)

	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
$PM_{Strike} * Random_{AIS}$	Total Homicides	-0.064	-0.454	0.326
	Homicides (Men)	0.050	-0.337	0.436
	Homicides (Women)	-0.113	-0.272	0.046

	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
$PM_{Strike} * Random_{AIS}$	Homicides (<15)	0.042	-0.069	0.153
	Homicides (15-45)	-0.240	-0.636	0.156
	Homicides (>45)	0.134	-0.082	0.350

Notes: $PM_{Strike} * Random_{AIS}$ reports the effect of police strikes on violent deaths in pseudo-gang territories. All errors are clustered at the district level.

6.3. Discussion

Overall, this paper contributes to our understanding of the complex interplay between police strikes, gang competition, and violent crime and has significant implications for policymakers and law enforcement agencies seeking to address these issues. The findings highlight the need for effective measures to combat gang violence and improve public safety.

My results demonstrate that gang-disputed territories are disproportionately affected by the increase in homicides during police strikes. These findings are consistent with my proposed model of gang conflicts, as the sudden decrease in police presence raised the expected gains from violent conflicts, resulting in confrontations between organized criminal groups and leading to an increase in violent deaths in gang-controlled areas.

However, the impact of police strikes on crime extends beyond just homicide rates. With the significant presence of criminals in these areas, the sudden shift in police patrolling could impact other forms of criminal activity as well. The rise in property crime during police strikes is another possibility, as criminal gangs may exploit robberies and thefts to fund their operations and pay soldiers to attack rival groups. Additionally, the incentive for criminals to commit robberies could increase due to the lower probability of arrest in the standard Becker model.

Table 15 presents the estimates of the effect of police strikes on other crimes in criminal gang-controlled areas using Equation 5. The results indicate a significant increase in robbery (about 35% compared to the baseline) in criminal gang turfs following the military police strike. While the individuals who committed these robberies cannot be identified, these findings further support other effects of reducing police presence on crime.

Therefore, this paper reveals the stark impact of police strikes on crime in areas affected by organized criminal gangs. The results suggest that not only does the sudden reduction in police presence lead to an increase in homicides, but it also impacts other criminal activities such as robbery. These findings highlight the importance of maintaining police presence in areas affected by criminal gangs to ensure public safety and prevent the rise in criminal activities.

Table 15: The effect of Police strikes on other crimes

	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
$PM_{Strike} * GangTurfs$	Robbery	174.8	67.4	282.2
	Theft	64.1	-3.02	131.2
	Drugs	3.33	-8.04	14.69
	Guns	2.68	-5.09	10.44
	Rape	2.73	-2.96	8.43

Notes: $PM_{Strike} * GangTurfs$ reports the effect of police strikes on other crimes in gang territories. All errors are clustered at the district level.

7. Conclusion

This paper offers important insights regarding the impact of police strikes on violent deaths and highlights the unique interpretation of this natural experiment. Using a novel dataset, I show that police strikes lead to a significant increase in violent deaths, particularly in territories disputed by organized criminal groups. These results suggest that criminal gangs exploit the absence of police presence to attack rivals, highlighting the importance of considering the interplay between criminal gangs and state authorities in evaluating the effect of shifts in policing on crime.

My study sheds light on the role of organized crime groups in understanding the impact of police on crime and provides important policy implications for violence reduction. Specifically, the inability to commit to a *status quo* division of gang turfs during police strikes leads to conflicts, as gangs choose to fight rather than allow rivals to attack first. My findings underscore the importance of considering the specific context of gang competition and territorial disputes when evaluating the effect of policing on crime and suggest that targeted interventions may be necessary to reduce violence in these settings.

References

J. Andenaes. *Punishment and deterrence*. University of Michigan Press Ann Arbor, 1974.

J. D. Angrist and J.-S. Pischke. *Mostly harmless econometrics*. Princeton university press, 2008.

E. D. Arias. The dynamics of criminal governance: networks and social order in rio de janeiro. *Journal of Latin American Studies*, 38(2):293–325, 2006.

G. S. Becker. Crime and punishment: An economic approach. In *The economic dimensions of crime*, pages 13–68. Springer, 1968.

C. Blattman, G. Duncan, B. Lessing, and S. Tobón. Gang rule: Understanding and countering criminal governance. Technical report, National Bureau of Economic Research, 2021.

J. M. Buchanan. A defense of organized crime. *The economics of crime and punishment*, 119:119, 1973.

G. Calderón, G. Robles, A. Díaz-Cayeros, and B. Magaloni. The beheading of criminal organizations and the dynamics of violence in mexico. *Journal of Conflict Resolution*, 59(8):1455–1485, 2015.

A. C. Cameron and D. L. Miller. A practitioner's guide to cluster-robust inference. *Journal of human resources*, 50(2):317–372, 2015.

V. Cardoso and M. Resende. Police and crime: Further evidence from a quasi-natural experiment. 2018.

D. Clarke and K. Tapia-Schythe. Implementing the panel event study. *The Stata Journal*, 21(4):853–884, 2021.

C. da Silva Lopes and A. A. Ferreira. O efeito gangue sobre a dinâmica dos homicídios: um estudo sobre o caso de cambé/pr. *Revista USP*, 1(129):29–46, 2021.

M. Dell. Trafficking networks and the mexican drug war. *American Economic Review*, 105(6):1738–79, 2015.

R. Di Tella and E. Schargrodsky. Do police reduce crime? estimates using the allocation of police forces after a terrorist attack. *American Economic Review*, 94 (1):115–133, 2004.

M. Draca, S. Machin, and R. Witt. Panic on the streets of london: Police, crime, and the july 2005 terror attacks. *American Economic Review*, 101(5):2157–81, 2011.

I. Ehrlich. On the usefulness of controlling individuals: an economic analysis of rehabilitation, incapacitation and deterrence. *The American Economic Review*, 71 (3):307–322, 1981.

ELPAIS. Rebeliões sinalizam fim de pacto entre PCC e CV e espalham tensão em presídios — brasil.elpais.com. (link), 2016. [Accessed 01-Feb-2023].

W. N. Evans and E. G. Owens. Cops and crime. *Journal of public Economics*, 91 (1-2):181–201, 2007.

FBSP. Anuário Brasileiro de Segurança Pública - Fórum Brasileiro de Segurança Pública — forumseguranca.org.br. (link), 2021. [Accessed 01-Feb-2023].

J. D. Fearon. Rationalist explanations for war. *International organization*, 49(3): 379–414, 1995.

FOLHA. Chacinas recentes escancaram guerra de facções e sensação de medo no CE — www1.folha.uol.com.br. (link), 2018. [Accessed 02-Feb-2023].

GAZETA. Mapa das Facções Criminosas no Brasil — infograficos.gazetadopovo.com.br. (link), 2019. [Accessed 01-Jul-2023].

J. Klick and A. Tabarrok. Using terror alert levels to estimate the effect of police on crime. *The Journal of Law and Economics*, 48(1):267–279, 2005.

B. Lessing. *Making peace in drug wars: crackdowns and cartels in Latin America.* Cambridge University Press, 2017.

S. D. Levitt. Using electoral cycles in police hiring to estimate the effect of policeon crime. Technical report, National Bureau of Economic Research, 1995.

S. D. Levitt. Using electoral cycles in police hiring to estimate the effects of police on crime: Reply. *American Economic Review*, 92(4):1244–1250, 2002.

S. D. Levitt and S. A. Venkatesh. An economic analysis of a drug-selling gang's finances. *The quarterly journal of economics*, 115(3):755–789, 2000.

B. Magaloni, E. Franco-Vivanco, and V. Melo. Killing in the slums: Social order, criminal governance, and police violence in rio de janeiro. *American Political Science Review*, 114(2):552–572, 2020.

J. McCrary. Using electoral cycles in police hiring to estimate the effect of police on crime: Comment. *American Economic Review*, 92(4):1236–1243, 2002.

E. L. Piza and V. F. Chillar. The effect of police layoffs on crime: A natural experiment involving new jersey's two largest cities. *Justice Evaluation Journal*, 4(2): 176–196, 2021.

R. Powell. War as a commitment problem. *International organization*, 60(1):169–203, 2006.

REUTERS. ESPECIAL-Facções brasileiras tornam-se grandes exportadoras de cocaína e inundam Europa com pó branco — reuters.com. `https://www.reuters.com/article/geral-cocaina-trafico-idLTAKBN20Z366`, 2020. [Accessed 23-Feb-2023].

T. C. Schelling. What is the business of organized crime? *The American Scholar*, pages 643–652, 1971.

L. W. Sherman and J. E. Eck. Policing for crime prevention. In *Evidence-based crime prevention*, pages 309–343. Routledge, 2003.

L. Sun and S. Abraham. Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, 225(2):175–199, 2021.

H. Takala. *The Police Strike in Finland.* Oikeuspoliittinen tutkimuslaitos, 1979.

G. Trejo and S. Ley. *Votes, drugs, and violence: The political logic of criminal wars in Mexico*. Cambridge University Press, 2020.

VEJA. A guerra de facções que assola Caucaia, a cidade mais violenta do Brasil — veja.abril.com.br. (link), 2021. [Accessed 03-Feb-2023].

J. R. White. Violence during the 1919 boston police strike: An analysis of the crime control myth. *Criminal Justice Review*, 13(2):61–68, 1988.

Appendix A. Figures and Tables

Table A.16: The effect of Police strikes on violent deaths - Place of Death

	Dependent Variable	β_1	**95% Confidence Interval**	
			Lower	Upper
Military Police Strikes	Homicides (Public Spaces)	1.596	0.340	2.852
	Homicides (Home)	0.049	-0.142	0.240
	Homicides (Hospitals)	0.990	0.374	1.606
	Homicides (NA)	0.299	-0.007	0.605
	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
Civil Police Strikes	Homicides (Public Spaces)	0.053	-0.124	0.231
	Homicides (Home)	0.031	-0.010	0.072
	Homicides (Hospitals)	0.129	-0.048	0.306
	Homicides (NA)	0.147	0.006	0.288

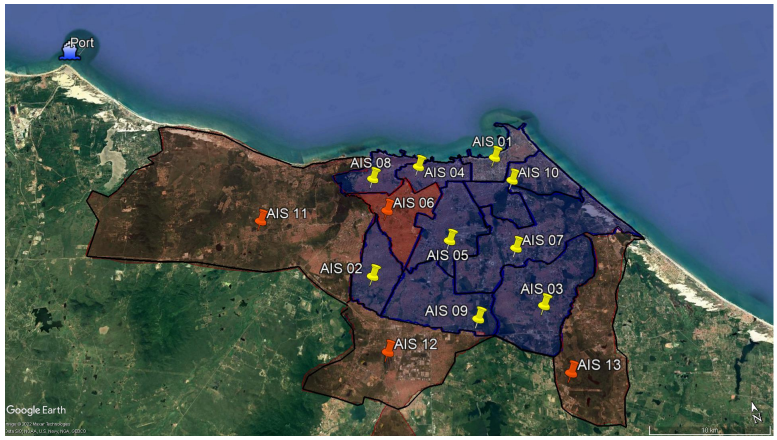
Notes: The coefficients β_1 and β_2 show the change in the number of violent deaths during Military and Civil Police strikes respectively. All errors are clustered at the state level.

Table A.17: The effect of Police strikes on gang-related homicides - Total and Age

	Dependent Variable	β_2	**95% Confidence Interval**	
			Lower	Upper
$PM_{Strike} * GangTurfs$	Total Homicides	1.023	0.205	1.841
	Homicides (<15)	0.027	-0.113	0.168
	Homicides (15-45)	0.807	0.171	1.443
	Homicides (>45)	0.189	-0.067	0.445

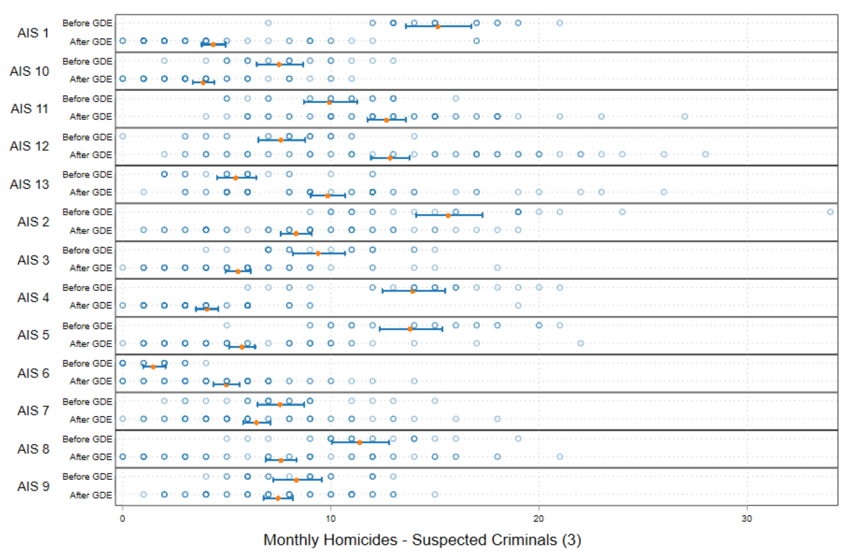
Notes: $PM_{Strike} * GangTurfs$ reports the effect on violent deaths in gang territories. All errors are clustered at the district level.

Figure A.4: Districts of Fortaleza/CE



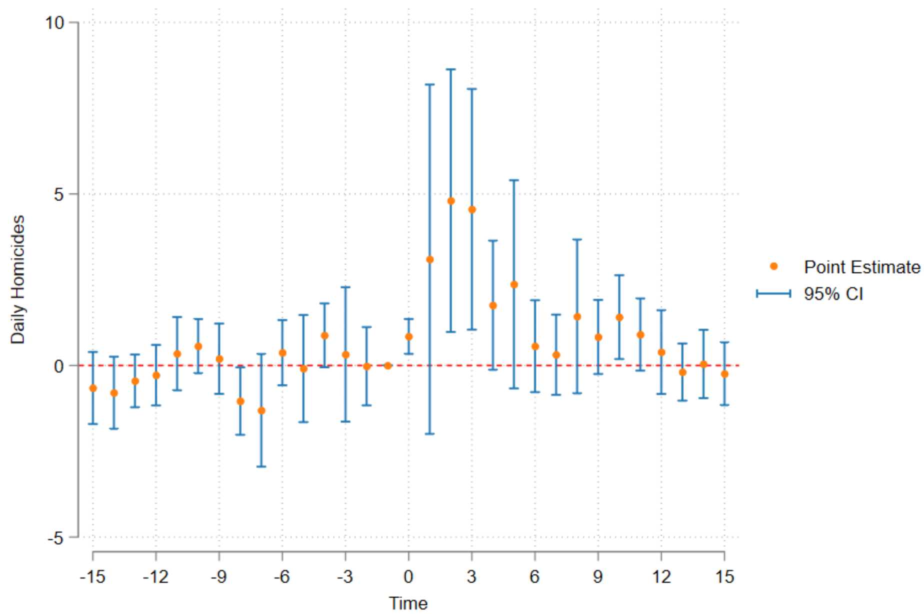
Notes: The map highlight Integrated Areas of Security ("AIS") in the metropolitan region of Fortaleza according to the State Secretary of Ceará.

Figure A.5: Treated and Control Group specification



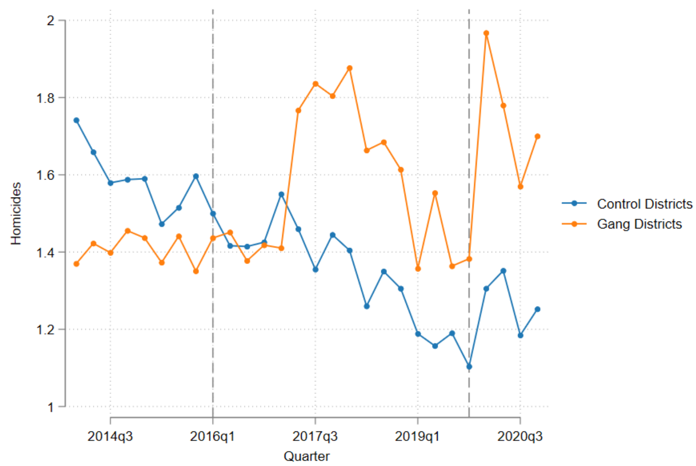
Notes: Using a t-test at a 95% confidence level we see that Districts 6, 11, 12 and 13 present a significant increase in monthly homicides of suspected criminals.

Figure A.6: Event Study - Military Police Strikes



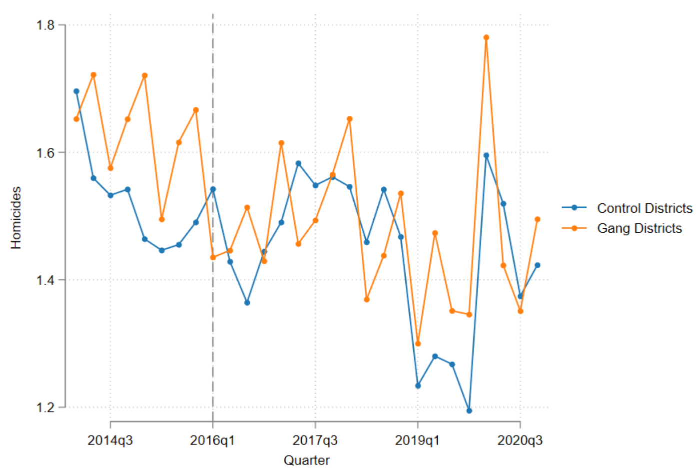
Notes: There is no clear evidence of a previous trend in homicides before the beginning of a Military Police Strike. The increase in violent deaths is significant and it lasts for couple of days.

Figure A.7: Treated and Control Group - Pre and Post Trend



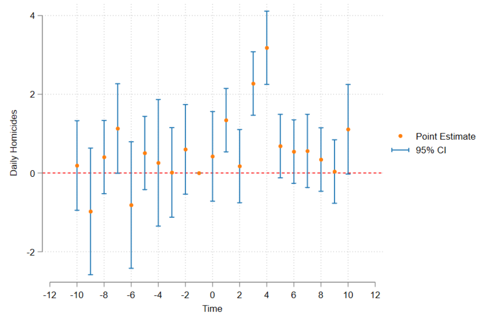
Notes: The first vertical red line indicates the entry of GDE in the first quarter of 2016 and the second one shows the quarter before the Military Police strike.

Figure A.8: Falsification Test - Pre and Post Trend

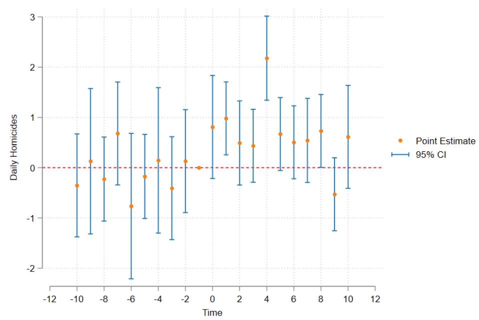


Notes: A random assignment of target and non-target districts do not show significant differences in homicides following the military police strike.

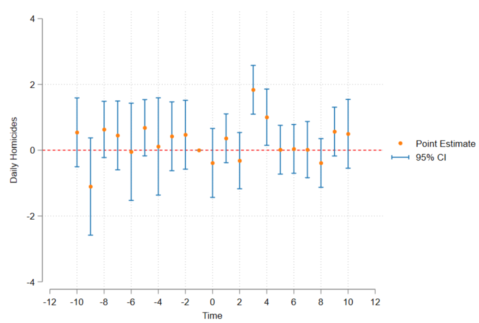
Figure A.9: Event Study - Police Strikes in Criminal Gang Turfs



(a) Total Homicides



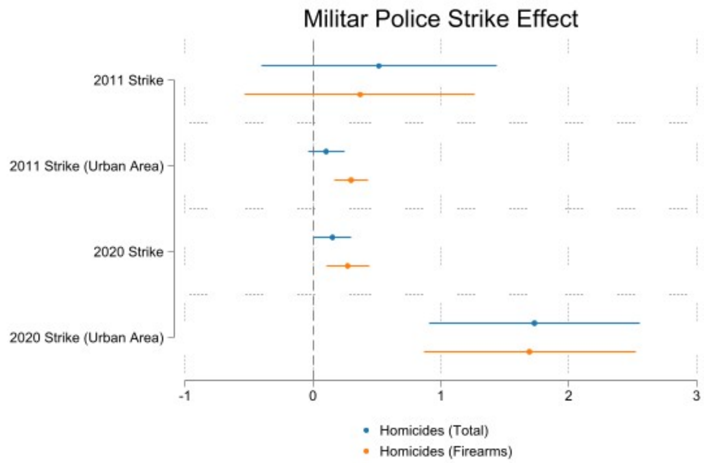
(b) Any Criminal Records



(c) No Criminal Records

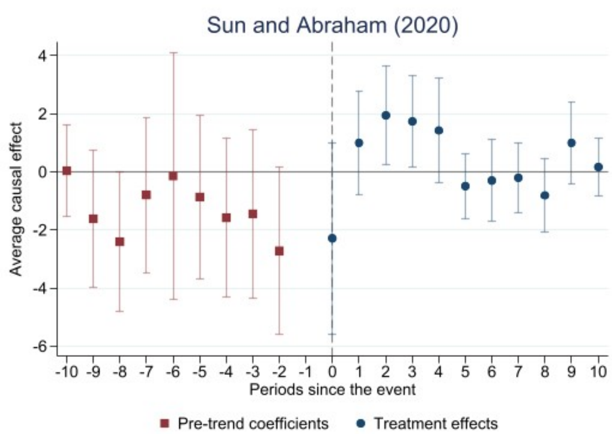
Notes: There is no clear evidence of a previous trend in homicides before the beginning of a Military Police Strike in contested turfs of Ceará. The increase in violent deaths is significant and lasts for a few days.

Figure A.10: Military Police Strike 2011 x 2020



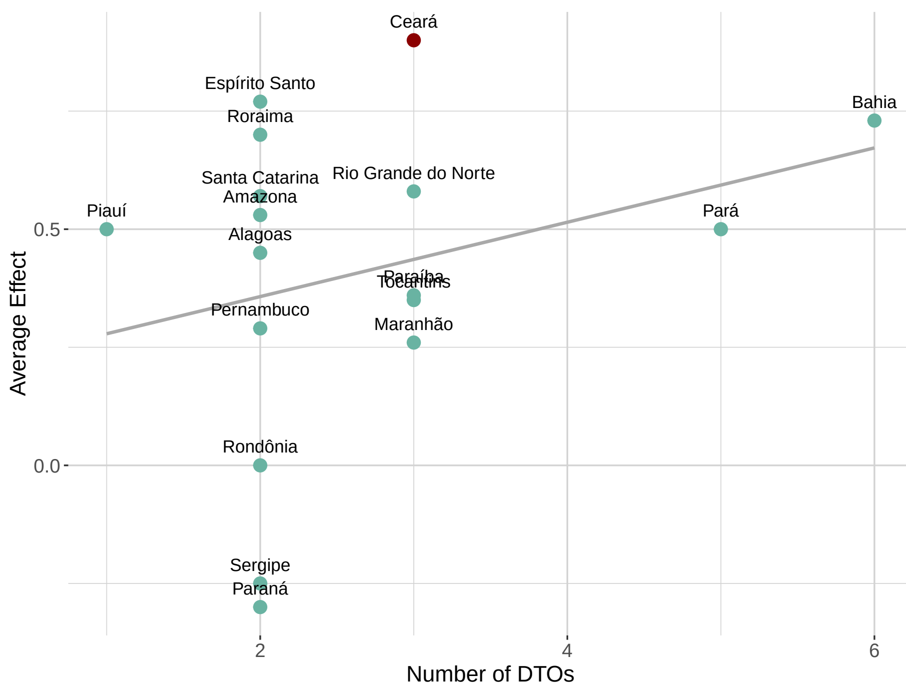
Notes: The increase in violent deaths in the 2020 Police Strike (when CV faced the competition of GDE by the control of criminal gang turfs in Ceará) is larger than what happened in the 2011 Police Strike (when CV had a hegemonic position).

Figure A.11: Robustness - Event Study State Level



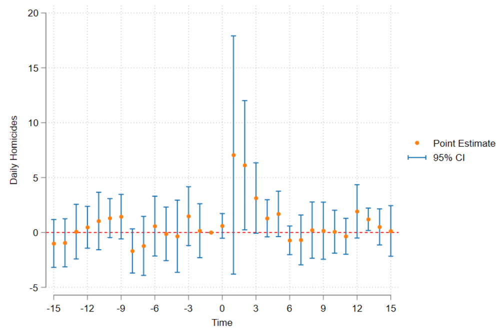
Notes: Testing the event-study specification proposed by Sun and Abraham (2021) the results are qualitatively similar.

Figure A.12: Police Strikes - Average Increase in Homicides by Number of DTOs

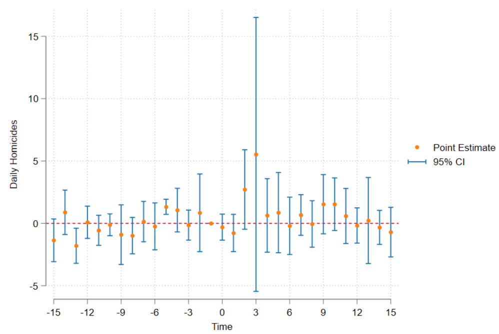


Notes: This figure shows that there is a positive correlation between the number of DTOs and the increase in homicides following police strikes. The case of Ceará is remarkable since the state shows the largest proportional increase in fatalities.

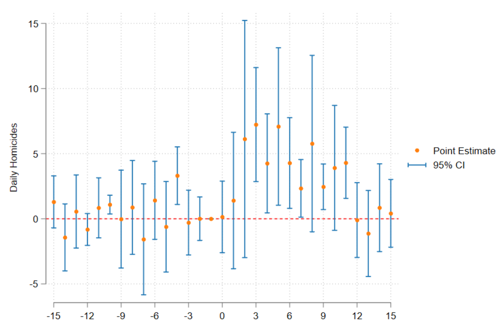
Figure A.13: Heterogeneous Effect by strike duration



(a) Small Events



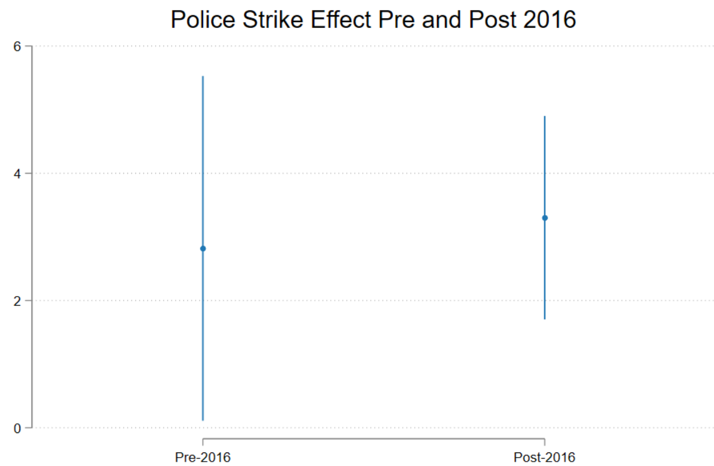
(b) Medium Events



(c) Large Events

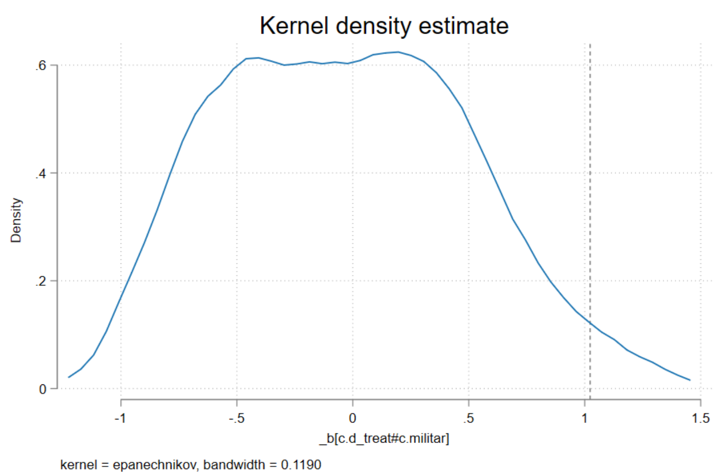
Notes: There is no clear evidence of a previous trend in homicides before a Military Police Strike outbreak. Events longer than 11 days seem to be resilient affecting homicides.

Figure A.14: Police Forces Strikes - Pre and Post 2016



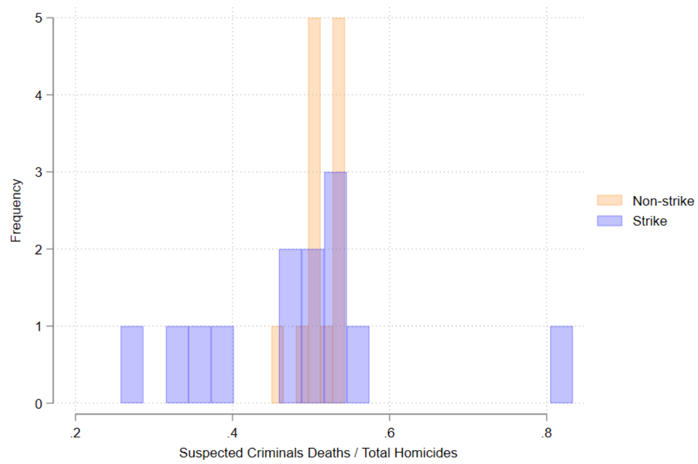
Notes: This figure shows that the effect of strikes that occurred after 2016 on daily homicides is 17% larger than the average effect of strikes prior to 2016.

Figure A.15: Randomization of Gang Districts (Treated Units)



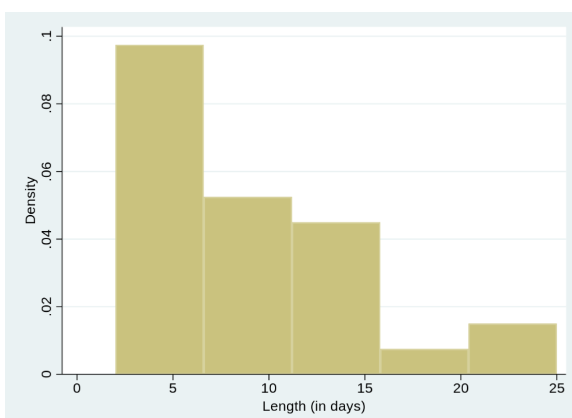
Notes: This figure shows the distribution of the coefficient β_2 of Equation 5 across all possible combinations of districts as the treatment group. Most combinations yield zero or negative coefficients and few show a value closer to the estimates of $\beta_2 = 1.023$ of our baseline specification.

Figure A.16: Proportion of suspected criminal deaths in total homicides by district



Notes: This figure shows the distribution of the ratio of suspected criminal deaths in total homicides by the districts of Ceará. The distribution in non-strike days (*orange shaded area*) is concentrated on the average while on strike days there is a spread of the distribution around lower and extreme values across districts.

Figure A.17: Military Police Stikes - Histogram (2000-2020)



Notes: Most of the strikes last less than seven days. I exploit this variation to assess the heterogeneous effects of the event by length.

Appendix B. Extensions of the Theoretical Model

Appendix B.1. Including dynamics in the model

In Section 3, I present a static version of a two-gang model engaged in territorial disputes over an area denoted as V. If we consider that these gangs are continuously fighting for control of drug trafficking over an extended period, it is reasonable to assume that they take into account not only the current status quo but also future dividends associated with maintaining the *status quo* division or acquiring new territories.

Let's assume that Gangs $g = A$ and $g = B$ have the same discount factor τ, meaning the present value of the flow of drug trafficking rents in dispute can be expressed as the sum of an infinite geometric progression given by $V' = \frac{V}{(1-\tau)}$. Similarly, the present value of the status quo division for each gang g is $Q'_g = \frac{Q_g}{(1-\tau)}$.

As a result, we can modify Equation 3 to account for the future value of drug trafficking rents in the decision to initiate a war:

$$\begin{aligned} p_g * \frac{V}{L_C} * \frac{1}{(1-\tau)} - \frac{(Q_g)}{L_C} * \frac{1}{(1-\tau)} - \frac{(L_g)}{L_C} > p_C \\ p_g * \frac{V * \alpha}{L_C} - \frac{(L_g + Q_g * \alpha)}{L_C} > p_C \end{aligned} \tag{B.1}$$

Here, $\alpha = \frac{1}{(1-\tau)} > 1$, assuming a discount factor $0 < \tau < 1$. Introducing dynamics affects the results depicted in Figure 1 in two main ways:

Intercept. After introducing the discount factor, for $p_c = 0$, we have

$$p_g = \frac{(L_g + Q_g * \alpha)}{V * \alpha} = \frac{L_g}{V * \alpha} + \frac{Q_g}{V} \tag{B.2}$$

with a discount factor $\alpha > 1$, the expression above is smaller than the static version of the model. This means that the curve shifts to the left, resulting in a wider range of combinations that could trigger a war following a reduction in police surveillance. The intuition behind this result is straightforward: considering all the future rents of expanding a drug trafficking territory, there is a larger set of combinations leading to war following a police strike.

Slope. Setting $p_g = 0$ in Equation B.1, we obtain

$$p_c = -\frac{(L_g + Q_g * \alpha)}{L_c} = -\frac{L_g}{L_c} - \frac{Q_g * \alpha}{L_c} \tag{B.3}$$

and therefore the slope of Figure 1 becomes more negative when considering the discount factor. This change means that gangs are now less sensitive to changes in the probability of police intervention. For example, given the same decrease in p_c, a gang with a small probability of victory would not decide to start a war. The intuition is that when considering the future rents of drug trafficking, gangs require a larger push, given that they have more to lose if they do not defeat their rival.

Appendix B.2. A example of bargaining

This section discusses an example of bargaining within the context of the baseline model. In Scenarios 2 and 4 (as shown in Figure 3), only one gang decides on conflict, while the other prefers peace. In such cases, due to the high costs associated with conflicts, a bargaining range emerges, meaning the gang that chooses not to engage in a confrontation during a police strike would prefer to avoid a costly war.

Let's suppose that in time t, both gangs realize that the military police will initiate a strike. Gang A decides to attack the rival, while gang B prefers to keep the *status quo* and avoids a costly conflict. In a multiple-period game, a good approximation for this scenario is assuming that $D_A(t+1) > D_A(t)$ and $D_B(t+1) = D_B(t)$, i.e., gang A's expected payoff in a conflict increases in the next period, whereas gang B's expected payoff remains unchanged.

In this setting, the minimum territorial division that gang A would accept to avoid war during a police strike would be the difference between the total amount of drug trafficking rents and its increased expected payoff:

$$\frac{V}{(1-\tau)} - D_A(t+1) \tag{B.4}$$

If the minimum territorial division proposed by gang A is less than gang B's expected payoff from confrontation, there is no bargaining range, and gang B would also choose war. Thus, this condition can be expressed as:

$$D_B(t) > \frac{V}{(1-\tau)} - D_A(t+1) \tag{B.5}$$

By rearranging terms and subtracting $D_A(t)$ from both sides of Equation B.5, we obtain the following condition:

$$D_A(t+1) - D_A(t) > \frac{V}{(1-\tau)} - [D_A(t) + D_B(t)] \tag{B.6}$$

The left side of Equation B.6 represents the shift in gang A's expected payoff caused by the police strike, while the right side is the bargaining range. In other words, it is the difference between the total amount of drug trafficking rents and what each gang could ensure in the *status quo*. Therefore, when there is a bargaining range, it is possible that gangs decide to accommodate instead of fighting, even in a context where at least one of them could potentially gain by attacking the rival during a police strike.