

Violence and Civilian Loyalties: Evidence from Afghanistan*

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Abstract

Insurgency and counterinsurgency are widely described as "population-centric warfare": a competition between military actors over civilian loyalties. Drawing on a high-resolution conflict event dataset and a new approach to analyzing reactive behavior in space and time, this paper answers the question of how civilian cooperation and defection are systematically driven by incumbent and insurgent violence. Theoretically, the study contributes to resolving a dispute between proponents of deterrence- and alienation-based approaches to population-centric warfare. Empirically, this analysis improves upon the mixed results from previous microstudies in favor of an integrated picture: indiscriminate violence has almost no effect on collaboration with the adversary in its immediate spatio-temporal vicinity. At larger levels of aggregation however, a clear reactive pattern of collaboration with the adversary becomes visible which is in-line with alienation-based reasoning.

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1 Introduction

The recent flurry of microstudies on violence in civil wars has generated many substantial insights. Violence against civilians and reactive mobilization have been analyzed thoroughly for the Vietnam war and Chechnya (Kalyvas and Kocher, 2009, Lyall, 2009, Kocher et al., 2011). Spatial determinants of violence in civil wars and the extent of primary conflict zones have been identified in a series of publications (Hegre et al., 2009, Raleigh and Hegre, 2009, Buhaug, 2010). The geography of ethnic settlement patterns has been linked to conflict onset and intensity (Weidmann, 2009, 2011). Moreover, survey-based research has greatly contributed to understanding civilian agency in war-torn societies (Lyall et al., 2013, Blair et al., 2014).

Despite these scientific achievements, certain questions seem far from being resolved. A central question that different theoretical schools and empirical studies have failed to answer conclusively is: *What are the coercive or alienating effects of indiscriminate violence in (counter)insurgencies?*

Two long-standing claims usually inform the current discussion. First, deterrence-based explanations suggest that larger quantities of violence against the insurgents might disrupt their ability to mobilize. Along these lines, civilians that witness the destructive capabilities of the state refrain from joining the uprising out of fear for their lives. At the same time, the existing rebel movement faces a more severe collective action problem due to increased risks for individual combatants, which in turn generates incentives for free riding (Olsen,

1965, Tullock, 1971, Lichbach, 1995). A second line of thinking puts a greater emphasis on the quality of applied violence. Indiscriminate violence is assumed to lead to *more* rebel mobilization due to civilians joining the rebel forces in retaliation for innocent bystanders that were harmed by the perpetrator. In this case, civilians would be predominantly alienated from the perpetrator instead of being deterred. Avoiding this effect, hereafter referred to as “reactive mobilization”, is an essential part of counterinsurgency doctrine. Most recently, a series of empirical studies have tried to shed light on the existence of reactive patterns in insurgencies to solve the long-standing dispute between advocates of deterrence and alienation (Downes, 2007, Kalyvas and Kocher, 2009, Lyall, 2009, Kocher et al., 2011, Condra and Shapiro, 2012). Interestingly, the empirical findings lend some support to both lines of thinking, leaving the discussion unresolved.

This paper argues that large- and small-scale effects of indiscriminate violence must be separated conceptually and builds on novel methodology that allows for an explorative and non-parametric analysis of reactive behavior. The analysis shows that reactive collaboration with the adversary becomes visible at higher spatio-temporal distances from the trigger event.

If this effect is taken into account, a clear picture of reactive violence emerges which lends support to alienation-based accounts. The study contributes to the theoretical understanding of reactive mobilization in insurgencies and applies a methodological approach directly tailored to resolving the corresponding empirical puzzle. Moreover, it is of direct political importance because it shows that deterrence in irregular war is a short-sighted strategy.

The paper proceeds as follows: the existing literature will be reviewed in the next section. After that, the ongoing conflict in Afghanistan and the dataset used in the empirical analysis will be discussed. The methodological setup will be examined in the subsequent section,

followed by a discussion of the results.

2 Related work

The micro-dynamics of violence in civil wars have received much attention in the past decade. Clearly, Kalyvas (2006) has generated important insights into how and why violence is applied against civilians in civil wars. However, Kalyvas' theory is mainly concerned with how violence is applied in order to enforce collaboration and deter against defection (Kalyvas and Kocher, 2007a, 210) and not how civilian alienation feeds back into the dynamics of conflict. With regard to the question of reactive mobilization the theory assumes mobilization and civilian collaboration to be largely endogenous to military control (Kalyvas, 2006, 12; 118-132).

Two entire literatures deviate from this assumption: attempts to bootstrap insurgent movements were an essential aim of communist insurgency, most notably those inspired by Guevara's Foco theory (Guevara, 1961). The problem Guevara faced during the Cuban Revolution was that the country was ineligible for revolutionary warfare according to Maoist doctrine, which put an emphasis on exploiting the vast areas of large countries when fighting the incumbent (Mao [1938] 1967, 7). Guevara broke with the assumptions of his theoretical predecessor: "It is not always necessary to wait for all conditions favorable to revolution to be present; the insurrection itself can create them" (Guevara, 1961, Chapter 1, Paragraph 1). Creating favorable conditions for insurrection meant to generate pockets of popular uprisings by mobilizing the civilian population.

Similarly, the counterinsurgency school has also focused on securing popular loyalties.

The notion of winning “hearts and minds” became a trademark of the Johnson administration during the Vietnam War. In order to secure civilian loyalties, the killing of innocent bystanders and the destruction of property were to be avoided since they alienate the population from the attacker. General Stanley McChrystal refers to this effect as “insurgent math”: for every civilian killed, a number of new insurgents are generated. In an attempt to create incentives to avoid using excessive force, McChrystal even suggested to establish a new medal for “courageous restraint” in combat situations (Hastings, 2010).

Ellsberg (1970, 6) introduced an interesting metaphor to describe how rebels provoke military overreaction by the state to then harness the backlash in public perception. According to Ellsberg, this mechanism resembles the use of the opponent’s weight in Judo: instead of creating a comparative advantage for the attacker, the more momentum they put behind their attack, the harder they fall themselves (see also Bueno de Mesquita and Dickson (2007)). Kilcullen (2009) coins the term “accidental guerrilla” referring to elements of the local population that are drawn into the fight instead of being a priori adversaries of the incumbent. Clearly, this accidental process is closely linked to incumbent behavior in the field: as civilian casualties mount and destruction of property continues, more locals might be willing to retaliate independent of antecedent strategic loyalties. The US Army Counterinsurgency Handbook also stresses the importance of avoiding unnecessary destruction and violence (DOD, 2007, 5-27).

While all of these accounts approach the problem from slightly different angles, the underlying mechanism hereafter referred to as “reactive mobilization” is obvious: instead of weakening the military opponent, violence can have the opposite effect. More civilians are alienated from the perpetrator and collaborate with its adversary. Military advisor John Paul

Vann observed this mechanism during his deployments in Vietnam: a few pot shots fired from a village by a single insurgent could trigger an airstrike on that village, turning the entire community against the South Vietnamese government. Consequently, Vann strongly emphasized the necessity for selective violence:

This is a political war and it calls for discrimination in killing. The best weapon for killing would be a knife, but I'm afraid we can't do it that way. The worst is an airplane. The next worst is artillery. Barring a knife, the best is a rifle — you know who you're killing (Sheehan, 1988, 317).

This quote is especially important because it replaces the clear-cut dichotomy of selective versus indiscriminate violence with an ordinal scale for the accuracy of applied tactics. Along these lines, violence is not necessarily entirely selective or indiscriminate, but just more or less prone to harming innocent bystanders. It also underlines that certain technologies of warfare bear the potential for indiscriminate destruction all by themselves, regardless of doctrine or intent (see: Lyall and Wilson, 2009). For the remainder of the text, “selective” and “indiscriminate” violence will be used in the sense of this ordinal concept and not in terms of a binary distinction.¹

In some sense this focus on civilian mobilization reverses the causal logic put forward by Kalyvas. Civilian collaboration is not so much assumed to be endogenous to military control, but military control can be brought about through mobilizing civilians. Clearly, the counterinsurgency school fought an uphill battle to convey this effect to the higher echelons of the US Army in the 1960s. After all, classic metrics of military success rely on Loss Exchange Ratios (Biddle, 2006, 22), “body counts”, or tonnage of dropped ordnance (Greiner, 2009,

¹It is important to mention that this use of the terms does not do justice to situations in which violence is applied in a one-sided fashion. Massacres, for example, might be carried out based on tactics that generally allow for discrimination between combatants and non-combatants, but are used deliberately against civilians. These situations are not in the focus of this study and cannot be accounted for based on the introduced terminology.

23). A strong focus on which side could deploy more firepower in the field, inflict greater destruction on enemy cities, or endure a war of attrition for the longest period of time are core components of military deterrence. Consequently, deterrence has also informed strategic decision making in a series of limited, asymmetric wars. As National Security Advisor Henry Kissinger put it: “I refuse to believe that a third-class power such as Vietnam does not have a breaking point” (Greiner, 2009, 22). Similarly, Secretary of Defense Robert McNamara expressed confidence in a metric of success constructed around body counts in 1962: “Every quantitative measurement we have tells us we are winning this war” (Sheehan, 1988, 290). More recently, former US ambassador to India and deputy National Security Advisor Robert Blackwill envisioned a partitioned Afghanistan with Pashtun areas under constant air attack: “Taliban civil officials – like governors, mayors, judges and tax collectors – would wake up every morning not knowing if they would survive the day in their offices, while involved in daily activities or at home at night” (Blackwill, 2010).

To summarize the literature, almost opposite effects for violence on reactive mobilization have been proposed. Revolutionary warfare according to communist theorists as well as counterinsurgency doctrine put an emphasis on the quality of applied force. Only selective and conditional violence is assumed to weaken the adversary while indiscriminate and unconditional violence have a positive (reactive) effect on the adversary’s ability to mobilize. Deterrence-based reasoning usually assumes that the quantity of applied force makes all the difference, with violence generally having a negative effect on the opponents’ ability to mobilize. Higher levels of force are assumed to harden the collective action problem for the adversary. Finally, on this crucial point, Kalyvas (2006) – otherwise certainly a gold standard for theories on irregular war – is somewhat agnostic, assuming that civilian collab-

oration is largely endogenous to military control, while acknowledging the potential negative consequences of indiscriminate violence for the perpetrator (page 150).

Several empirical studies have tried to resolve the theoretical debate. In a thorough analysis of reactive insurgent violence in response to the indiscriminate shelling of villages in Chechnya Lyall (2009) reports a *negative* effect of indiscriminate violence on insurgent activities, seemingly confirming deterrence-based explanations. The random artillery shelling of villages in the conflict zone led to a significantly reduced number of insurgent attacks in these villages in subsequent weeks and even months. In order to isolate the effect of indiscriminate shelling, Lyall (2009) applied statistical matching and also tested for spillover effects in terms of elevated levels of insurgent violence in neighboring villages after indiscriminate shelling took place. Downes (2007) contributed a case study from the Second Anglo-Boer war (1899-1902) and found that the size of the conflict zone had a negative effect on the ability of indiscriminate violence to undermine rebel support: the smaller the conflict zone, the stronger the deterrent effect.

However, empirical evidence in favor of alienation-based reasoning has also been published recently. Based on a high resolution GIS dataset that covers multiple years of the Vietnam war, Kocher et al. (2011) were able to show how military control systematically shifted in favor of the insurgency in response to largely indiscriminate aerial bombardments. Based on conflict event data from Iraq aggregated into administrative districts and weeks, Condra and Shapiro (2012) found a distinct reactive effect: civilian casualties caused by incumbent forces lead to more subsequent insurgent violence, while civilian casualties brought about by insurgents lead to less insurgent violence. In a recent series of survey experiments conducted in Afghanistan, Lyall et al. (2013) found a one-sided alienation effect: while harm

inflicted by ISAF leads to increased insurgent support, insurgent violence does not lead to increased collaboration with ISAF.

Sticking to observational data, Linke et al. (2012) applied a time-series analysis to finding reactive patterns between insurgent and incumbent violence in Iraq, drawing on a high-resolution conflict event dataset. Since these data are not aggregated to meaningful natural units of analysis, such as villages, the authors collapsed them into artificial cells of fixed sizes. They then calculated whether violent events predict reactive violence for different temporal lags.

While these studies rest on sound theoretical assumptions and apply suitable inferential tools, the absence of natural spatial units of analysis in the underlying data is a problem. First described by Openshaw and Taylor (1979), the “modifiable areal unit problem” (MAUP) refers to the fact that the selection of artificial cell sizes drives various spatial statistics.

Solutions to this problem have been proposed in the past and also been applied in conflict research. Kulldorff (1997) proposed "SaTScan", a method relying on sliding spatial and temporal windows to test for the existence of clusters of events on different levels of aggregation. SaTScan checks for clusters of point events in both space and time, using sliding space-time windows. The method allows for a fast assessment of event-clusters that are unlikely to be brought about by chance. To establish a baseline level of clustered events, SaTScan applies a simulation technique: for each size of the spatio-temporal window under consideration, the software allocates events at random in space and time. Repeating this process in multiple iterations allows for the analysis of a distribution of simulated events with regard to their tendency to cluster for different cell sizes. Comparing this distribution of artificial events to the empirical record allows to check if the observed empirical patterns is likely to have been

brought about by chance, or if it significantly deviates from the simulated random sample.

Building on a similar approach, Braithwaite and Johnson (2012) analyzed the spatial and temporal clustering of conflict events in Iraq. Instead of reallocating conflict events spatially and temporally, the authors let events remain in their original position, but shuffled event labels to generate a random baseline against which they compared the empirical record. Similarly, several studies on the location and diffusion of conflict events have applied scan statistics and simulated baselines (O'Loughlin and Witmer, 2010, Schutte and Weidmann, 2011). While these studies address the MAUP, the simulation of baselines also introduces natural limitations to the inferential insights that can be obtained in this way. For example, Braithwaite and Johnson (2012) find certain event-types tend to cluster more strongly than they would under the simulated independence assumption, but they cannot identify the causal effects of certain events on others with methodical rigor comparable to the matching designs of Lyall (2009) or Kocher et al. (2011).

Another potential problem for a causal analysis of reactive behavior is endogeneity. For example, one might estimate a strong positive effect for indiscriminate incumbent violence on subsequent levels of insurgent violence in comparison to some baseline. However, indiscriminate incumbent actions might also be applied in response to insurgent activity. In this case, insurgent activity would appear on both sides of the equation, obscuring the true causal effect.

I therefore apply a new method for finding reactive patterns in event data (Schutte and Donnay, 2014) and focus on events that clearly reflect changes in civilian loyalties in response to violence, without strongly affecting levels of subsequent violence to circumvent

the problem of endogeneity.² The next section summarizes the theoretical discussion and introduces a conceptual distinction between short- and long-term effects of violence.

3 Theory

Two theoretical approaches dominate the discussion on reactive mobilization: deterrence- and alienation-based explanations. In the empirical realm, both positive (Kocher et al., 2011) and negative effects (Lyall, 2009) of indiscriminate violence on insurgent activity have been reported. Deterrence-based explanations suggest a negative effect of indiscriminate violence on mobilization for the adversary. The mechanism at work is a collective action problem imposed on the adversary. If, for example, incumbent forces engage in acts of indiscriminate violence, sympathizers of the rebels are less inclined to join the uprising since it is assumed that they follow a risk-reward consideration with survival being their main goal.

Intuitive as it may sound, even this most simple version of deterrence-based reasoning tacitly relies on problematic assumptions. First, as pointed out by Kalyvas and Kocher (2007b), this mechanism only works if non-participation actually entails lower risks for individuals than participation. This assumption is frequently violated in civil wars: individuals that refuse to join a military actor might suffer repression and punishment and deprive themselves of the security provided by a military actor. Second, deterrence only works if individuals face unacceptable consequences in the future as a result of their choices in the present. This would not be the case, however, if violence was completely indiscriminate. In this case, no benefit would arise from collaboration (see Martinez and Morgan, 2011). Third, collaboration with an adversary might not necessarily have to be a binary choice, but a balancing of risks and

²Please refer to section 2.4 of the supplementary information for an in-depth discussion of this problem.

rewards. A cautious strategy toward collaboration with the military adversary might very well allow individuals to simply work against a military actor without exposing their true loyalties. Nevertheless, certain implications of deterrence-based reasoning will be tested in the empirical part of this study. The corresponding hypothesis is therefore:

- H1: Indiscriminate violence leads to more civilian cooperation with the perpetrator

In contrast to deterrence-based reasoning, alienation-based accounts assume reactive collaboration with the military adversary to be a likely response to indiscriminate violence in insurgency. This assumes that the collective action problem can be solved through selective incentives: whoever loses innocent loved ones or property to indiscriminate violence will attempt to take revenge on the perpetrator. Revenge, along these lines, qualifies as a strong utility that potentially outweighs the perceived risks. This line of reasoning suggests the opposite effect:

- H2: Indiscriminate violence leads to more civilian cooperation with the adversary

In order to suitably test these expectations, the spatial and temporal distances between violence and reaction must be considered. As mentioned before, neither of these two hypotheses has received decisive empirical support. The problem of making sense and measuring reactive violence arguably stems from a problematic, simplifying assumption in the underlying theories. Both deterrence and alienation assume that civilians can change sides at a moment's notice, but this assumption is largely unrealistic. Rebels who consider the rebellion's course of action too risky cannot simply lay down their arms and accept the government's authority without finding themselves in front of a firing squad composed of their former comrades. Instead, they have to wait until an opportunity to desert arises. Later and outside the rebels'

reach they can pass on information that aids the government, for example. Similarly, civilians with little or no military training cannot strike back at the army to avenge their fallen loved ones. Instead, they have to make contact with insurgents, prove themselves trustworthy, and then aid the adversary under favorable tactical conditions. At some spatio-temporal distance, an opportunity for active assistance to the adversary and against the perpetrator could arise. While still exposing themselves to as little risk as possible, civilians would then take revenge. This effect makes an empirical analysis of reactive mobilization drastically more difficult: averse reaction to violence is not likely to show immediately. Reactive behavior becomes visible at a greater spatio-temporal distance from the incident and under circumstances that combine low risks with effective revenge.

Clearly, types of micro-events in insurgency must be selected very carefully to test these hypotheses. Most importantly, a class of conflict events must be selected that represents covert civilian assistance, i.e. an effective way to take part in the conflict at minimal risk. Moreover, this type of event should not affect subsequent levels events that are used as proxies for selective or indiscriminate violence to circumvent the problem of endogeneity.

3.1 Operationalizing reactive loyalties

To test the introduced theories, the empirical analysis relies on a disaggregated dataset on conflict events covering the war in Afghanistan. In order to clarify to what extent loyalties change in response to indiscriminate violence, this analysis relies on a direct measure of civilian collaboration: the turning in of unexploded ordnance or other explosive remnants of war that could be used by insurgents against US forces.

To compensate for the lack of heavy weaponry, insurgents in Afghanistan often rely on

“Improvised Explosive Devices” (IEDs) in attacks on both civilian and military targets. IEDs account for the largest number of US casualties in Afghanistan according to icasualties.org. In most cases, IEDs are military-grade explosives obtained from unexploded ordnance. For instance, artillery and mortar shells can be refitted with improvised detonators and used as IEDs.

Due to this technical particularity, obtaining unexploded ordnance is a crucial prerequisite for generating a constant supply of new and powerful IEDs. Confronted with unexploded ordnance or readily assembled IEDs, civilians face a strategic choice: They can either remain passive and thereby allow explosives to be obtained by insurgents and explosives to be used against ISAF or they can alert ISAF to their presence. Taking sides with the incumbent would entail informing them of the threat at hand.

The other strategic option for the civilian population is to cooperate with the insurgents. A variety of possible implementations of such a cooperation spring to mind. Civilians could point insurgents and their collaborators directly to the explosives or just passively allow for ordnance to fall into insurgent hands. Either way, the turning in of material that aids the insurgency provides a rare opportunity to take sides in civil war without having to signal loyalties publicly, which would be extremely risky. Moreover, providing such low-level assistance to the military actors entails lower costs. Instead of directly engaging in violent attacks which requires training, commitment, and sacrifice, civilians can take sides with lower personal risk. In comparison to related studies that focus on reactive violence, this focus on reactive non-violent support should provide a more sensitive measurement of civilian loyalties.

Therefore, variation in the levels of civilian support to the incumbent was used to analyze the effects of violence. In order to find out whether the proposed hypotheses hold, a quanti-

tative case study on the micro-dynamics of insurgency was conducted for Afghanistan. The following section briefly discusses the case selection.

4 The war in Afghanistan

The ongoing war in Afghanistan was identified as a typical case of insurgency which is eligible for testing the more general hypotheses discussed above. Afghanistan's general socio-economic conditions, the composition of the uprising, the international context, and the sequence of events at the macro-level are all typical of this type of conflict.

From a socio-economic point of view the country is a risk candidate for civil war. Widespread poverty, a weak central government, a recent history of intense political violence, forbidding mountainous geography, and a patchwork of intermingled ethnic groups with varying access to political power and wealth make Afghanistan a prime candidate for civil war with regard to the central variables associated with war onset (Buhaug and Gates, 2002, Fearon and Laitin, 2003, Cederman et al., 2010). These characteristics entail that lessons learned from the micro-dynamics of the war in Afghanistan are likely to generalize to other ongoing conflicts in the Greater Middle East.

The composition of the uprising is almost prototypical for conflicts of this kind, combining an irregular local insurgency with the build-up of a shadow administration of judges and tax collectors. Moreover, clandestine international support for the insurgency is assumed to take place and can be found across a variety of cases, such as Chechnya and Ingushetia (Moore and Tumelty, 2008), Vietnam (Sheehan, 1988, 650), and, of course, the anti-Soviet insurgency in Afghanistan (Wright, 2007, 120). Apart from that, the sequence of macro-events

that led to a large-scale insurgency is also typical of a wider class of cases: a government is replaced through outside intervention and subsequent occupation of the country. The new government faces a problem of legitimacy and is heavily reliant on outside support. Elements loyal to the former administration start a protracted campaign to topple the new incumbent.

The conflict dynamics are also typical for a large-scale insurgency: a small core of highly motivated combatants slowly attracts additional followers and mounts increasingly large and sophisticated attacks. Despite heavy losses, additional insurgents are mobilized and the conflict spirals out of control. This pattern is reflected in Figure 1 which shows the conflict intensity over time. Reaction to violence is a mechanism that could partially explain these temporal dynamics. With these considerations in mind, an analysis of the micro-dynamics of reactive violence in Afghanistan should grant generalizable insights. The next section describes the SIGACT data in more detail.

5 Data

5.1 Coverage

The empirical analysis requires highly accurate conflict event data. After having carefully considered alternative datasets, I decided to use SIGACT data coded by the US military in Afghanistan which was released to the general public in 2010.³ This data has been used in a responsible manner for basic research in other recent publications (O’Loughlin et al., 2010,

³The Hamlet Evaluation System (HES) is a Vietnam-era dataset that has been analyzed in comparable studies. The Armed Conflict Location Dataset (ACLED) covers a variety of conflicts, but does not distinguish among as many types of conflict events as SIGACT. The GED dataset puts a special emphasis on georeferencing lethal events (Melander and Sundberg, 2011), but is also less explicit about which kinds of events led to casualties.

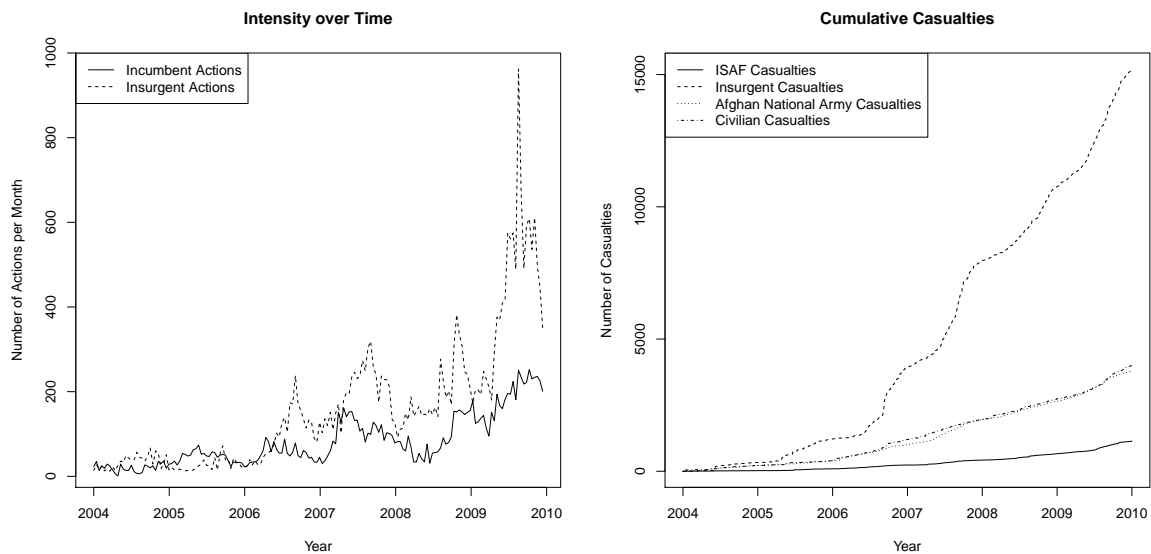


Figure 1: The plot on the left shows the number of actions per month for both incumbent and insurgent. The plot on the right shows cumulative casualties for ISAF, insurgents, Afghan National Security Forces, and civilians. The so-called “fighting season”, an annual cycle in the intensity of the conflict that peaks in the summer, is clearly reflected in the data. Despite heavy casualties, insurgents were able to increase their activity over time.

Linke et al., 2012, Condra and Shapiro, 2012, Zammit-Mangion et al., 2012, Braithwaite and Johnson, 2012, Carpenter et al., 2013, Weidmann, 2014). To ensure that the empirical analysis would not in any way harm or endanger the individuals, institutions, or political actors involved, I only analyze events in the statistical aggregate. Moreover, the particular empirical analysis of this study uses a matching design which entails that no marginal effects are estimated for geographic covariates, further strengthening the anonymity of the findings. Based on these precautions, the ethics committee of ETH Zurich reviewed a proposal for this study carefully and then allowed it to proceed.

The SIGACT (“Significant Activity”) files cover the time period from 2004 to 2010 and amount to 76,247 records. All records are time- and georeferenced, affiliated with insurgent or incumbent activity, and distinguish among 154 types of events. SIGACTs are passed up the chain of command from the platoon level, allowing for an extremely detailed record of the conflict from the US perspective. Several potential limitations arise with a sole focus on one side of the conflict. First, the figures for civilian casualties might be generally too low since it is the soldiers in the field who report them without independent confirmation. The use of indirect fire or air strikes in particular might harm bystanders without ground troops taking notice. Moreover, activities of other coalition troops, private contractors, and US service branches (such as the US Air Force) are not systematically recorded in the data. Of course, insurgent-civilian relationships are not visible in the data either. Apart from these limitations, SIGACTs provide the most complete and arguably unbiased view of the Afghan War. Figure 2 illustrates the scope of the SIGACTs from Afghanistan and shows which of all the possible interactions between the actors are visible in the empirical record. Note that civilian relationships with the insurgents cannot be directly observed, but collaboration

with US forces can be measured based on changes in the frequency of “turn in” instances. Moreover, fighting between the military actors can be observed and its effects on civilian collaboration can be assessed.

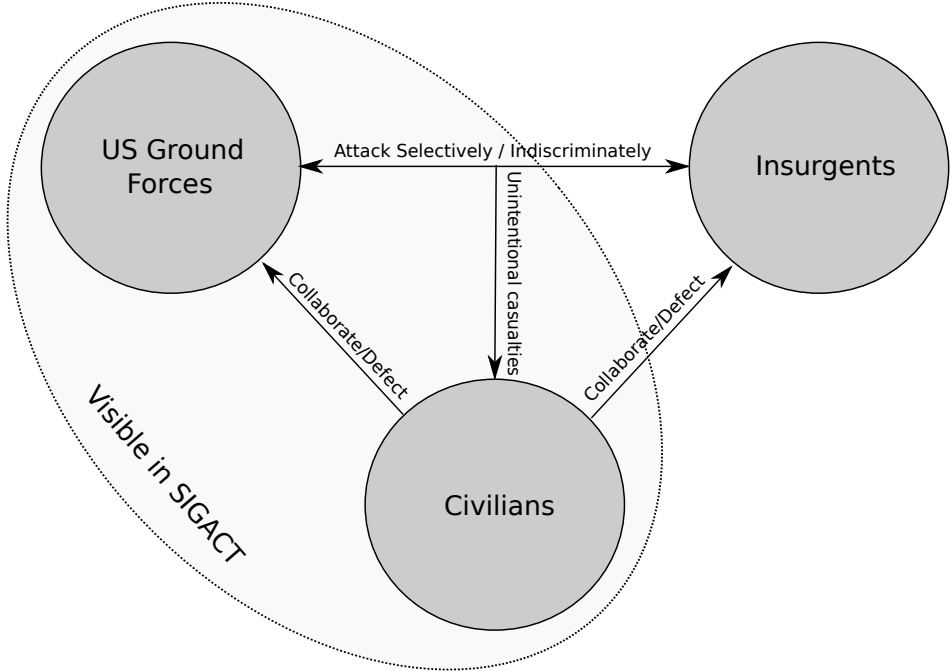


Figure 2: Conceptual illustration of the actor constellation visible in SIGACT. Note the constraints that arise from the fact that data is only available from US sources: Civilian-insurgent relationships cannot be observed directly. Therefore, variation in civilian behavior towards incumbent forces is analyzed.

5.2 Event categories

Testing the proposed theoretical hypothesis requires the concepts to be operationalized empirically. Based on a careful review of the 154 event categories in SIGACT, selective and indiscriminate violence were coded. I want to clearly communicate however, that the coding had to strike a balance between empirical feasibility and theoretical adequacy: based on

the assumption that attacks are more or less selective dependent on the tactics and weapons systems involved, I focus mainly on direct versus indirect fire and their effects on civilian collaboration. Clearly, not every single incident of indirect fire qualifies as an indiscriminate attack, but it can be assumed that they tend to cause more destruction than direct fire attacks. As discussed in section 2, I use the terminology in relative rather than in absolute terms. Moreover, I report results of an additional analysis based on SIGACT casualty figures in the supplementary information. A guiding principle for the operationalization was to focus on relatively frequent events that can be clearly associated with one or the other category. The following paragraphs describe the coding in detail. Section 2.3 in the supplementary information elaborates more on the exact coding choices and the lack of suitable alternatives within SIGACT.

Indiscriminate insurgent violence

Mine strikes were counted as acts of indiscriminate violence. In order for an explosive device to classify as a land mine, it must be victim-activated. It is this technical particularity that renders land mines extremely inaccurate, since no identification of the target is possible by the attacker. Similarly, indirect fire allows an attacker to hit targets beyond their line of sight. Moreover, it allows the attacker to deliver heavy and explosive munitions over greater distances. These tactical characteristics come at a decisive cost in population-centric warfare: limited accuracy and high lethality. Effective indirect fire usually relies on an artillery spotter having line-of-sight contact with the target to report back to the shooter. It generally requires several iterations of shooting and re-aiming to hit a target. More importantly, explosive munitions destroy the homes and property of innocent bystanders, even if they do not physically

harm civilians. These characteristics make *indirect fire* less discriminate than direct small arms fire and these events were therefore counted as indiscriminate.

Selective insurgent violence

Direct fire by insurgents has certainly claimed the lives of civilians, but it still provides a more selective way of targeting collaborators and incumbent forces than indirect fire. More importantly, due to line-of-sight contact being a precondition of the use of direct fire, insurgents at least know what or whom they are shooting at in combat situations.

Indiscriminate violence by US forces

US military rules of engagement put restrictions on using lethal force. Although ISAF can presumably utilize *indirect fire* more professionally than insurgent forces, the problem of high lethality combined with low accuracy remains. Even if measures are taken to spare the lives of bystanders, large-scale material destruction is still a natural byproduct of explosive munitions. Therefore, instances of *indirect fire* were counted as indiscriminate violence for the incumbent side. Generally, SIGACT does not contain information on Air Force activity in Afghanistan. This is due to the fact that soldiers on the ground file the reports and only sometimes include references to air strikes. If air strikes were carried out as part of other fighting activities, the incident might simply not be labeled as such. Nevertheless, *close air support* was counted as an instance of indiscriminate violence since it applies violence more destructively and less selectively than direct small arms fire.

Coded type of event	SIGACT event category	N
Incumbent selective	direct fire	823
Incumbent indiscriminate	close air support, indirect fire	595
Insurgent selective	direct fire	15,458
Insurgent indiscriminate	mine strike, indirect fire	7,173
Civilian assistance	turn in, evidence turn-in/received, ERW/turn-in	899

Table 1: Event categories for the empirical analysis.

Selective violence by US forces

Direct fire was also counted as an instance of selective violence. Again, these events are frequent enough to allow for generalizable insights, and arguments for counting insurgent direct fire as selective also apply to the incumbent side. Moreover, relying on direct and indirect fire for both insurgent and incumbent keeps treatment and control events comparable across actors. Table 1 summarizes event categories and the number of observations in the dataset. Figure S1 in the supplementary information shows the locations of all observations in the sample.

6 Methodological Approach

6.1 Causal analysis based on MWA

In order to establish the causal effect of indiscriminate violence on civilian collaboration with the incumbent, I applied a novel methodological setup introduced by Schutte and Donnay (2014). Introducing the intricacies of the method here would exceed the scope of this paper, but a full description of the approach and Monte Carlo tests of the efficiency of the method

can be found in Schutte and Donnay (2014). I will limit myself to a rough sketch of the general setup here. Matched Wake Analysis (MWA) generates balanced samples of so-called “treatment” and “control” events. In this case, the treatment event corresponds to instances of indiscriminate violence and the control events are instances of selective violence. Prior to generating the balanced sample, treatment and control events are associated with geographic context information through nearest-neighbor mapping: population density of an attack site, for example, can be established by intersecting all the attack sites with the geo-referenced “gridded population of the world” dataset (CIESIN, 2005). Similarly, the spatio-temporal vicinity of the attack can be analyzed based on the numbers of previous and posterior events within specific geographic and temporal distances from the treatment and control events. In this case, the quantity of interest are counts of civilian assistance to US ground forces before and after violence was applied. Figure 3 illustrates this empirical setup: instances of civilian assistance before and after the treatment and control events are depicted as stars. A local trend in civilian assistance is established by subdividing the lower half of the spatio-temporal cylinder into two halves. In figure 3, this trend is flat with one instance of civilian assistance in the first two quarters of the cylinder. Based on this trend and the multivariate information established in the nearest neighbor mapping, an automated matching procedure (Iacus et al., 2012) is used to generate a balanced sub-sample of treatment and control events. Intuitively, this step ensures that the difference between treatment and control is established under otherwise comparable conditions. Finally, a Difference-in-Differences regression design (DD hereafter) is used to establish the “treatment effect” of indiscriminate violence on civilian collaboration.

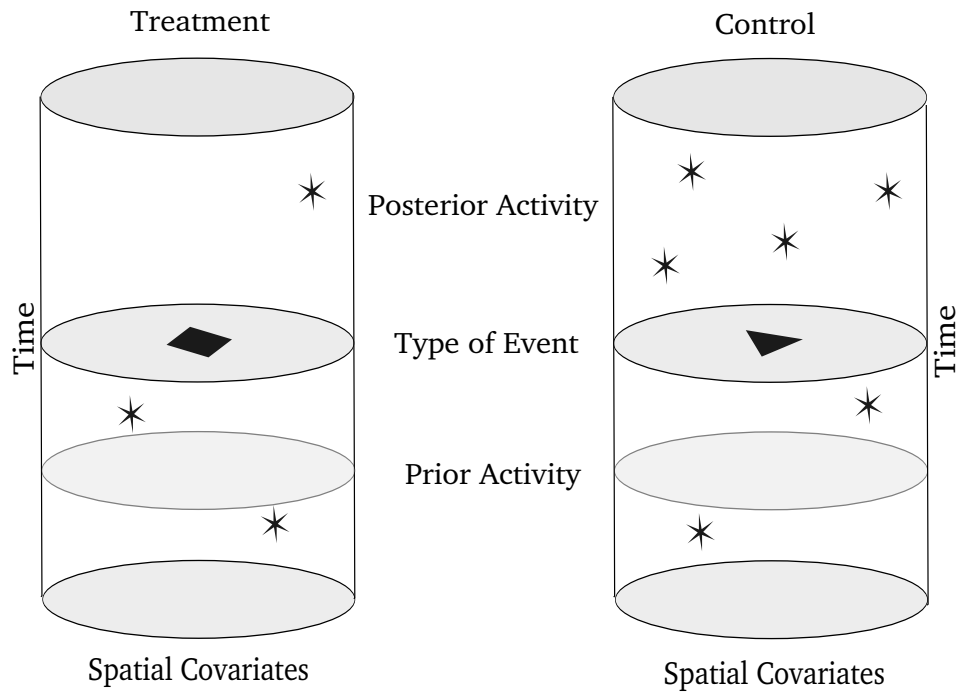


Figure 3: Concept of the MWA analysis. Classes of conflict events are categorized into “treatment” and “control” groups and depicted here as a triangle and a rectangle. The star-shaped symbols are instances of civilian assistance to US forces. A matched sample is generated based on a series of spatial covariates and a trend in civilian assistance prior to intervention. Finally, a Difference-in-Differences analysis is used to estimate the before-and-after average treatment effect of the treated. (Figure taken from Schutte and Donnay (2014)).

One final problem needs to be addressed in this empirical setup: A central result from the geographic literature is that the size of artificial units in spatial aggregations is likely to drive inferential findings (Openshaw and Taylor, 1979). To account for this effect, MWA repeats the steps discussed above for various spatial and temporal cell sizes. Suitable parameter ranges for the spatial and temporal cylinder sizes very much depend on the underlying event dataset: if cylinders are chosen too small, counts for previous and posterior events will all be zero, which means that treatment effects cannot be estimated. If they are chosen too large,

cylinders for different events will overlap and Schutte and Donnay (2014) report that this tends to bias the results. Therefore, cylinder sizes must be chosen to maximize variation in previous and posterior counts while keeping overlaps at a minimum.

For the matching step, MWA relies on an automated approach to generating well-balanced datasets that was proposed and implemented by Iacus et al. (2012). “Coarsened Exact Matching” (CEM) applies three steps to generating a matched dataset. In a first step, substantially indistinguishable values for confounding factors are grouped together and represented by one numerical value. After that, exact matching is performed for this “coarsened” sample. Observations of the control group for which no matched equivalent can be found in the treatment group are eliminated from this sample. Finally, the remaining observations can be used in a subsequent analysis with their original variable values. CEM automatically generates more balanced datasets without requiring manual optimization for each parameter combination of the sliding spatio-temporal window.

The selection of matching variables was guided by theoretical considerations. Kalyvas’ (2006, 124) theory is constructed around the notion that civilian collaboration in wartime is endogenous to military control. Treating Kalyvas (2006) as a point of departure, I use matching variables that correlate with insurgent and incumbent control.

Several studies point to the importance of rugged and inaccessible terrain for providing shelter for rebel movements (see McColl, 1969, Fearon and Laitin, 2003, Buhaug et al., 2009). To account for this effect, I used spatially referenced data on elevation above sea level (Gesch et al., 1999) with an approximate resolution of 1km close to the equator.

Similarly, remoteness from the state’s power center and the ability to seek refuge across international borders has been associated with rebel presence. Generally, the center of state

power is associated with the capital city and the rebels' realm is the periphery. This assumption is in line with the communist literature (Guevara, 1961, 10), counterinsurgency studies (Galula, 1964, 23-24), recent conflict research (Kalyvas and Balcells, 2010, 415), and agent-based simulation studies (Cederman, 2008). Empirical evidence also indicates that rebels indeed seek out the most remote regions to start insurgencies. Macaulay (1978, 288) reports that the Cuban 26th of July Movement operated from the easternmost province of the island – the Sierra Maestra mountains – and then gradually moved toward Havana. Nolan (1958, 71) observes that “in the twentieth century, those seeking power for the purpose of radically transforming society have generally turned to rural-based guerrilla warfare as a means of overthrowing the existing order”. Using international borders for retreat and supply, insurgent movements tend to use remote areas to build up their bases (Salehyan, 2009, Hironaka, 2005, 76). To account for this effect, I calculated distances to Pakistan and Kabul from Weidmann et al. (2010).

As the heaviest fighting in Afghanistan takes place in the Pashtun tribal areas where insurgents might exercise greater control, I also coded the predominant ethnic group in the region for each conflict event based on Wucherpfennig et al. (2011).⁴ As wealthy regions might be better protected by state power (Hegre et al., 2009), I used information on spatially disaggregated wealth based on Nordhaus (2006). This data is only available at a coarser spatial resolution of about 50km. Finally, I coded population numbers for the year 2000 from a 5km resolution dataset (CIESIN, 2005) which generally correlate with the number of conflict events in any region (Raleigh and Hegre, 2009), and a newly generated line-of-sight dataset

⁴GeoEPR accounts for several ethnic groups in Afghanistan: Pashtun, Hazara, Turkmen, Uzbeks, and Tajiks. Only Hazaras and Pashtuns were considered in this analysis because these groups saw significant changes in their power status after the 2001 invasion.

derived from digital elevation figures.⁵ Line-of-sight is important, as types of violence are coded based on the use of indirect fire. In places where direct fire cannot be used due to natural obstacles blocking the line of sight, actors might be more inclined to resort to indirect strikes or air attacks.⁶

6.2 Difference-in-Differences analysis

This analysis is generally interested in the change in civilian assistance induced by different types of violence. These are the “dependent” event in this setup. For this type of question, a Difference-in-Differences (DD) design (see Angrist and Pischke, 2009, 227-243) has been proposed and used in related studies (see Lyall, 2009). DD performs an OLS regression on the matched dataset to estimate changes in the before- and after trend brought about by the treatment. The number of events counted as civilian assistance after the trigger event is the dependent variable in this model. The sample consist of different types of trigger events. For example selective insurgent violence are the “control” events against which indiscriminate violence is compared as a “treatment”. The number of incidents of civilian assistance before the treatment is also necessarily included in the model.⁷ Moreover, matching on the trend before treatment for civilian assistance was possible by subdividing the spatio-temporal half of the cylinder that preceded the trigger event as shown in Figure 3. In essence, this setup means that “treatment” and “control” events are analyzed under otherwise most comparable conditions: Matching on the spatial context and the trend preceding them means that differences

⁵Please refer to the supplementary information for details on how the line-of-sight dataset was generated.

⁶The supplementary information presents a series of robustness checks, both for the selection of matching variables and codings for types of violence.

⁷Aggregating these counts into a pre- and post-treatment period solves the problem of serial correlation that DD designs are otherwise prone to (Bertrand et al., 2004, 252).

in subsequent “dependent” events are caused by the treatment. Translated into a regression specification, the DD model looks like this:

$$n_{post} = \beta_0 + \beta_1 n_{pre} + \beta_2 treatment + u$$

In this model, β_2 is the estimated average treatment effect of the treated, i.e. the quantity of interest for this study. Preceding numbers of dependent events (n_{pre}) should translate directly into a specific number of subsequent dependent events (n_{post}) as the trends in dependent events are parallel. However, if there is a systematic treatment effect, it is reflected in the *treatment* estimate.

For the correct choice of matching variables, this estimate reflects the causal effect of the event type, but MWA naturally has the same limitations as other multivariate methods: unobserved confounding factors cannot be ruled out completely. In the results below, estimates for β_2 are shown for different spatio-temporal aggregations.

6.3 Results

Generally, the results show very clear reactive patterns. Indiscriminate incumbent violence decreases collaboration in direct comparison to selective incumbent violence under otherwise comparable conditions. For insurgent attacks, the reverse effect can be observed: indiscriminate insurgent attacks increase collaboration with US forces in comparison with selective attacks. Beyond its theoretical significance, this result also underlines that indirect fire –which is coded as indiscriminate– does not automatically lead to more “turn in” events than direct fire.⁸

⁸One concern would be that indirect fire itself produces explosive remnants of war that are then turned in, which would lead to an endogeneity problem. This does not seem to be the case for two reasons: first, if this

Results are presented below in a series of contour plots, showing the β_2 -estimates for the treatment term in the DD regression. The shaded areas in the plots indicate p-values above 0.1, i.e. parameter combinations for which no significant average treatment effect could be found. Dotted lines indicate p-values smaller than 0.1 but above 0.05. All non-shaded areas indicate significant effects for the β_2 term.

Indiscriminate incumbent violence affecting civilian collaboration

Civilian assistance to incumbent forces as a reaction to indiscriminate incumbent violence was operationalized as changes in the number of “turn in” events following indirect fire and air attacks. As shown in figure 4, indiscriminate incumbent violence has different effects for different spatio-temporal aggregations. Locally, no strong effect can be seen in the analysis. However, as distances from the interventions increase up to four km and 30 days, a clear negative effect becomes visible. Note that this effect is not visible for the immediate vicinity of the attack site (<three km), but if the spatial offset is taken into account, a robust negative effect emerges and remains visible between 30 and 45 days and four to 10 kilometers. The results clearly show a negative treatment effect for medium distances from the interventions. How does this finding relate to the hypotheses? If deterrence was the mechanism at work (H1), we would expect indiscriminate incumbent violence to lead to more collaboration with the state, i.e. predominantly positive estimates. Alienation (H2) as an alternative mechanism would lead to negative estimates, reflecting declining collaboration with US forces in reaction

were true than ISAF munitions (i.e. modern NATO equipment) would leave much more unexploded shells behind than shells from the improvised arsenal of insurgents which is highly unlikely. Second, Afghanistan has seen almost continuous political violence since the Soviet invasion in 1979. This has led to a cumulation of landmines and various types of unexploded munitions estimated to be one of the highest in the world. Turned in munitions therefore potentially stem from a much larger population than just the remnants of the most recent attack.

to indiscriminate incumbent violence. This is the case, but declining collaborations with the perpetrator of indiscriminate violence and increased collaboration with the adversary only become visible at certain spatio-temporal distances from the trigger event. However, alienation is the predominant effect of indiscriminate violence according to these results. It is important to note, however, that the effect is moderately small: At 40 days and 8 km, it is -0.1. This means that for every 100 instances of indiscriminate violence, 10 fewer instances of civilian assistance to US forces occur at this level of aggregation.

While these results are robust and warrant substantive interpretation, they also appear rather small. One possible explanation for this modest effect is that civilians simply do not always have the opportunity to turn in unexploded ordnance or IEDs. In most cases, they simply do not have any information to pass on. The resulting empirical signal in the MWA analysis is therefore relatively weak.

Why do we see the substantive effects at specific levels of spatial and temporal aggregation? Numerous factors influence the spatial offsets between trigger and reaction: in densely populated areas with high concentrations of ISAF forces, the reactive effects could occur in closer proximity than in sparsely populated regions. Similarly, the temporal dimension is affected by multiple factors: not all parts of the country can be regularly patrolled and making contact with ISAF in the absence of communication or transportation infrastructure takes time. In countries with more developed communications infrastructure or areas with higher ISAF presence, the temporal offsets could be smaller. In summary, the parameter combinations that yield significant results are hard to interpret substantively, but the sliding window approach offers a remedy for the Modifiable Areal Unit Problem via multiple parameter testing.

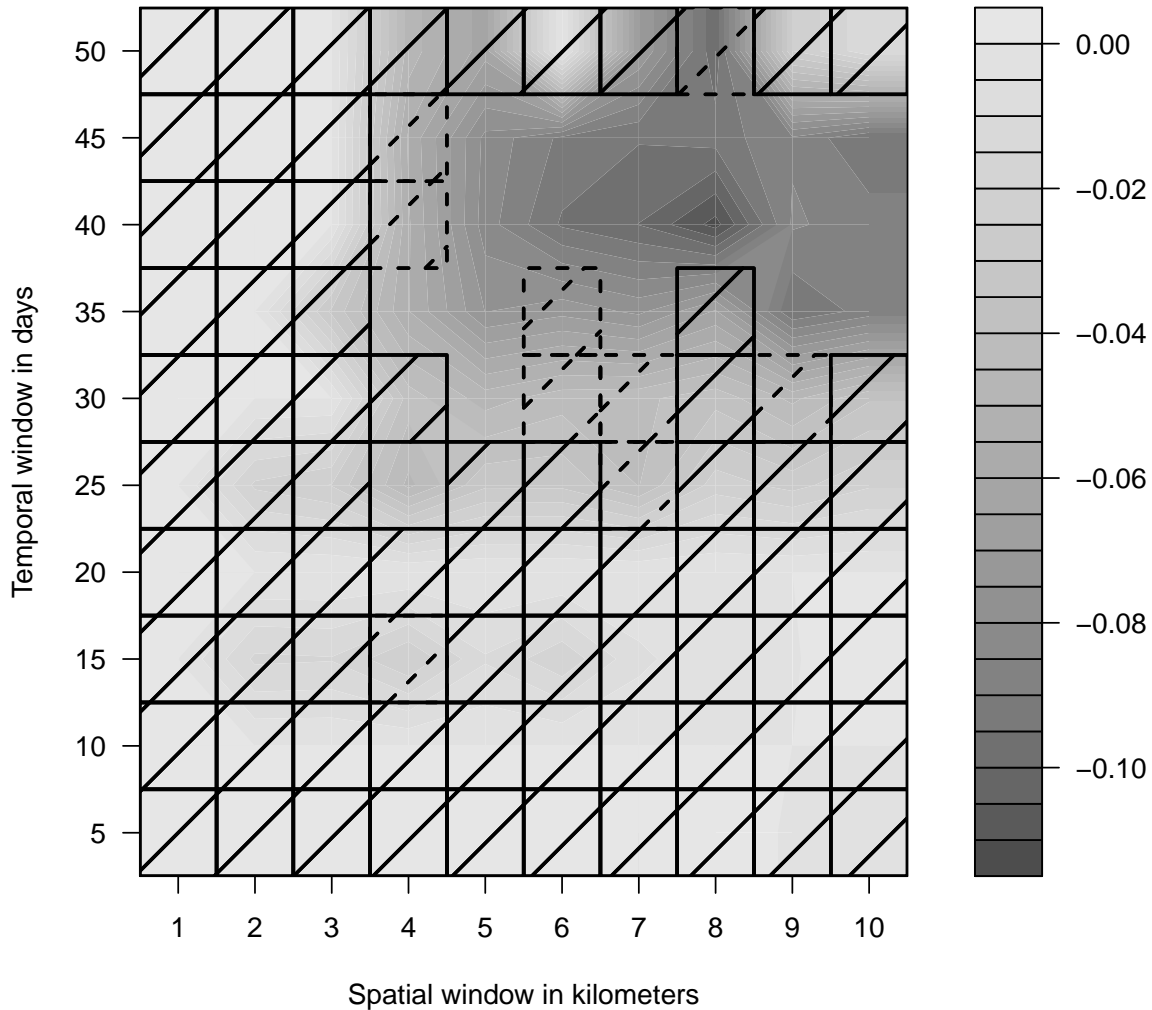


Figure 4: A contour plot showing the before-and-after average treatment effect from the DD regression. The control group consists of instances of selective violence by US forces and the treatment group of indiscriminate violence by US forces. The dependent variable is the number of events in which civilians turned in unexploded ordnance. In the clear areas, the estimate is significant at $p < 0.05$. In dotted areas, it is only significant at $p < 0.1$ and in areas with solid lines the estimate is not significant. Note that the estimates are predominantly negative.

Apart from substantive findings, the effectiveness of the matching procedure was also assessed. Table 2 shows summary statistics for each parameter combination in the MWA analysis. The situation prior to matching and after matching is described by a number of summary statistics. “N” indicates the numbers of observations available for each group before and after matching. “L1” and “%CS” show two multivariate similarity measures discussed in Iacus et al. (2012). Both statistics compare the joint distributions of the confounding between treatment and control group, either with regard to the normalized dissimilarity between the distributions of confounding factors (L1) or the overlap of value ranges in the treatment and control groups (common support). The range of the substantively interpreted effect at distances of four to 10 kilometers and between 25 and 45 days show improvements in balance as a result of the matching. Common support is increased from about 12% to almost 27% in these cells. Similarly, L1 decreases from 0.7 to about 0.55. Across all spatial and temporal parameters, matching decreases L1 and increases common support, highlighting the effectiveness of coarsened exact matching.

Table 2 also shows instances of treatment and control events before and after interventions in the columns “%SO” (same overlap) and “%MO” (mixed overlap). For the substantively interpreted area, instances of temporally overlapping indiscriminate violence by US forces occur: For distances of up to four km and 25 days, about half of all observations in the sample have at least one preceding intervention of the same type within their spatio-temporal cylinder. Schutte and Donnay (2014) point out that these overlaps constitute violations of the underlying “Stable Unit Treatment Value Assumption” and propose a possible remedy in terms of matching on the numbers of previous interventions.⁹ Based on this precaution, the

⁹Another possible remedy for spatio-temporal overlaps could be a circular spatio-temporal band with minimal and maximal distances from the trigger event. While such a circular shape would have reduced the number

overlapping interventions are less likely to drive the statistical results. In the supplementary information, robustness tests in terms of alternative confounding factors and placebo tests are presented.

Indiscriminate insurgent violence affecting civilian collaboration

In order to find out whether reactive collaboration with the adversary works both ways in insurgencies, the effects of insurgent violence on civilian assistance to US forces was also analyzed. In figure 5, a clear reactive effect is visible. All except one estimate in the interpreted (i.e. non-shaded) areas are positive, suggesting that indiscriminate insurgent violence leads to more collaboration with US forces in reaction to indiscriminate insurgent violence. While this effect is even visible locally at an aggregation of one km and five days, a more robust effect emerges for 25-50 days and from one to five kilometers. Positive estimates can be found for the entire region of this plot. Again, the spatial and temporal lag of the reaction corresponds well to the previous analysis of reactions to incumbent violence: A robust positive effect can be found for larger aggregations. Negative estimates can also be found, albeit only for a narrow parameter combination and outside the interpreted (“significant”) areas of the plot. Again, these insights correspond very well to hypothesis 2: Alienation from the user of force occurs, but mainly at certain spatial and temporal distances from the trigger event. The estimated effect size is relatively small, and peaks at about 0.02.

of overlapping events, the adequacy of this remedy remains questionable as closer treatment and control events are likely to affect subsequent levels of civilian support.

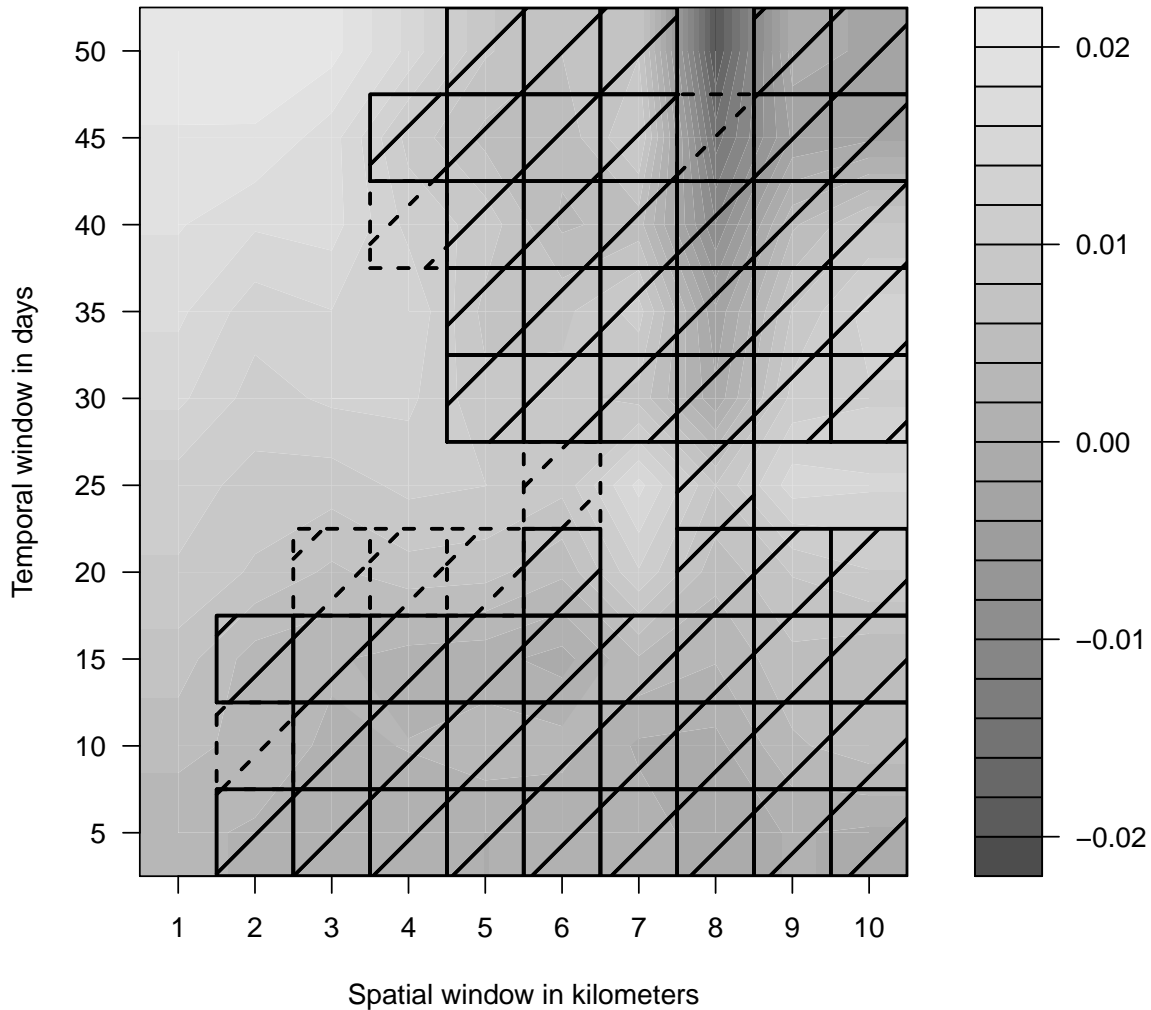


Figure 5: Contour plot showing the before-and-after average treatment effect of the DD regression. The control group consists of instances of selective violence by insurgents and the treatment group of instances of indiscriminate violence by insurgents. The dependent variable is the number of events in which civilians turned in unexploded ordnance. In the clear areas, the estimate is significant at $p < 0.05$. In dotted areas, it is only significant at $p < 0.1$ and in areas with solid lines the estimate is not significant. Note that the estimates are predominantly positive in the interpretable areas.

For this analysis, summary statistics were also calculated for the matching procedure and SUTVA violations were assessed. As seen on the left in table 3, both the treatment as well as the control groups in this sample are much larger than in the analysis of reactions to incumbent actions. Unfortunately, the decrease in L1 brought about by matching is less pronounced than in the previous analysis. For common support, the post-matching sample show a 10-15% improvement in comparison to the original sample. With regard to the possible SUTVA violations, the analysis seems less affected than the previous one. Instances of double interventions in the interpretable area of the plot range from 30% to 50% depending on the spatial and temporal aggregations. Again, matching on previous interventions was performed to prevent the effects of SUTVA violations from driving the results.

7 Discussion and conclusion

Deterrence- and alienation-based reasoning in different forms has dominated the discussions on the effects of violence in civil wars for decades. Recently, a series of mixed empirical results has given support to both camps. The results presented in this study clearly indicate the existence of alienating effects in the Afghan civil war, but they paint a more complicated picture than previous studies by explicitly taking the spatio-temporal margins into account that separate trigger and response. As a result, a reaction to indiscriminate violence cannot be found locally, but only at certain temporal distances to the trigger event. This finding is somewhat in line with the conditional deterrent effect reported by Downes (2007) and the reactive pattern reported by Condra and Shapiro (2012) for Iraq. Interestingly, the results deviate from the survey-based findings of Lyall et al. (2013) for Afghanistan: as shown in the

main analysis and the supplementary information to this article, increased collaboration with ISAF in reaction to indiscriminate insurgent violence is a very robust effect and reactions to violence exhibit a somewhat symmetrical pattern for both incumbent and insurgent. It is difficult to tell whether this mismatch is due to the particularities of the different identification strategies in these studies; future research will be necessary to resolve this issue.

The findings presented here indicate two effects: civilians are driven toward the adversary as a consequence of indiscriminate violence, but while trying to settle the score with the perpetrator, they expose themselves to as little risk as possible. By explicitly focusing on a type of event that exposes civilians to comparatively little risk and sliding spatial and temporal windows, this study has uncovered a corresponding empirical pattern. At greater spatio-temporal distances, an alienating effect of indiscriminate violence can be found, indicating that civilians take revenge on the perpetrator once they have found a safe opportunity to do so. This insight suggests that Kalyvas' (2006, 118-132) emphasis on military control being the sole determinant of civilian collaboration might be falling short of a full explanation. Instead, civilian support of military actors seems to be conditional on their behavior as suggested by counter insurgency theory.

Based on these insights, Hypothesis 1, which describes a deterrent effect of indiscriminate violence, does not seem to hold. Hypothesis 2, which describes an alienating effect, seems to hold in this case, although civilian assistance is a comparatively low-risk endeavor in comparison to direct participation in armed conflict. Generally, Hypothesis 2 must be considered most suitable in explaining the empirical results. The crucial policy conclusion from this finding is that deterrence is a short-sighted strategy in population-centric warfare. Alienation from the user of force is a reliable mechanism even though it does not show lo-

cally. This finding is in line with a basic insight of the counterinsurgency school: loyalties shift to the strategic adversary if actors cause indiscriminate destruction in the field. If actors react to the increased resistance by applying more force of the same kind, they can quickly find themselves locked in an increasingly deadly struggle in which tactical victories over enemy combatants translate into strategic defeat in population-centric warfare. This mechanism could explain how domestic insurgencies without strong international support can take on mechanized armies, as it is happening in Syria. Historical examples of insurgencies in less developed countries that have defeated superpowers might also be explained better along these lines.

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	Results			Before matching						After matching						
	Time	Space	Est.	p	N	%Treat.	L1	%CS	%S0	%MO	N	%Treat.	L1	%CS	%S0	%MO
1	25.00	4.00	-0.05	0.02	1294	40.70	0.69	14.70	41.90	31.70	734	40.70	0.54	29.50	52.00	39.90
2	30.00	5.00	-0.05	0.03	1294	41.40	0.72	13.50	46.80	35.50	691	41.40	0.58	25.90	57.70	43.70
3	35.00	4.00	-0.06	0.03	1294	40.00	0.71	13.40	45.00	34.30	735	40.00	0.59	24.20	55.60	43.10
4	35.00	5.00	-0.07	0.03	1294	40.40	0.72	13.40	47.90	36.70	722	40.40	0.61	22.10	58.90	45.40
5	35.00	7.00	-0.08	0.05	1294	39.50	0.73	12.50	51.50	39.60	708	39.50	0.64	20.60	62.40	48.50
6	35.00	9.00	-0.10	0.01	1294	38.60	0.75	12.10	55.30	41.30	682	38.60	0.55	29.00	66.60	50.60
7	35.00	10.00	-0.09	0.01	1294	38.80	0.75	12.60	56.70	41.70	681	38.80	0.55	29.50	68.00	51.00
8	40.00	5.00	-0.08	0.02	1294	40.60	0.73	13.00	49.10	37.90	707	40.60	0.61	23.00	60.30	46.40
9	40.00	6.00	-0.10	0.01	1294	40.40	0.74	12.50	51.00	39.30	693	40.40	0.62	22.50	61.80	48.10
10	40.00	7.00	-0.10	0.01	1294	39.90	0.75	12.20	52.80	40.60	692	39.90	0.64	22.00	63.60	49.60
11	40.00	8.00	-0.11	0.02	1294	39.30	0.76	11.90	54.90	41.50	666	39.30	0.64	22.30	66.00	50.50
12	40.00	9.00	-0.08	0.02	1294	39.20	0.76	11.80	56.70	42.60	665	39.20	0.57	28.70	67.90	51.80
13	40.00	10.00	-0.09	0.02	1294	39.40	0.77	11.80	58.00	43.20	665	39.40	0.58	28.40	69.30	52.40
14	45.00	5.00	-0.08	0.01	1294	42.00	0.74	12.60	50.10	39.00	704	42.00	0.56	25.00	61.20	47.40
15	45.00	6.00	-0.09	0.01	1294	42.10	0.74	12.30	52.20	40.60	698	42.10	0.58	23.50	62.80	49.20
16	45.00	7.00	-0.10	0.01	1294	41.50	0.75	12.00	53.80	41.90	697	41.50	0.56	27.70	64.50	50.60
17	45.00	8.00	-0.09	0.03	1294	41.00	0.76	11.60	56.00	42.90	668	41.00	0.57	27.60	67.20	51.80
18	45.00	9.00	-0.09	0.02	1294	40.60	0.77	11.40	58.10	44.00	668	40.60	0.59	26.80	69.50	52.80
19	45.00	10.00	-0.10	0.02	1294	40.80	0.77	11.70	59.40	44.60	665	40.80	0.59	27.50	70.80	53.40

Table 2: Detailed overview of the MWA results. Spatio-temporal cylinder sizes for the interpreted areas of figure ?? are shown on the left side of the table together with estimated treatment effects on civilian collaboration and p-values. The middle columns of the table show summary statistics before matching was used. The L1 distance metric and Common Support (“%CS”) express similarity between treatment and control group for the joint distributions of the covariates. The acronyms “%S0” and “%MO” stand for “same overlap” and “mixed overlap” respectively. Note that higher numbers in these columns are problematic as the overlaps violate the SUTVA assumption as discussed in the main text. Matching on previous numbers of treatment and control events was used to remedy this problem (see Schutte and Donnay, 2014). All estimates are negative implying reduced collaboration with ISAF caused by the use of heavy arms. Note the improvements in balance brought about by the matching and the comparatively large overlaps of observations.

	Results			Before matching						After matching						
	Time	Space	Est.	p	N	%Treat.	L1	%CS	%SO	%MO	N	%Treat.	L1	%CS	%SO	%MO
1	5.00	1.00	0.00	0.01	22448	34.50	0.69	20.30	29.20	7.40	17255	34.50	0.61	36.90	38.60	11.40
2	10.00	1.00	0.01	0.00	22305	35.20	0.71	18.60	36.40	10.60	17081	35.20	0.64	31.00	46.30	16.10
3	15.00	1.00	0.01	0.00	22173	35.30	0.73	17.50	40.60	13.10	16373	35.30	0.64	30.20	50.50	19.70
4	20.00	1.00	0.01	0.00	22098	35.40	0.74	16.10	43.30	15.20	15914	35.40	0.65	28.20	53.30	22.60
5	20.00	2.00	0.01	0.00	22098	38.10	0.79	13.20	53.30	23.00	15477	38.10	0.71	22.00	63.50	33.20
6	20.00	7.00	0.01	0.01	22098	40.60	0.86	9.00	70.30	46.50	14127	40.60	0.83	11.20	80.00	61.10
7	25.00	1.00	0.01	0.00	21967	35.90	0.75	15.50	45.30	17.00	15886	35.90	0.67	26.60	55.30	25.10
8	25.00	2.00	0.01	0.00	21967	37.80	0.79	13.10	55.40	25.60	15067	37.80	0.72	20.70	65.60	36.60
9	25.00	3.00	0.01	0.02	21967	38.90	0.82	10.60	61.30	32.50	14591	38.90	0.77	16.50	71.50	45.10
10	25.00	4.00	0.01	0.01	21967	39.40	0.85	9.00	65.40	38.90	14768	39.40	0.80	13.50	75.50	52.50
11	25.00	5.00	0.01	0.03	21967	39.50	0.85	9.50	68.40	43.30	14407	39.50	0.83	11.10	78.40	57.50
12	25.00	7.00	0.02	0.00	21967	40.40	0.87	7.70	72.80	50.60	14004	40.40	0.85	9.50	82.20	64.90
13	25.00	9.00	0.01	0.02	21967	40.90	0.89	6.40	76.10	56.90	13569	40.90	0.87	8.50	85.00	70.90
14	25.00	10.00	0.01	0.04	21967	41.20	0.88	6.30	77.60	59.40	13305	41.20	0.88	7.80	86.20	73.10
15	30.00	1.00	0.01	0.00	21753	35.80	0.76	14.70	46.80	18.40	15567	35.80	0.68	25.10	56.90	27.00
16	30.00	2.00	0.01	0.00	21753	38.40	0.80	12.20	57.00	27.70	14910	38.40	0.74	19.10	67.30	39.30
17	30.00	3.00	0.01	0.01	21753	39.50	0.84	9.70	63.00	35.20	14291	39.50	0.79	15.00	73.10	48.10
18	30.00	4.00	0.01	0.01	21753	39.90	0.85	9.90	67.00	42.10	14473	39.90	0.82	11.70	77.00	55.80
19	35.00	1.00	0.02	0.00	21623	36.20	0.77	14.20	48.20	19.50	15364	36.20	0.68	24.30	58.30	28.70
20	35.00	2.00	0.01	0.00	21623	38.30	0.81	11.60	58.40	29.60	14550	38.30	0.75	18.40	68.70	41.70
21	35.00	3.00	0.01	0.01	21623	39.50	0.85	9.10	64.50	37.50	14266	39.50	0.80	13.80	74.60	50.70
22	35.00	4.00	0.01	0.01	21623	40.20	0.86	9.20	68.50	44.40	14005	40.20	0.83	11.20	78.40	58.40
23	40.00	1.00	0.02	0.00	21431	36.30	0.76	14.40	49.30	20.80	15002	36.30	0.69	23.50	59.40	30.40
24	40.00	2.00	0.02	0.00	21431	38.40	0.82	10.90	59.60	31.40	14268	38.40	0.76	17.10	69.90	43.80
25	40.00	3.00	0.02	0.00	21431	39.70	0.84	10.80	65.70	39.60	13840	39.70	0.81	12.70	75.70	53.10
26	45.00	1.00	0.02	0.00	21246	36.50	0.76	14.00	50.30	22.00	14979	36.50	0.69	22.80	60.40	32.00
27	45.00	2.00	0.02	0.00	21246	38.40	0.82	10.50	60.60	33.20	14179	38.40	0.77	16.30	70.80	46.00
28	45.00	3.00	0.02	0.00	21246	39.40	0.85	10.40	66.80	41.50	13949	39.40	0.82	11.90	76.60	55.10
29	50.00	1.00	0.02	0.00	21054	36.40	0.77	13.30	51.10	22.90	14847	36.40	0.70	21.20	61.30	33.30
30	50.00	2.00	0.02	0.00	21054	38.50	0.83	9.80	61.60	34.40	13957	38.50	0.78	15.40	71.80	47.50
31	50.00	3.00	0.02	0.00	21054	39.60	0.85	9.60	67.70	43.00	13720	39.60	0.83	11.10	77.60	56.60
32	50.00	4.00	0.01	0.02	21054	39.60	0.88	7.90	71.80	50.10	13880	39.60	0.87	8.70	81.20	63.90
33	50.00	8.00	-0.02	0.04	21054	41.70	0.89	6.90	80.70	65.50	13035	41.70	0.90	6.10	88.40	77.40

Table 3: Detailed overview of the MWA results. Spatio-temporal cylinder sizes for the interpreted areas of figure ?? are shown on the left side of the table together with estimated treatment effects on civilian collaboration and p-values. The middle columns of the table show summary statistics before matching was used. The L1 distance metric and Common Support (“%CS”) express similarity between treatment and control group for the joint distributions of the covariates. The acronyms “%SO” and “%MO” stand for “same overlap” and “mixed overlap” respectively. Note that higher numbers in these columns are problematic as the overlaps violate the SUTVA assumption as discussed in the main text. Matching on previous numbers of treatment and control events was used to remedy this problem (see Schutte and Donnay, 2014). Please note that all estimates with the exception of row 33 are positive. The number of observations is also higher than for incumbent violence and the matching summaries show substantive improvements in balance.