Taking away the guns:
Forcible disarmament and rebellion

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Abstract

If a government is facing an armed uprising, why doesn't it confiscate all privately-owned weapons? When and where is forcible disarmament most likely to occur? Can forcible disarmament reduce rebel activity? To establish a monopoly on the use of force, a government must either convince its citizens not to rebel, or remove their capacity to do so. Existing literature has left this choice – between punishment and disarmament – virtually unexplained. Most existing research focuses on disarmament in the context of post-conflict stabilization, rather than forcible disarmament during war. I introduce a mathematical model of irregular warfare, in which government and rebel forces seek a monopoly on violence. The model shows that disarmament occurs mainly in 'hard cases,' where otherwise strong governments are unable to punish opponents or reward supporters. I test these claims with declassified archival data on counterinsurgency in the Soviet North Caucasus. The data confirm that disarmament was most likely where the government's coercive leverage was limited – due to poor intelligence and potential backlash from collateral damage. In these otherwise challenging circumstances, disarmament significantly reduced rebel violence – short-term and long-term, locally and region-wide. By limiting the potential coercive resources under the opposition's control, disarmament can render rebels unable to sustain a campaign of violence against the state.

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To establish a monopoly on the use of force, a government must either convince its citizens not to rebel, or remove their capacity to do so. Why do governments forcibly disarm their subjects in some cases, but not in others? What is the effect of disarmament on rebel activity?

The current essay examines the choice between punishment and disarmament in civil conflict. Using a mathematical model of coercion, I show that incentives for forcible disarmament are strongest in 'hard cases,' where otherwise strong governments lack the information needed to punish opponents, or the local means to reward supporters. Unable to deter rebellion, such a government must either employ a massive level of force to compensate for its shortcomings, or concede the battle to the rebels. Disarmament offers a brute force solution to this dilemma: by preventing civilians from pooling privately-held arms, the government can limit the coercive capacity of the opposition, in the absence of local popular support.

I test these propositions with declassified micro-level data on early Soviet disarmament efforts in the North Caucasus. Between 1921 and 1925, Soviet forces disarmed parts of Chechnya, Dagestan and neighboring republics, while allowing weapons to circulate elsewhere. Soviet authorities kept records on when and where such operations took place, and what effects they had on subsequent levels of violence.

The data show that disarmament occurred where conventional counterinsurgency failed – due to poor intelligence and potential backlash from collateral damage. Facing a choice between inaction and widespread indiscriminate violence, the Soviets took a third path: denying potential rebels – and the population at large – the means to organize violence. Where disarmament occurred, it significantly suppressed rebellion.

This study's contribution is threefold. First, it opens a new front in the conflict resolution literature, which has focused mainly on consensual disarmament following a negotiated settlement, rather than forcible disarmament during war. Second, it extends existing theoretical models of irregular war by formalizing disarmament as a brute force alternative to

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coercive violence, and derives several propositions about when and where disarmament is likely. Third, it offers initial empirical evidence, at the subnational level, for both the determinants and consequences of forcible disarmament during an armed conflict. It also offers several suggestions for future research, at the cross-national and sub-national levels.

The challenge of disarmament

Perhaps the most direct means of limiting opponents' capacity to resist is to take away their guns. Even if rebels can overcome collective action problems associated with mobilizing support for insurrection, they must still organize and maintain a campaign of violence against the state. Pivotal to the success of this campaign is the group's control over organized means of coercion, including the ability to pool privately-held arms. As Tilly (1997: 7.44) writes, 'the greater the coercive resources [. . .] controlled by the revolutionary coalition, the more likely a transfer of power.'

To establish a stable monopoly on violence, a government must ensure that its rivals are either unwilling or unable to mobilize these resources against it. One option is to use *punishment* – arresting or killing opponents, and increasing the relative costs of insurrection. This coercive logic is the focus of most contemporary research on civil conflict (Leites & Wolff, Jr., 1970; Mason & Krane, 1989; Kalyvas, 2006). Another option is *disarmament* – collecting, documenting, controlling and discarding privately-owned arms, ammunition and explosives, and reducing the population's capacity for rebellion. Unlike coercion, disarmament is generally not 'intended to shape the behavior of a targeted audience by altering the expected value of a particular action' (Kalyvas, 2006: 26). Rather than deterring support for rebels, disarmament limits rebels' escalatory potential.

Civil conflict literature has examined disarmament primarily in the context of post-conflict stabilization, peacekeeping and mediation (Walter, 1997; Mattes & Savun, 2009; Mason, 2012). Here, disarmament is mostly consen-

sual. It follows a negotiated settlement or decisive military victory, with the explicit agreement of all sides. Members of the population willfully surrender arms in exchange for protection, payments, or promises thereof.

Scholars have devoted less attention to disarmament during the active phase of armed conflict. Here, individuals have fewer incentives to voluntarily disarm. Where a state is unable to enforce laws or defend property rights, weapons confer defensive and economic power to their owners. By disarming entire communities, the government renders them incapable of self-defense, vulnerable to predation, unable to credibly police themselves or threaten reprisals (Gluckman, 1955; Fearon & Laitin, 1996). This reluctance to self-disarm complicates the transition from privately-supplied security to centralized coercive power (Bates, 2001: 65).

Given the often intractable challenges of consensual disarmament, many governments and peacekeepers have opted to confiscate weapons by brute force. *Forcible disarmament* involves the compulsory collection and disposal of privately held arms, against the will of the party being disarmed. Recent examples during multidimensional peacekeeping and peace enforcement missions include Somalia, Liberia, Haiti and Bosnia, where multinational forces attempted to disarm non-compliant militias.

Forcible disarmament may also occur in the absence of a settlement or decisive victory – while bullets are still flying. Here, disarmament does not seek to enforce compliance with an existing agreement, or to consolidate power after military victory. It is the means to achieve this victory. Operationally, forcible disarmament entails cordoning off a populated area, followed by the search and seizure of all arms in the locality.

The Central African Republic became the site of one such campaign in December 2013, when French and African Union forces began a major operation to disarm rival Seleka and Anti-Balaka militias. In neighborhoods of Bangui where militias were active, troops went door to door confiscating weapons and munitions, and rounding up group leaders. The operations were not immediately successful, often meeting armed resistance.

To date, there has been little, if any, rigorous evaluation of why governments use forcible disarmament, or whether this practice is effective in reducing violence. The conventional wisdom among policy analysts is that such methods are extremely costly, to the forces conducting them as well as to civilians. A recent study of such operations in Uganda's Karamoja region concluded that 'Ugandan military operations to forcibly disarm the Karimojong [...] have destabilized an already volatile security situation' (Bevan, 2008: 17). Observers have similarly criticized a 2006 South Sudanese disarmament campaign in central Jonglei for 'considerable human rights violations, significant internal displacement, and wide-scale looting and food insecurity' (Berman, 2008).

Despite these criticisms, policymakers in unstable regions continue to see forcible disarmament as a potentially fruitful way to reassert state power. In response to the assassination of a senior intelligence official in July 2012, Tajikistan's President Emomali Rakhmon ordered his security forces to disarm militias in the city of Khorog. The resulting operation seized 251 light arms and over 20,000 rounds of ammunition, and claimed the lives of 12 servicemen and 30 rebels (Yuldashev, 2012). In January 2009, Rwandan Defense Forces moved to encircle and disarm the town of Jomba in the Democratic Republic of Congo, where loyalists of Laurent Nkunda had taken refuge. In March 2012, in response to continuing inter-communal violence in Jonglei, South Sudan launched a new statewide disarmament campaign, 'Operation Restore Peace,' which human rights groups again condemned for alleged abuses of civilians.

Why do governments forcibly disarm their subjects in some cases, but not in others? Is disarmament more effective at reducing rebel activity than coercion? To help answer these questions, I develop a theoretical model of disarmament.

The logic of forcible disarmament

Imagine a conflict zone populated by two combatants – government forces and rebels – and a group of neutral civilians. Sovereignty is divided between the combatants, each of whom seeks a monopoly on the use of force – locally, regionally or country-wide. They pursue this goal by extracting the resources needed to maintain military operations and establish a viable state (Tilly, 1985) – principally taxes, intelligence and manpower – while denying these same resources to their opponent. Combatants cannot collect these resources without civilian cooperation. Given the costs and benefits of supporting the government or rebels, civilians cooperate with one of the two sides or remain neutral.

I begin by examining disarmament in a scenario where combatants rely exclusively on punishment to shape civilian behavior. I show that disarmament can facilitate a government monopoly if the government faces few constraints on the use of force, but its local coercive leverage is limited by poor intelligence. I then consider a more complicated scenario where combatants use rewards, as well as punishment, to attract support. I show that governments are more likely to use disarmament where they cannot offer a competitive package of private goods to their supporters. In sum, disarmament should occur where otherwise strong governments are locally weak – unable to punish opponents or reward supporters.

(Table I)

Disarmament and punishment

Let G_t and R_t denote the sizes of government and rebel forces at time t. Let C_t denote the size of the neutral civilian population at time t. Let $\pi_G(\mathbf{s}) = \frac{G_{eq}}{G_{eq} + R_{eq}} \in [0, 1]$ denote the government's payoff from strategy set $\mathbf{s} = \{s_G, s_R, s_C\}$, or the government's share of public support at equilibrium. Similarly, let $\pi_R(\mathbf{s}) = \frac{R_{eq}}{G_{eq} + R_{eq}} \in [0, 1]$ denote the rebels' payoff. An

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equilibrium outcome with $\pi_G = 1, \pi_R = 0$ is a *government victory*, in which the rebel population converges to zero and the government establishes a monopoly on the use of force. An outcome with $\pi_G = 0, \pi_R = 1$ is a *rebel victory*. Let $\pi_C\{\mathbf{s}\} = -\kappa \in (-\infty, 0]$ represent civilians' payoffs, defined as the costs inflicted on civilians by combatants' violence.

Combatants maximize their shares of popular support by increasing the costs of cooperation with their opponents' group, which in practice means arresting, assassinating or otherwise punishing that group's supporters. Let $s_R: \rho_R \in [0, \rho_R^{max})$ be the intensity of rebel punishment of government supporters and $s_G: \rho_G \in [0, \rho_G^{max})$ be the intensity of government punishment of rebels. ρ_R^{max} and ρ_G^{max} are exogenous upper bounds on punishment, as determined by budgetary, normative or logistical constraints. As the relative intensity of punishment inflicted against a group increases, civilian cooperation with that group becomes more costly.

The costs combatant $i \in \{G, R\}$ inflicts on its opponent depend on the selectivity of its violence ($\theta_i \in (0, 1)$), defined as the intelligence needed to correctly identify and target one's opponents. Where selectivity is high ($\theta_i \to 1$), combatant i can punish opponents with high accuracy, and the attrition rate converges to ρ_i. If selectivity is imperfect ($0 < \theta_i < 1$) – due to difficulties in surveillance, or a lack of tips from the local population – some fraction of the violence will reach its intended targets ($\rho_i \theta_i$), but the remainder will indiscriminately harm neutral civilians ($\rho_i(1 - \theta_i)$).

Civilians try to minimize these costs by staying neutral or supporting one of the two combatants. If civilians support G or R, they will accrue costs proportional to levels of selective violence inflicted against that group. If civilians stay neutral, they will accrue costs in proportion to overall indiscriminate violence directed at civilians.

Let $s_C: \mu_i \in [0, 1]$ be the rate of civilian cooperation with group i. If civilians are driven foremost by security concerns, they will cooperate with G and R based on relative rates of survival in each group. An expression for μ_i must then be monotonically decreasing in the costs inflicted selectively

against i and non-negative for all levels of punishment. One formulation that meets these conditions is:

$$\mu_R = 1 - \frac{\rho_G \theta_G}{\rho_G + \rho_R} \tag{1}$$

$$\mu_G = 1 - \frac{\rho_R \theta_R}{\rho_G + \rho_R} \tag{2}$$

If G can inflict more selective violence against R than R can against G ($\rho_G \theta_G > \rho_R \theta_R$), C will cooperate with G at a higher rate ($\mu_G > \mu_R$).

These dynamics comprise a system of ordinary differential equations

$$\frac{\delta C}{\delta t} = k - \left(\mu_R R_t + \mu_G G_t - \rho_R (1 - \theta_R) - \rho_G (1 - \theta_G) - u \right) C_t \tag{3}$$

$$\frac{\delta G}{\delta t} = (\mu_G C_t - \rho_R \theta_R - u) G_t \tag{4}$$

$$\frac{\delta R}{\delta t} = (\mu_R C_t - \rho_G \theta_G - u) R_t \tag{5}$$

where $\frac{\delta i}{\delta t}$ is the growth of group i over time, k is an immigration parameter and u is natural deaths due to disease, disasters and other exogenous factors that afflict civilians and combatants equally.

As the fighting unfolds, the system in Equations (3)-(5) will converge to either a government or rebel victory. Since the two equilibria are symmetrical, the following discussion examines conditions for government victory only.

Proposition 1. *A government victory equilibrium is stable if and only if the government's rate of selective violence is greater than that of the rebels.*

Corollary 1.1. *The government punishes at a higher rate if its selectivity is low.*

Proof. See online appendix.

Government victory requires cooperation with the rebels to be more costly than cooperation with the government. The equilibrium balance of public

support depends on the selective violence ratio, $\frac{\rho_G \theta_G}{\rho_R \theta_R}$. When this ratio is greater than 1, government forces have a *coercive advantage* and can inflict costs on the rebels at a higher rate than the rebels can against them.

In this benchmark case, equilibrium behavior is one of mutual escalation. If combatant i punishes at level $\rho_i > \rho_{-i} \frac{\theta_{-i}}{\theta_i}$, the opponent will respond by escalating ρ_{-i} to at least $\rho_i \frac{\theta_i}{\theta_{-i}}$. The two sides do not escalate equally. Where rebels enjoy an advantage in selectivity ($\theta_R > \theta_G$), the government must use a disproportionately high level of force to break even ($\rho_G > \rho_R$). If the two sides face the same constraints on the use of force ($\rho_G^{max} = \rho_R^{max}$), the government will reach this upper bound before the rebels do.

If Proposition 1 is true, how can informationally-poor counterinsurgents possibly defeat rebels, without killing scores of innocent civilians? Let $h \in [0,1]$ denote the proportion of privately-held arms the government confiscates from the population. At higher levels of h, rebel military operations inflict less damage per unit of effort on both government forces and civilians. I assume that disarmament is less informationally intensive than punishment, and the government can conduct house-to-house searches in the absence of a prior tip. However, disarmament is costly, and takes limited resources away from punishment, $\rho_G \leq \rho_G^{max} - h$.

This modification yields new cooperation rates

$$\mu_R^* = 1 - \frac{\rho_G \theta_G}{\rho_G + (1-h)\rho_R} \tag{6}$$

$$\mu_G^* = 1 - \frac{(1-h)\rho_R \theta_R}{\rho_G + (1-h)\rho_R} \tag{7}$$

and a new system of equations

$$\frac{\delta C}{\delta t} = k - \left(\mu_R^* R_t + \mu_G^* G_t - (1-h)\rho_R(1-\theta_R) - \rho_G(1-\theta_G) - u \right) C_t \quad (8)$$

$$\frac{\delta G}{\delta t} = (\mu_G^* C_t - (1-h)\rho_R \theta_R - u) G_t \quad (9)$$

$$\frac{\delta R}{\delta t} = (\mu_R^* C_t - \rho_G \theta_G - u) R_t \quad (10)$$

Proposition 2. *If the government confiscates a sufficiently large share of privately-held arms, selective violence advantage is not necessary for victory.*

Corollary 2.1. *The government disarms at a higher rate if its selectivity is low.*

Proof. See online appendix.

If the government can regulate the supply of privately-held arms, then selective violence ceases to be an indispensable condition for victory. A government that disarms at a sufficiently high rate can win the contest despite a coercive disadvantage, and rebels can lose despite a coercive advantage. The outcome depends on a critical value for disarmament,

$$\underline{h} = 1 - \frac{\rho_G \theta_G}{\rho_R \theta_R} \quad (11)$$

where $\underline{h}$ is the minimum rate of disarmament needed to ensure a stable government victory equilibrium. This threshold value depends on the scope of the government's coercive disadvantage ($\rho_R \theta_R - \rho_G \theta_G$). No disarmament is needed if the government can already inflict more costs on the rebels than the rebels can against the government $\left(\rho_G > \rho_R \frac{\theta_R}{\theta_G} \right)$. Where it cannot do this $\left(\rho_G < \rho_R \frac{\theta_R}{\theta_G} \right)$, $\underline{h}$ is increasing in the difference $\rho_R \theta_R - \rho_G \theta_G$.

The relative cost-effectiveness of disarmament depends on the government's budgetary and normative constraints. For states less constrained in the use of force ($\rho_G^{max} > 1$), disarmament will always produce more cooperation per unit of effort than punishment ($\frac{d\mu_G^*}{dh} > \frac{d\mu_G^*}{d\rho_G}$). For states of more

limited escalatory potential ($\rho_G^{max} \leq 1$), punishment is more efficient.

Disarmament and rewards

How do incentives to disarm change if civilians respond to positive as well as negative inducements? Rather than terrorize civilians into submission, a combatant may co-opt civilian support by offering rewards for cooperation, such as land, loot, or other private goods. We will assume that these rewards are distributed in wartime, and do not depend on the probability of either side's success. Let $\mu_i^{\dagger} = \mu_i^{*} + \iota_i$ be the resulting cooperation strategy, where μ_i^{*} is cooperation due to coercion, as defined in 6-7, and $\iota_i \in [0, \infty)$ is the size of the reward package combatant i offers to its supporters.

Proposition 3. *Disarmament is necessary for government victory if the government has a selective violence disadvantage and/or government rewards are too low.*

Corollary 3.1. *The government disarms at a higher rate if its reward package is low.*

Proof. See online appendix.

If cooperation depends on both punishment and rewards, selective violence ceases to be an indispensable condition for victory. A combatant offering sufficiently generous rewards can win despite a selective violence disadvantage; a combatant who offers too little can lose despite an abundance of coercive leverage. For a government monopoly to be stable, the rate of disarmament must be at least

$$\underline{h}^* = 1 - \frac{(\mu_G^* + \iota_G)(\rho_G \theta_G + u)}{(\mu_R^*)\rho_R \theta_R} + \frac{u}{\rho_R \theta_R} \tag{12}$$

This expression is monotonically decreasing in ι_G.[1] An increase in the government's rewards, in other words, reduces the minimum amount of

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[1]See online appendix for full derivation.

disarmament needed to negate the rebels' coercive advantage. Yet disarmament is only more cost-effective than co-optation if rebel selectivity is relatively high ($\frac{d\mu_G^\dagger}{dh} > \frac{d\mu_G^\dagger}{d\iota_G}$ if $\theta_R > \frac{(\rho_G+(1-h)\rho_R)^2}{\rho_G\rho_R}$). The same is true for punishment ($\frac{d\mu_G^\dagger}{d\rho_G} > \frac{d\mu_G^\dagger}{d\iota_G}$ if $\theta_R > \frac{(\rho_G+(1-h)\rho_R)^2}{(1-h)\rho_R}$).

In sum, incentives to forcibly disarm the population are greatest where otherwise strong governments are locally weak. For governments with few constraints on the use of force, but limited local ability to deter opponents and reward supporters, disarmament is the most cost-efficient option available. Where these conditions do not hold, disarmament is unnecessary and unjustifiably expensive.

Violence in the North Caucasus, 1920's

In the early 1920's, Russia's North Caucasus region was gripped by rebellion, political violence and the emergence of parallel Islamic governing structures that directly challenged the sovereignty of the nascent Soviet state. By late 1925 the uprising had subsided, and the Soviets asserted a near-monopoly on the use of force and policymaking. Historians are divided over how this result came about. Some attribute the region's pacification to the use of forcible disarmament in key violent hot spots (Aptekar', 1995a,b; Galitsky, 2009). Others argue that disarmament occurred in 'easy cases' where violence was already on the decline; if one accounts for this selection process, disarmament was unnecessary and perhaps even counterproductive (Zhupikova, 1998; Gakaev, 1997). Although archival data exist on when and where disarmament occurred, there have be no quantitative attempts to identify its impact on violence.

After the Bolshevik Revolution of 1917, the North Caucasus – a vast mountainous region between the Black and Caspian Seas – was one of the last pieces of Russian territory to come under Soviet rule. Home to an ethnically and economically diverse population of Cossacks, mountain tribes,

wealthy landowners and peasants, this resource-rich region had been one of pre-revolutionary Russia's main agricultural and industrial centers, accounting for over 40% of grain exports, and 75 and 20% of coal and oil production (Kozlov, 1977).

During the Russian Civil War in 1918-1919, the region became a bastion of the anti-Communist White Movement, thanks to the patronage of influential and conservative local clerics, landowners, merchants and industrialists (Zhupikova, 2006: 104). After General Anton Denikin's counter-revolutionary Armed Forces of South Russia retreated to Crimea in August 1919, many of his supporters dispersed across southern Russia and waited with trepidation for the Bolshevik arrival. Demobilized pro-Communist civil war veterans, meanwhile, quickly became a liability for the new government. As Lenin (1970: 16–17) observed, 'the peasant army's demobilization leaves behind hundreds and thousands of broken, restless people, who are accustomed only to war as their occupation.'[2]

Initial attempts to assert Soviet power in the region were fraught with difficulties. The Communists struggled to implement radical and deeply unpopular political reforms, often at the expense of postwar economic recovery. Even the Bolsheviks' wartime allies – like Chechens and other highlanders with historical grievances against the deposed regime – grew frustrated with the inefficiencies of Soviet administration, food shortages, rationing and requisitioning of grain and livestock (Russian State Archive of Socio-Political History, RGASPI, 1920a: 4). By late 1920, the area around Terskaya Oblast became a hotbed of insurrection, as rural authorities unwilling to implement reforms began to publicly encourage anti-government demonstrations and boycotts (RGASPI, 1920b: 72). In a classified report from 12 July 1921, the North Caucasus Military District's (SKVO) Main Intelligence Directorate described a rapidly accumulating set of grievances:

> Fundamentally poor management by organs of Soviet power,

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[2]All quotations from Russian sources translated to English by author.

frequent use of repression, [...] unaccountable administration and criminal abuse of power, ... a ban on free commerce, annulment of currency, general disarray in agriculture, transport and industry, have undercut regional quality of life and killed the initiative of freedom-loving Cossacks and highlanders – all of this has deeply angered the population, which has become ready to support any anti-Soviet action in the hope of liberating itself from the new order. [...] the more active elements of the population are beginning to leave for the mountains and forests, to form armed units in opposition to local Soviet authorities (Russian State Military Archive, RGVA, 1921: 1).

Initially organized into small, autonomous armed groups without a central command structure, the rebels (or *bandits*, in official parlance) began carrying out raids on Soviet outposts, with the aims of paralyzing state-building efforts and 'avenging previous instances of repression' (RGVA, 1921: 1).

The rebellion gradually became more sophisticated in its coordination and planning, and adopted unified military-political objectives. The focus of rebel activity turned to the seizure of strategic choke points and fortified areas, and the destruction of Soviet logistical hubs, railroads and supply dumps. During raids, 'the bandits killed mainly newly-arrived Soviet personnel and did not touch [locals], as long as the latter remained neutral' (RGVA, 1921: 1).

As the violence unfolded, its locus shifted from the plains of Stavropol' and Kuban' to the rugged, forested terrain of Chechnya, Ingushetia and Dagestan, where a group of charismatic clerics – most notably Nazhmutdin Gotsinskiy, Ali Gadzhi Akushinskiy and Imam Shamil's grandson Said-Bek – led a series of pan-Islamic uprisings to establish a regional monarchy based on Sharia law. By 1923, these movements had erected elements of a parallel state. In the vicinity of Dargo on the Chechen-Dagestani border, Soviet governing structures effectively co-existed with ones loyal to Sheikh Akushinskiy (Galitsky, 2009: 41). Sharia courts oversaw almost all

legal proceedings. Clerical authority in Chechnya was so great, that 'it was impossible to organize a single public gathering without their approval' (Zhupikova, 2006: 124-125).

Over time, the violence in the region began to feed itself, blurring the distinction between an armed struggle for political objectives and the opportunistic exploitation of instability for economic gain. Regular kidnappings, train robberies, and looting had paralyzed economic development (RGVA, 1924: 1).

Soviet efforts to pacify the region were problematic from the start. The Army's conventional doctrine and tactics proved ineffective against mobile guerrilla opponents. As SKVO intelligence reported at the time, 'Operations against bandits forced regular units to outrun their logistics and rear services, and inevitably led to the Army's reliance on self-supply at the expense of the local population, which provoked the latter's exasperation and increased sympathies for the bandits' (RGVA, 1921: 1).

More fundamental challenges stemmed from the Soviets' considerable informational disadvantage. Government power in the region rested on 'Soviet administrators dispatched from the center, unfamiliar with the region's ethnic and cultural composition,' while the rebels 'maintained a network of informants, organized on the basis of a supportive population' (RGVA, 1921: 1). This intelligence asymmetry complicated efforts to locate and identify the government's opponents. As one intelligence report notes,

> combat in populated areas required fully knowledgeable and reliable guides, but in Chechnya one could not even rely on [Communist] Party members. Local guides confused unit operations, perhaps even knowingly. [...] Civilians on the street concealed the movements of insurgents, who were impossible to distinguish from the peaceful population (RGVA, 1929: 230).

The government's inability to distinguish rebels from civilians increased reliance on indiscriminate force, particularly the heavy use of artillery, light

armor, and air power. SKVO intelligence readily acknowledged the futility of these methods:

> The liquidation of banditism cannot be limited to the use of force, since this will incite even greater antipathy among the population and induce a larger flow of reinforcements to the bands. [...] This will, at best, lead to either the bands' temporary dispersion, or to an even greater degree of hesitation and second-guessing in the conduct of military operations (RGVA, 1921: 1).

This choice – between escalation at the expense of alienating the population, or restraint at the expense of ceding the military initiative – was the fundamental dilemma Soviet commanders faced. Collateral damage was all but unavoidable given the poor quality of intelligence. Yet the non-use of force posed an even greater challenge to the integrity of the Soviet state. Soviet commanders chose a third way. Rather than minimize grievances, they would minimize opportunities for the aggrieved to mobilize.

The North Caucasus had historically been among the most heavily-armed regions in the Russian Empire. After a century-long confrontation with Tsarist forces, intergenerational blood feuds, territorial disputes, and the Russian Civil War, the local population had become reliant on self-defense to protect life and property, resolve conflicts and maintain order. Even before Denikin's army left the region in June 1919, Georgian revolutionary Sergo Ordzhonikidze reported, 'There is hardly a single highlander who does not have a [7.62 mm Mosin] rifle with 150-200 rounds' (Ordzhonikidze, 1956: 89). Unsurprisingly, Party leaders saw the heavily armed civilian population as a challenge to their monopoly on legitimate force and a key factor facilitating the rebellion (RGVA, 1924: 1).

Early Bolshevik conceptions of sovereignty and coercive power foreshadowed those articulated by Charles Tilly some 60 years later: the defining feature of a revolutionary situation is the potential of more than one polity

to control significant coercive resources and make competing, mutually exclusive claims to power. As Trotsky (1965: 224) wrote, 'To overcome the 'anarchy' of this twofold sovereignty becomes at every step the task of the revolution – or the counter-revolution.' The answer to the Soviets' dual sovereignty problem became forcible disarmament.

Disarmament operations typically proceeded as follows. Under the guise of 'training exercises,' regular army units would cordon off a designated settlement, severing residents' contact with the outside (RGVA, 1924: 75). Officers from the People's Commissariat of Internal Affairs (NKVD) would then issue an ultimatum, demanding the surrender of all private weapons within two hours. When the ultimatum expired, regular forces would open a ten-minute indiscriminate artillery barrage – more limited in duration and intensity than what locals had come to expect from typical Soviet operations. The NKVD would then issue a new ultimatum with a shorter time window, after which its would initiate house-to-house searches and seizures.

Forcible disarmament had significant operational requirements. The most ambitious of these operations – like those in late 1923 and 1925 – required months of planning and the temporary deployment of over 7,000 personnel (Galitsky, 2009; Gakaev, 1997). These were large-scale combined-arms operations, requiring coordination and interoperability between multiple government agencies. Although more limited seizures took place during routine sweeps, disarmament marked a significant departure from conventional counterinsurgency warfare (Kulinchenko, 2011).

Historians are divided on how commanders selected the timing and location of disarmament, and the impact these operations had. Zhupikova (1998) argues that disarmament occurred mostly in 'easy cases,' where violence was on the decline, the population was war-weary and intelligence capabilities were robust. Aptekar' (1995a,b) and Galitsky (2009) disagree, and see the targets as 'hard cases,' where rebels were deeply entrenched and Soviet authority was lacking. The latter view considers disarmament

as essential to Soviet success; the first view is more skeptical. Can the declassified data once used by Soviet commanders shed light on this debate?

Data and research design

To facilitate a more fine-grained analysis of why the Soviets used disarmament and whether these efforts were successful, I use a new dataset drawn from the declassified archives of the USSR's North Caucasus Military District Intelligence Directorate. These data have an attractive feature: they represent the real-time information Soviet commanders used over the full course of the conflict, as documented in thousands of intelligence briefs, incident reports, and after-action reviews – the full set of such records stored at the Russian State Military Archive (RGVA).[3]

Like all documents generated by security forces, these data are not without reporting biases. Crucially, they only document the rebel actions Soviet officers were able to observe and report, directly or through informants. These data are not 'the truth,' but 'the truth as Soviets saw it.' Yet if we want to model Soviet decision-making based on the information available at the time, this 'perceived truth' can be at least as useful as the real thing.

The dataset includes 795 rebel raids, 1,477 counterinsurgency operations and 272 instances of disarmament in Stavropol, Terskaya oblast, Dagestan and the Mountain Autonomous Soviet Socialist Republic (Figure 1).[4] I combined these records with census data on local demographics (Central Statistical Directorate of USSR, 1928), official lists of administrative units (NKVD, 1921), maps of historical ethnic settlement patterns (Tsitsuev, 2007), and a digital elevation model of the local terrain (U.S. Geological Survey, 1996).

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[3]Primary data sources include incident reports and chronologies catalogued in: RGVA, Fond [Series] 25896, Opis' [List] 9, Dela [Cases] 269, 270, 273, 275, 276, 286, 287, 313, 319, 325, 346, 436, 454, 456.

[4]I geocoded all events at the village/municipality level.

(Figure 1)

(Figure 2)

The unit of analysis is a government *counterinsurgency operation*, which I grouped into two categories: (1) disarmament, involving a large-scale cordon-and-search operation to seize all privately-owned arms, ammunition and explosives, or (2) conventional offensive operations like raids, ambushes, pursuits, infiltrations, detentions and patrols. Operations in the first category comprise the study's *treatment group*; the second category comprises the *comparison group*.

The quantity of interest is the effect of disarmament on local rebel violence, or the average difference between levels of violence after disarmament, and violence following conventional operations. To estimate this effect, I use matching – a two-step procedure involving, first, the selection of balanced subsamples of treatment and comparison cases and, second, the analysis of differences in outcomes across these two groups. By matching treatment cases to their closest comparison cases in the sample, and discarding data points without a close neighbor in the other group, matching seeks to ensure that treatment assignment is ignorable, or independent of the outcome conditional on observable pre-treatment covariates.

To facilitate matching, I divided the study region into a 5 km × 5 km spatial grid, and recorded the number of rebel attacks in each cell (hereafter referred to as 'locality') in the 15 weeks before and after each government operation. I selected this resolution based on archival accounts of the time needed to plan and implement a disarmament operation, and the need to capture both the immediate and longer-term effects of these operations. In the online appendix, I provide sensitivity analyses at alternative scales.

To ensure that subsequent variation in rebel violence could be more plausibly attributed to disarmament, I sought to minimize differences in the joint distribution of several pre-treatment covariates. I summarize these

variables below, along with their expected impact on the government's selectivity (Corollary 2.1), and local ability to project power and resources to reward supporters (Corollary 3.1). Although not all of these covariates are likely to have an equally strong statistical association with disarmament, one might expect some imbalance between treated and non-treated cases on these dimensions.

- *Percent urban* is the proportion of a locality's population that resides in a settlement with least 3,000 residents, of whom no more than 15% are employed in agriculture (Central Statistical Directorate of USSR, 1928). I expect capacity to monitor opponents and reward supporters to be higher in urban areas due to a relatively pervasive security and law enforcement presence.

- *Population* is the natural logarithm of the total number of people residing in the locality's district (Central Statistical Directorate of USSR, 1928). In sparsely-populated areas, the government's presence is lighter and rebels have more opportunities to establish sanctuaries.

- *Females per 1,000 males* reflects the sex ratio in a given locality (Central Statistical Directorate of USSR, 1928). The supply of potential rebel recruits is higher where the sexual imbalance favors men.

- *Russian* is a binary indicator of whether the dominant ethnic group in a locality is ethnically Russian (Tsitsuev, 2007). I expect government monitoring capacity to be more robust in a population of co-ethnics.

- *Chechen* is a binary indicator of whether the dominant ethnic group in a locality is ethnically Chechen (Tsitsuev, 2007). I expect Soviet monitoring capacity to be more limited in such areas.

- *Cossack* is a binary indicator of whether a locality is situated on historically Cossack lands (Tsitsuev, 2007). I expect Soviet intelligence

assets to be more robust in such areas due to the recent operational legacy of the Terek Cossack population's forcible resettlement in 1920.

- *Diversity* is the number of ethno-linguistic groups in a locality (Tsitsuev, 2007). In diverse areas, the government has more opportunities to recruit collaborators through divide-and-rule strategies.

- *Elevation*, in meters above sea level, measures the altitude of each locality (U.S. Geological Survey, 1996). Natural concealment from surveillance makes high-elevation areas prime sanctuary locations.

- *Slope*, in degrees, is an alternative measure of mountainous terrain (U.S. Geological Survey, 1996). Where slope is high, rebels are more likely to establish base camps.

- *Distance to rail* is the distance, in meters, from the center of a locality to the nearest railroad line (NKVD, 1921). Where this distance is great, the government's power projection capability is lower.

- *Border* is an integer indicating the number of inter-provincial or inter-district border crossings contained within a locality (NKVD, 1921). Border crossings tend to attract a higher concentration of government checkpoints and patrols than inland areas, due to concerns over illicit cross-border trade and population movements.

To ensure that the treatment group does not include a disproportionate share of 'easy cases' with little expected resistance to disarmament or 'hard cases' where disarmament was seen as most urgent, I also sought balance on pre-existing numbers of rebel attacks, conventional government operations and disarmament efforts over the Δt weeks preceding a counterinsurgency operation. Because government intelligence gathering and power projection also vary over time and space in unobserved ways, I matched treatment and control units on the geographic coordinates of a locality, and the year and month of the operation.

I used an ensemble of matching solutions to minimize imbalance across these covariates. The optimal solution was genetic matching with a nested semiparametric propensity score model, which achieved the most accurate predictions of treatment assignment, superior goodness of fit, while maximizing balance at minimal data loss.[5] This solution produced 238 matched pairs.[6] For brevity, I present only the genetic matching results below, but provide a full account of other matching results in the online appendix.

When and where did disarmament occur?

The theoretical model predicts that incentives for disarmament are strongest where the government has difficulty identifying and selectively punishing its opponents (Corollary 2.1). Soviet archival data support this claim.

Table II reports the results of logit models regressing disarmament on the full set of pretreatment covariates discussed above (Model 1), along with the best-fitting propensity score model used by the genetic matching algorithm, with (Model 2) and without (Model 3) splines. Because the best-fitting propensity score model includes only a subset of the covariates in Model 1, I present the latter results here for comparison. Figure 3 reports a summary of group means pre- and post-matching for all covariates, along with standardized bias and Kolmogorov-Smirnov p-values.[7]

(Table II)

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[5]Genetic matching (Sekhon & Diamond, 2013) minimizes the distance metric $D_G(X_i, X_j) = \sqrt{(X_i - X_j)'(\mathbf{S}^{-1/2})'\mathbf{W}\mathbf{S}^{1/2}(X_i - X_j)}$, where $\mathbf{W}$ is a $k \times k$ positive definite weight matrix, $\mathbf{S}^{1/2}$ is the Cholesky decomposition of the sample variance-covariance matrix, and X is a matrix of pre-treatment covariates and propensity scores from the model $\{\text{Disarmament} = \text{logit}^{-1}[\beta_0 + \beta_1\text{Russian} + \beta_2\text{Percent Urban} + \beta_3 log(\text{Population}) + \beta_4\text{Females per 1,000 Males} + \beta_5\text{Border} + \beta_6\text{Prior rebel activity} + \beta_7\text{Prior Disarmament} + \beta_8\text{Year} + f(\text{Month}) + f(\text{Long}, \text{Lat}) + \epsilon]\}$, where $f()$ is a thin-plate spline.

[6]Post-1927 treated cases were dropped because no contemporaneous comparison units were available.

[7]Standardized bias is defined as $\frac{\bar{x}_k^T - \bar{x}_k^C}{\sigma(x_k^T)}$.

(Figure 3)

Soviet forces were more likely to use disarmament where ethno-linguistic conditions complicated intelligence collection. Disarmed localities were home to relatively few Russian co-ethnics. Just 2% of disarmament actions occurred in majority Russian areas, compared with 42% of conventional operations. According to Model 1, majority Russian areas were 66.7% less likely (95% CI: -88.8, -23.5) to experience disarmament than minority-Russian ones. Although disarmament was, on average, more likely in Chechen areas and less so in Cossack areas, these relationships disappeared after controlling for other variables.

Consistent with Corollary 3.1, disarmament also occurred in areas conducive to the establishment of rebel sanctuaries, where logistical realties limited government territorial control and power projection. Disarmament was more common in rural areas with a sparse population and a relative abundance of males, than in densely-populated urban areas with a greater Soviet security presence – and more resources for co-optation. According to Model 1, urban areas were 82.9% less likely to be disarmed (CI: -98.3, -31.6) than rural ones. Although not significant in a multivariate setting, Figure 3 shows that a typical disarmed locality was almost twice as far from the nearest railroad as the average non-treated case, was situated at slightly higher altitude and rougher terrain.

Even for variables without a strong statistical association to disarmament – like Chechen ethnicity and distance to railroad – Figure 3 indicates substantial imbalance between treated and comparison groups, in the direction one would expect from Corollaries 2.1 and 3.1. How effective was matching in reducing these differences? In the original data, differences in means were substantively large and statistically significant for all variables save elevation and slope, with an average standardized bias of 0.824. Post-matching, average standardized bias dropped to 0.046 – a reduction of 94%. The only variable for which a significant difference-in-means re-

mained was the month of the operation – mid to late August (8.65) for disarmament, and early August (8.18) for conventional operations. Although it is doubtful that an average two-three week difference is large enough to induce a heavy selection bias, statistical modeling can address this remaining imbalance.

Did disarmament work?

Did disarmament help reduce rebel activity in the North Caucasus? The evidence indicates that, yes, it did. Compared to conventional offensive counterinsurgency operations, disarmament had a consistently suppressive effect on rebel violence. This result holds on the local and regional levels, short-term and long-term, under a variety of matching estimators.

I present these findings in four stages. First, I report the study's central quantity of interest – the average effect of disarmament in cases where it was most likely to be used or, formally, the sample average treatment effect on the treated (SATT). Second, I report a difference-in-difference estimate of the disarmament effect within and between the two groups.[8] Third, I offer a model-based estimate, to screen out the influence of additional confounding factors. Fourth, I report sensitivity analyses using alternative treatment windows, geographical scales, and matching designs.

SATT. Localities where a disarmament operation took place saw an average reduction in rebel violence of -0.24 (95% CI: -0.45, -0.03), compared to similar localities where these operations did not occur. By way of reference, the average number of attacks across all localities in the 15 weeks following a government operation was 0.16: 0.03 in the treatment group

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[8]The difference-in-differences estimate is

$$\delta = E\left[(Y_{t+\Delta t}\,(T=1) - Y_{t-\Delta t}\,(T=1)) - (Y_{t+\Delta t}\,(T=0) - Y_{t-\Delta t}\,(T=0))\right] \quad (13)$$

where Δt is the size of the post/pre-treatment time window (15 weeks). I report a model-based estimate of δ, with fixed effects, in the online appendix.

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(maximum of three attacks) and 0.28 in the comparison group (maximum of five attacks). Disarmament reduced the average intensity of violence by 88%.

Difference-in-differences. The impact of disarmament is more compelling still if one compares its 'before and after' picture with that of conventional counterinsurgency. As Table III shows, disarmed localities saw a 70% drop in rebel attacks, from an average of 0.11 pre-treatment to 0.03 post-treatment. Meanwhile, localities in the comparison group recorded a 168% *increase* in rebel violence, from 0.10 pretreatment to 0.28 post-treatment. The resulting difference-in-difference is -0.25, or a 238% reduction in the average intensity of rebel violence.

(Table III)

Model-based estimates. While matching screened out much of the pre-treatment imbalance in the data, we may worry that the reported disarmament effect is driven, at least in part, by confounding variables not formally considered in the estimation of the SATT or difference-in-differences. To address these concerns, I present two sets of additional results: the SATT estimated with a bivariate linear regression of post-treatment violence on disarmament, and a full model that controls for all covariates included in the best-fitting propensity score specification used by genetic matching. Although the inclusion of control variables reduces the size of the disarmament effect slightly, from -0.25 (CI: -0.33, -0.16) to -0.19 (CI: -0.28, -0.11), the direction and statistical significance of this estimate remain unchanged.[9] As reported in the online appendix, this result holds in models with alternative distributional assumptions, including Poisson, Negative Binomial, and logit with a binary outcome measure.

Sensitivity analysis. Does the disarmament effect hold under other matching designs and aggregation levels? Figure 4 shows the SATT at the same

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[9]AIC statistics are 652.32 and 530.04, respectively, suggesting that the full model is a better overall fit to the data.

geographic scale as before (5 km × 5 km), but with treatment windows ranging from 1 week to 6 months. The red dots represent 1,000 Monte Carlo simulations of the SATT, estimated at each window size. Solid lines are means of the resulting distributions and dashed lines are 95% confidence intervals. The SATT is consistently negative and significant in all cases except $\Delta t = 2$ weeks. This ambiguous immediate-term effect may reflect a temporary spike in retaliatory attacks following disarmament. In all other cases, disarmament has a consistently negative impact.

(Figure 4)

(Figure 5)

The same general result holds at different spatial scales, and with different matching designs. Figure 5 shows four grids – one for each class of matching solutions – with treatment window size on the horizontal axis and the geographic grid size on the vertical. The shadings correspond to the uncertainty of the SATT estimate – formally, the proportion of 1,000 draws from the SATT's posterior distribution that are greater than zero. Darker shades indicate that most of the distribution is negative, while lighter shades indicate the opposite.

In the 1,100 matching solutions presented here, the SATT point estimate was negative 97% of the time. This estimate was negative and statistically significant in 65% of all cases, negative but insignificant 32% of the time, positive and insignificant 3.4% of the time. In not one instance was the SATT both positive and significant. Uncertainty was greatest immediately following disarmament, at windows of one to six weeks. Yet there and everywhere else, the disarmament effect was usually suppressive, sometimes ambiguous, but never counterproductive.

Discussion

Can forcible disarmament suppress rebellion? The Soviet experience appears to suggest that it can. At the very least, forcible disarmament was more effective in taming the 1920's North Caucasus uprising than other methods in the government's arsenal. The Soviets used disarmament where conventional approaches fell short – where they were less able to punish opponents and less able to reward supporters. In these 'hard cases,' disarmament limited the opposition's potential coercive resources, and rebels became unable to sustain a campaign of violence.

From a policy standpoint, the Soviet success should be interpreted with some caution. The mere consideration of such methods is evidence of fundamental weaknesses in a government's local standing. Disarmament should be unnecessary if a population does not rely on self-defense and sees the government as a credible guarantor of security.

One may reasonably ask if a weaker incumbent facing similar challenges could have reached the same result. Soviet security forces in the North Caucasus had a dismal understanding of the local environment, but great capacity for brute force. Even in its upstart years, the USSR could offset a lack of local support with labor and capital from elsewhere, drawing on external sources of revenue, reinforcements and loyalists. As a result, the Soviets could plan and execute complex and ambitious operations, while insulating themselves from the whims of local support.

The Soviet experience is most instructive for combatants with a similar mix of great power and local unaccountability – like peacekeeping forces operating under a strong mandate, or relatively powerful autocratic regimes. Other actors may find the Soviet model difficult to replicate.

Although Soviet archival data allow us to test the model's predictions at a highly disaggregated level, it remains unclear if these results travel to other places and times. The main barrier to generalizability is data scarcity. There are currently no comprehensive cross-national data on the

timing and location of forcible disarmament campaigns, or on the dynamics of small arms circulation more generally.[10] To facilitate cross-national comparisons, collecting such data should be a priority for future research.

Without cross-national data on forcible disarmament, we can conduct only indirect investigations into the generalizability of the Soviet case. We could, for instance, look at the relationship between civil conflict and private possession of firearms – and see if the theory's logic extends to less extreme forms of gun control. I report tentative results from one such analysis in the online appendix, which finds some similarities in the determinants and consequences of gun control. For instance, bans on private gun ownership are more likely where governments are less able to monitor their populations. Countries with stricter gun laws have also experienced less political violence, on average, in recent years. Yet even if cross-national evidence on peacetime gun laws aligns with our theory of wartime disarmament, there is still a need for a more direct test.

Future research will need to gather cross-national data on when, where and why disarmament campaigns and other gun control policies came into force, and levels of violence before and after these interventions. A more robust examination would also require data on the location and timing of disarmament campaigns within countries, as well as disaggregated data on state capacity and informational endowment. Ideally, future studies should combine a cross-national focus with data on a subnational scale, exploring variation both across and within different conflict zones.

In the context of divided sovereignty, an abundance of privately owned arms becomes simultaneously a source of security for those who possess them, and an obstacle to any centralized system of law and order. The results presented here suggest that – for better or worse – disarmament can sometimes accelerate the consolidation of coercive power.

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[10]For instance, `GunPolicy.org` releases data on gun regulations, and Small Arms Survey (2007) has additional information on small arms production and stockpiles, but for a limited date range.

Replication data

Data, R code and online appendix are at www.prio.org/jpr/datasets.

Acknowledgements

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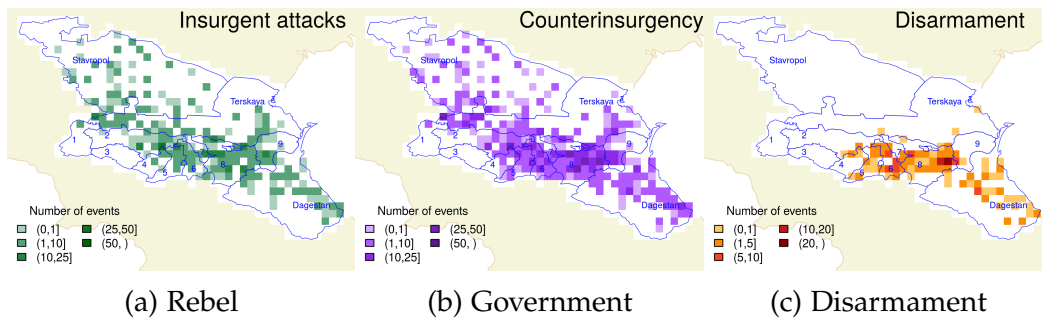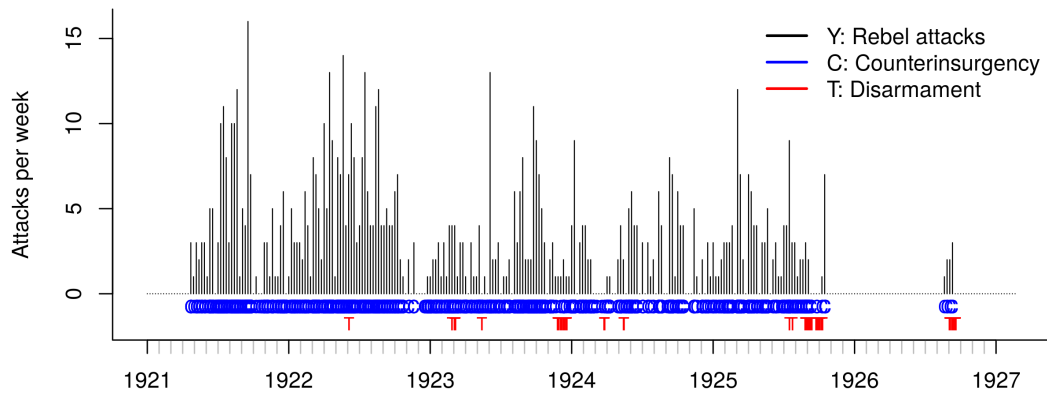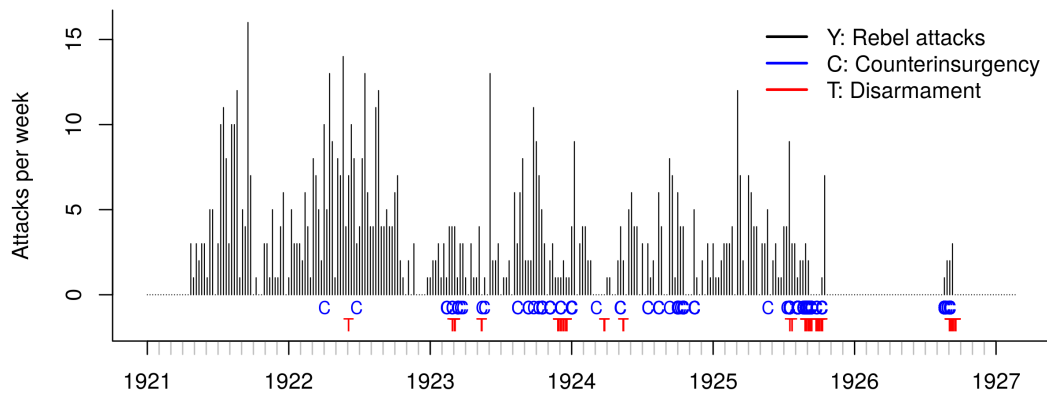
Figure 1. Geographical vistribution of violence

20 km × 20 km grid shown. Mountain Republic districts: (1) Karachay, (2) Kabardin, (3) Balkar, (4) Digorskiy, (5) Ossetian, (6) Ingush, (7) Sunzhenkskiy, (8) Chechenskiy. Dagestan districts: (9) Hasavyurt.

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(a) Pre-matching

(b) Post-matching

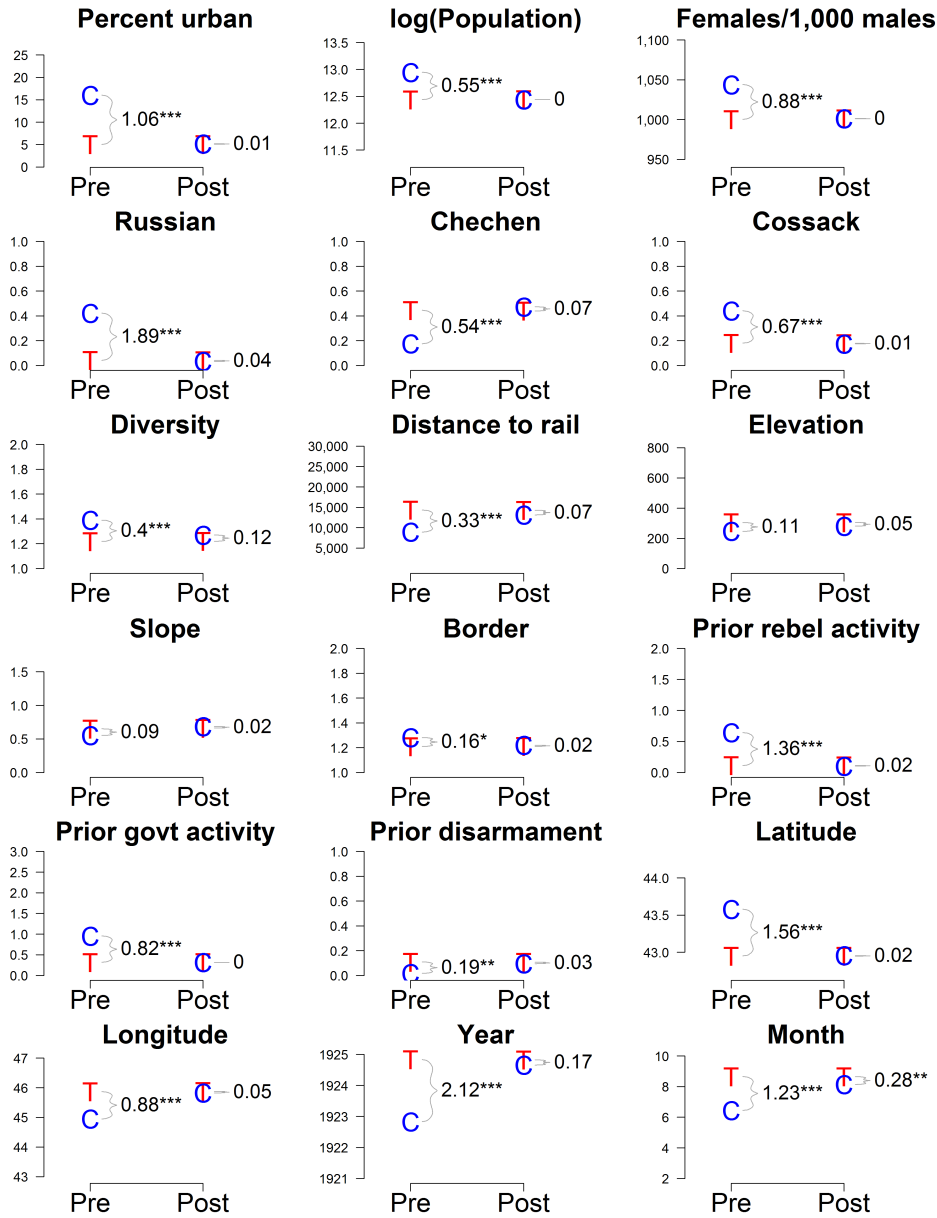Figure 2. Temporal distribution of violence

Figure 3. Balance summary statistics

T and *C* are means for treatment and comparison groups, pre- and post-matching. Numbers next to curly brackets are standardized differences in means. Asterisks are bootstrapped *p*-values from Kolmogorov-Smirnov tests.

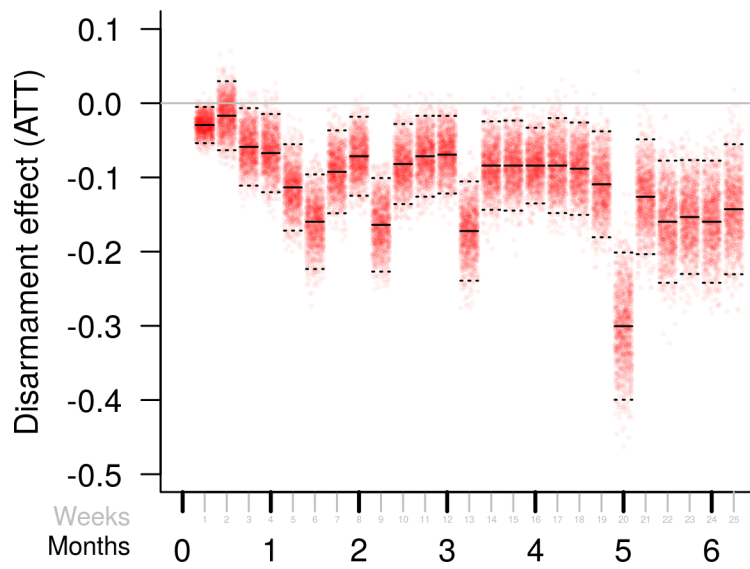Figure 4. SATT over time

Genetic matching with propensity scores. Geographic scale: 5 km $\times$ 5 km grid.
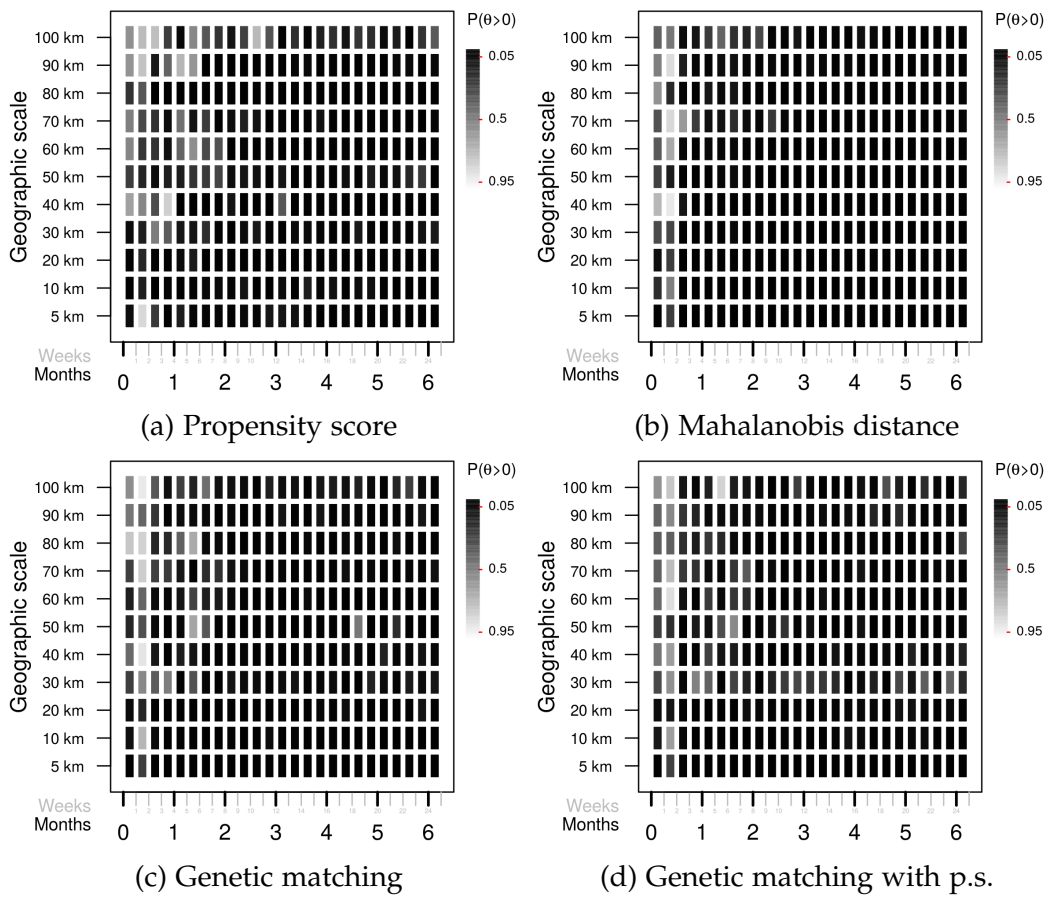
Figure 5. Uncertainty of matching estimators

Shadings represent $P(\theta > 0)$, or the proportion of simulated SATTs greater than zero.

<div align="center">Table I. Notation</div>

Symbol	Description
Population parameters	
$C_t \in [0, \infty)$	Neutral civilians at time t
$R_t \in [0, \infty)$	Rebel supporters at time t
$G_t \in [0, \infty)$	Government supporters at time t
Strategy choices	
$\rho_R \in (0, \rho_R^{max})$	Rebels' rate of punishment (s_R)
$\rho_G \in (0, \rho_G^{max})$	Government's rate of punishment (s_{G1})
$h \in (0, 1)$	Proportion of weapons confiscated (s_{G2})
Exogenous parameters	
$\theta_G \in (0, 1)$	Government's selectivity
$\theta_R \in (0, 1)$	Rebels' selectivity
$\iota_G \in (0, \infty)$	Government rewards
$\iota_R \in (0, \infty)$	Rebel rewards
$k \in (0, \infty)$	Constant civilian immigration rate
$u \in (0, \infty)$	Constant population death rate
Endogenous parameters	
$\mu_i = 1 - \frac{\rho_{-i}\theta_{-i}}{\rho_{-i}+\rho_i}$	Rate of civilian cooperation with combatant $i \in \{G, R\}$ (s_C)
Objective functions	
$\pi_C(\mathbf{s}) = -\kappa(i)$	Minimize costs associated with membership in group $i \in \{G, R, C\}$
	$\kappa(G) = \rho_R\theta_R, \kappa(R) = \rho_G\theta_G$, and $\kappa(C) = \rho_R(1 - \theta_R) + \rho_G(1 - \theta_G)$
$\pi_G(\mathbf{s}) = \frac{G_{eq}}{G_{eq}+R_{eq}}$	Maximize equilibrium share of popular support
$\pi_R(\mathbf{s}) = \frac{R_{eq}}{G_{eq}+R_{eq}}$	Maximize equilibrium share of popular support

Table II. Determinants of disarmament.

	Dependent variable:		
	Disarmament in locality i, week t		
	GLM logit (full model)	GAM logit (p-score)	GLM logit (p-score)
	(1)	(2)	(3)
Percent urban	−0.02*	−0.02*	−0.02*
	(0.01)	(0.01)	(0.01)
log(Population)	−0.93***	−0.67*	−0.89***
	(0.19)	(0.30)	(0.17)
Females/1,000 males	−0.01**	−0.01**	−0.01***
	(0.003)	(0.004)	(0.002)
Russian	−1.23*	−0.99†	−1.19**
	(0.49)	(0.56)	(0.45)
Chechen	−0.36		
	(0.35)		
Cossack	−0.40		
	(0.36)		
Diversity	−0.43		
	(0.27)		
Distance to rail	3e-6		
	(7e-6)		
Elevation	-3e-4		
	(4e-4)		
Slope	−0.02		
	(0.18)		
Border	0.62*	0.42	0.26
	(0.31)	(0.32)	(0.26)
Previous rebel acitvity	−0.81*	−0.37	−0.70**
	(0.40)	(0.23)	(0.23)
Previous govt activity	0.10		
	(0.29)		
Previous disarmament	−0.34	−0.44†	−0.23
	(0.37)	(0.24)	(0.22)
Longitude	0.65**		0.59**
	(0.22)		(0.18)
Latitude	0.38		0.28
	(0.41)		(0.37)
Spatial spline		EDF: 14.4	
		χ^2: 41.6***	
Year	1.43***	1.65***	1.46***
	(0.13)	(0.17)	(0.13)
Month	0.47***	EDF: 8.64	0.47***
	(0.05)	χ^2: 84.9***	(0.05)
Observations	1,370	1,370	1,370
Adjusted R^2	0.59	0.69	0.60
Log Likelihood	−293.51	−248.80	−290.26
AIC	587	497.6	580.5
AUC	0.955	0.973	0.954
UBRE	−0.57	−0.64	−0.58

Model 1 is fully-specified, Models 2–3 are best-fitting propensity score models, with and without splines. †p<0.1; *p<0.05; **p<0.01; ***p<0.001; intercept not reported.

Table III. Difference-in-differences.

Quantity	No disarmament (C)	Disarmament (T)	Diff-in-diff
$E[Y_{t-\Delta t}]$	0.10	0.11	0.01
$E[Y_{t+\Delta t}]$	0.28	0.03	-0.25
$E[Y_{t+\Delta t} - Y_{t-\Delta t}]$	0.18	-0.08	-0.25
Percent change	$+168\%$	-70.37%	-238.37%