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ABSTRACT

How are insurgents able to mobilize the population to fight and withhold valuable information from government forces? More specifically, what role does government mistreatment of non-combatants play? We study these questions by using uniquely-detailed micro-data from Afghanistan and Iraq to assess the impact of civilian casualties on insurgent violence. By comparing the data along temporal, spatial, and gender dimensions we are able to distinguish short-run "information" and "capacity" effects from the longer run "recruiting" and "revenge" effects. In Afghanistan we find strong evidence for a revenge effect in that local exposure to ISAF generated civilian casualties drives increased insurgent violence over the long-run. Matching districts with similar past trends in violence shows that counterinsurgent-generated civilian casualties from a typical incident are responsible for 1 additional violent incident in an average sized district in the following 6 weeks. There is no evidence of short run effects in Afghanistan, thus ruling out the information and the capacity mechanisms. Critically, we find no evidence of a similar reaction to civilian casualties in Iraq, suggesting insurgents' mobilizing tools may be quite conflict-specific. Our results suggest that minimizing harm to civilians will indeed help counterinsurgent forces in Afghanistan minimize insurgent attacks.

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Introduction

How much risk should commanders of counterinsurgency forces assume in an effort to protect civilians from harm? Often when planning military operations, commanders are forced to choose how much risk their own troops should accept in an effort to avert civilian injury or death. In addition to soldiers' moral or legal obligations to minimize civilian casualties, there may also be strategic military returns to such action if civilian casualties are associated with greater levels of insurgent violence. Thus the question has recently been reframed as whether to accept greater risk to their forces in the short-term because such behavior leads to reduced violence (and personal risk) in the long-term. A related issue is whether insurgents are held to the same standard with respect to their behavior toward civilians or instead if soldiers bear the cost for civilian casualties, no matter which side causes the damage?[2] Underlying both of these questions is a set of theories as to how insurgents are able to mobilize the population and produce violence. Determining which factors enable insurgent groups to motivate people to fight is a critical theoretical question which bears on policies governing the use of force and on debates about how the international community can best help provide security, development, and governance in conflict environments.

This paper analyzes the impact of civilian casualties on insurgent violence in the conflict in Afghanistan using micro-level, geocoded data on civilian casualties and violence between International Security Assistance Force (ISAF) units and insurgents. We employ a series of analytic comparisons to distinguish between four prominent theories on the how civilian casualties may affect violence: revenge, recruitment, population-provided information, and

[2] In Afghanistan at least, the conventional wisdom on this question is summed up neatly by the chief spokesman for the International Security Assistance Force (ISAF), U.S. Army Colonel Wayne Shanks: "When the Taliban blow up a bunch of people, you don't see a lot of protest. But when we screw up and accidentally kill somebody, you get riots in the streets." Quoted in Wood (2010).

insurgent group capacity. Separating out levels of future violence from long-run trends (a 3-period moving average) allows us to distinguish the short-run 'information' and 'capacity' effects from the longer run 'recruiting' and 'revenge' effects. Examining differences in the impact of events that kill women and children from those that kill men allows us to separate the 'information' and 'capacity' effects. Studying how local responses to local civilian casualties differ from local response to civilians casualties in other parts of the country helps disentangle the 'recruiting' and 'revenge' effects.

To conduct our analysis, we link ISAF reports on violent incidents in Afghanistan with civilian casualty data from the ISAF Civilian Casualty Tracking Cell (CCTC) aggregated to the district bi-month level.[3] Overall there is a positive relationship between civilian casualties and levels of future violence in an area. Using a matched sample, we find that if the average ISAF-caused incident, which resulted in 2 civilian casualties, was eliminated, then in an average-sized district there would be 1 fewer violent incident between ISAF and insurgents (i.e., SIGACTs) over the next 6 weeks. The relationship is somewhat asymmetric, larger for ISAF than insurgent, but weakly positive regardless of which side – ISAF or insurgents – is responsible for the civilian casualties.

While we find a robust relationship between civilian casualties and long-run trends in IED incidents, there is little evidence of a short-run effect, suggesting the information and capacity mechanisms are not substantial drivers of the response to civilian casualties in Afghanistan. Instead, the data are consistent with the claim that civilian casualties are affecting future violence through increased recruitment into insurgent groups after a civilian casualty incident. Local exposure to violence from ISAF appears to be the primary driver of this effect.

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[3] Incident data from the from the ISAF Combined Information Data Network Exchange (CIDNE) database include unclassified fields such as date, time, location, and type of attack.

Given the frequent linkages made between Iraq and Afghanistan and the importance of externally validating our results, we conduct a parallel analysis on civilian casualty and violence data from Iraq. The differences between the consequences of civilian casualties across these conflicts provide valuable inferential leverage on the processes underlying insurgents' production of violence. In Iraq, we find no evidence that civilian casualties affect long-run trends in violence. Considered alongside Condra and Shapiro's (2010) finding that civilian casualties in Iraq have a short-run, symmetric effect, this suggests insurgents face fundamentally different constraints across these conflicts. In Iraq, the evidence suggests insurgents face an information constraint: when Coalition forces kill civilians and people respond sensibly by sharing less information with counterinsurgents, there is a short-run increase in violence. In Afghanistan, the evidence suggests insurgents face a labor constraint: when ISAF units kill civilians, this increases the number of willing combatants, leading to an increase in insurgent attacks.

The remainder of the paper proceeds as follows. Section one outlines the mechanisms that have been identified for a link between violence against civilians and insurgency in Afghanistan. Section two describes our data on insurgency and violence against civilians in Afghanistan. Section three analyzes the Afghanistan data in detail, providing short-term and long-term results. Section four replicates the empirical approach on data from Iraq, showing that the dynamics of the two conflicts are quite different, at least in the long run, and suggesting possible reasons for the disparity in the results. Section five concludes by detailing the implications of our findings for research and ongoing policy debates.

1. Mechanisms Linking Civilian Casualties and Insurgent Violence

Pundits routinely associate civilian casualties with higher Taliban recruitment and violence.[4] Some commanders and those responsible for formulating rules of engagement (ROE) feel that reducing harm to civilians during battlefield operations, while risky, is nevertheless necessary for purposes of gaining the support of the local population. Despite the current support for the need to limit violence against civilians, there has been relatively little systematic thinking about exactly how civilian casualties influence insurgent violence. The existing policy and academic literatures identify three mechanisms that could explain the relationship between civilian casualties and violence. We term these effects: "revenge", "recruitment", and "information" effects. A fourth mechanism that has not been much discussed complicates efforts to study the issue, what we call the "capacity" effect. We discuss each of these in turn.

First, civilians might be driven to participate in violence after Coalition/ISAF civilian casualties out of a desire to avenge specific harm to family, friends, or neighbors; what we call the 'revenge effect'. Our findings buttress arguments that the social traditions of the Pashtun ethnic group, which dominates the Taliban and other Islamic extremist groups in the Afghanistan-Pakistan border region, are a key factor in supporting the insurgency. Johnson and Mason (2008) argue, for example, that the Pashtun social code (Pashtunwali) places a high value on personal revenge. If a Pashtun man is dishonored, he must avenge that dishonor "or he will lose face and social status to the point of becoming an outcast" (Johnson and Mason 2008, 63).[5] This revenge mechanism predicts that civilian casualties should lead to increasing long-run

[4] See, e.g., Nadery and Humayoon (2008).

[5] See also Gutman (2010): "To a great extent, though, the Taliban remain motivated by revenge. The massacre in 2001 of hundreds, perhaps thousands, of Taliban detainees at the hands of an Uzbek warlord in northern Afghanistan still motivates Taliban to fight. 'That massacre was the base or foundation for all the fighting that is now going on,' [Vahid] Mojdeh [former Taliban foreign ministry official] said. The senior ISAF general agreed the massacre was 'absolutely' a recruiting tool for the Taliban. 'Those kinds of things thicken the hatred and cause more people to join.'"

trends in violence as individuals take up the fight in response to specific slights, but that the effects should be highly localized.

Second, we could see heightened violence in areas that sustain civilian casualties if casualties make people angrier and more easily recruited by insurgent groups, what we call the 'recruiting effect'. This is a commonly cited concern and matches the conventional wisdom among journalists, soldiers, and policymakers that civilian casualties are used by insurgent groups as a recruitment tool.[6] During his June 2009 testimony before the U.S. Senate Armed Services Committee prior to being confirmed as Commander of ISAF and US Forces in Afghanistan, General Stanley McChrystal talked about how civilian casualties affect popular perception and behavior. "I would emphasize that how we conduct operations is vital to success….This is a struggle for the support of the Afghan people. Our willingness to operate in ways that minimize casualties or damage, even when doing so makes our task more difficult, is essential to our credibility."[7] U.S. Secretary of Defense, Robert Gates, expressed the same opinion before Congress. "But I will tell you that I believe that the civilian casualties are doing us enormous harm in Afghanistan, and we have got to do better in terms of avoiding casualties. And I say that knowing full well that the Taliban mingle among the people, use them as barriers. But when we go ahead and attack, we play right into their hands."[8]

The recruiting mechanism differs from the revenge one in that it does not require local exposure to civilian casualties in order to boost insurgent recruitment. Instead, recruitment increases because civilian casualties create a feeling of antipathy toward the national government

[6] For example, Michael O'Hanlon, of the Brookings Institution, says, "It is certainly the consensus view among NATO intelligence that the inadvertent killing of civilians is one of the two or three things, along with corruption and favoritism perhaps, that most help the Taliban in recruiting." Quoted in Pleming (2010).
[7] Congress, Senate, Committee on Armed Services, *Hearing to Consider Nominations*, 111th Cong., 1st sess., 2 June 2009, 11.
[8] Congress, Senate, Committee on Armed Services, *Hearing to Receive Testimony on the Challenges Facing the Department of Defense*, 111th Cong., 1st sess., 27 January 2009, 21.

and Coalition/ISAF forces, which prompts involvement in insurgent organizations. Thus the recruiting mechanism suggests civilian casualties elsewhere should lead to increased insurgent violence.

Third, civilian casualties might affect levels of future violence if casualties affect the level of civilian cooperation with ISAF and government units, what we term the 'information effect'. Insurgent operations such as planting IEDs, setting ambushes, and training inevitably reveal information to non-combatants. This information is key for counterinsurgents as government forces and their allies have an overwhelming advantage in combat power but often lack of information about insurgents' identity and whereabouts. When ISAF forces kill civilians, the local population may be angered or perceive a greater threat to their physical security from ISAF and consequently share less information with them. In contrast, when insurgents kill civilians, the local population may choose to share more information with US forces, meaning insurgents are less able to produce violence in subsequent periods.[9] The information mechanism suggests we should see a short-run, symmetric reaction to civilian casualties as information on insurgents' whereabouts and weapons caches can have an immediate impact on violence by enabling raids that substantially reduce insurgent capacity.

Fourth, there may be a mechanical correlation between civilian casualties and insurgent capacity, what we term the 'capacity effect'. If ISAF forces are more likely to employ force in ways that have a high potential to cause civilian casualties when the target is particularly valuable from a counterinsurgency perspective (as their rules of engagement suggest they should), then we should see ISAF-caused casualties associated with a drop in insurgent violence, at least in the short term. We would expect this capacity effect to be relatively short-term as a successful attack on a high-value target should result in an immediate loss of organizational

[9] See Condra and Shapiro (2010) for more complete discussion of this argument.

capacity for insurgents. In the long-run, insurgent capacity can be replenished as leadership is replaced, confining the capacity effect to the short-run. The capacity effect can thus be thought of as impacting the short-run ability of insurgent groups to plan and execute specific activities but assuming a supply of sufficiently skilled potential insurgents, will not affect the long-run output of the groups.

This paper's contribution is in part laying out a series of comparisons between different models to distinguish these four theories. Table 1 presents some basic expectations for each theory: revenge, recruitment, information, and capacity. We can test these expectations in several ways: comparing short-run fluctuations with long-run trends; comparing the effects within an area to those in neighboring areas, and comparing the effect between men and women. By analyzing data at different levels of temporal aggregation we can disentangle the short-run 'information' and 'capacity' effects from the longer run 'recruiting' and 'revenge' effects. By examining differences in the impact of events that kill women and children from those that kill men, we can disentangle the 'information' and 'capacity' effects. By studying how local responses to local violence against civilians differ from local response to violence against civilians in other parts of the country we can disentangle the 'recruiting' and 'revenge' effects.

[INSERT TABLE 1 ABOUT HERE.]

2. Data and Descriptive Statistics from Afghanistan

In this section we present descriptive statistics on civilian casualties and insurgent violence in Afghanistan and discuss some of the implications of what we find.

2.1 Data Summary

The data on civilian casualties we use were collected by ISAF's Civilian Casualty Tracking Cell (CCTC). When ISAF units are involved in incidents in which civilians are wounded or killed, the unit makes a series of reports on the specifics of the incident to ISAF HQ.[10] The CCTC reviews these reports and collects data on civilian casualties that occur at the hands of insurgents and ISAF forces. Importantly, the CCTC data are culled of any casualties involving people with ambiguous combatant status under the Law of Armed Conflict, including Afghan government personnel, interpreters, security guards, and contractors. The data are cross-checked against media reports for completeness.

These data include the perpetrator (ISAF, insurgents, other, or unknown), the type of weapons used by ISAF and insurgents, the nationality of any ISAF units involved, and the number of killed and wounded in three categories; men, women, and children. We aggregate these data to the district-week level from January 2009 through March 2010.[11] These data contain 4,077 civilian casualties from 2,118 incidents, 10 percent of which involve women and children.

In the last 15 months there have been 10.5 confirmed civilian casualties per day on average. Of these, 10 percent were women or children. While most of the civilian casualties are caused by insurgents, an equal number of women or children are killed by both insurgents and

[10] When an event involving a civilian casualty event occurs, the patrol unit submits a First Information Report (FIR) within 4 hours of the event via radio to the Regional Command. The unit submits a Second Information Report (SIR) within 24 hrs of the incident. The SIR contains more information about the incident than was included in the FIR, including any media assessment, the cause(s) of the incident, whether key leaders were engaged or solatia (compensation) was paid, etc. If the incident resulted in wounded civilians, the incident reporting is concluded at this point (though, if civilians involved in the incident later die, the incident is re-opened). If the incident resulted in civilian death, another report is submitted within 72 hrs called an Investigation Information Report (IRR). This final incident report is sent to the Legal Adviser at ISAF HQ who makes recommendations to COM-ISAF on any further steps that should be taken to address the situation.

[11] Although data on civilian casualties was collected from by the Civilian Casualty Tracking Cell since about September 2007, between September 2007 and June 2008 there is only data on Afghan civilians killed by ISAF. Injuries and not-ISAF-generated-civilian casualties are not included. Beginning in July 2008 the CCTC tracks non-ISAF and injuries but the data consistency and fidelity is not verified until about January 2009.

ISAF. This means that as a *proportion* of all civilian casualties, ISAF kills or injures many more women and/or children.[12]

As a measure of combat occurring between ISAF units and insurgents we use incident reports submitted by ISAF forces, commonly known as 'significant activity' or SIGACT reports. Unclassified data on 24,937 separate incidents drawn from the ISAF Joint Command (IJC) CIDNE Database provide the location, date, time of incidents in various categories which we combine into six major categories: direct fire, indirect fire, IED explosions, IEDs found and cleared, IED hoaxes, and premature detonations. We analyze the impact of civilian casualties on the sum of all and also focus in on just the direct fire and IED attacks (this latter category is the sum of IED explosions, IEDs found and cleared, and IED hoaxes), as they make up the vast majority of the incidents. We create a bimonthly panel dataset at the district-level using these incident data over the period for which we have corresponding data on civilian casualties (January 2009 through March 2010).

To facilitate cross-district comparisons we scale the counts of civilian casualties and total incidents by the population multiplied by 1000. Scaling by population is not trivial in the Afghan context where there has not been a population census in nearly 30 years. There are generally three available data sources for population: the Afghan Central Statistics Office (CSO) estimates based on surveys and a village census, the Gridded Population of the World (GPW) data, and the LandScan population data. We determined the LandScan data were the most reliable as they are gridded at a higher resolution than GPW and the CSO population data do not include population on villages larger than 5,000. The LandScan data (2008) comprise worldwide population estimates for every cell of a 30" X 30" latitude/longitude grid. Population counts are

[12] This can be at least partially explained by the fact that insurgents live and operate among the population which greatly increases the risk to civilians during counterinsurgency operations.

apportioned to each grid cell based on an algorithm which takes into account proximity to roads, slope, land cover, nighttime illumination, and other information.[13]

2.2 Descriptive Statistics

As a starting point we examine how civilian casualties and insurgent violence are distributed across space in Afghanistan; and what kind of weapons are used in incidents which result in civilian casualties.

Unsurprisingly, both combat and civilian casualties tend to be concentrated in specific districts, mostly in the Regional Command East and Regional Command South areas as illustrated in the map in figure 1. This map combines two important sets of data. The districts are color coded on a sliding scale according to the number of SIGACTs reported (per 1000 people). The size of the circle in each district reflects the number of civilians killed or wounded (per 1000 people) during the period under study. As we might expect, in most cases the most violent districts are also those that report the highest number of civilian casualties. This is likely because these areas are where there is the most combat and the greatest troop presence.

[INSERT FIGURE 1 ABOUT HERE]

Figure 1 does not show the degree of variation in the number and the nature of civilian casualties over time. Time trends in standardized units are shown in Figure 2. This scaling highlights the fact that there is much greater week-to-week fluctuation in civilian casualties than in insurgent violence.

This degree of volatility is worth noting because it suggests that the number of civilians killed or injured in any given week is quasi-random with respect to long-run trends in violence. As figure 2 shows, this is more likely to be true for the lower levels of ISAF generated civilian

[13] Full details on the LandScan population data are available at http://www.ornl.gov/sci/landscan/.

casualties than the more persistent, higher level of insurgent caused civilian casualties. The volatility of the civilian casualties time series makes the causal interpretation of estimates from a simple linear specification reasonable. If the number of individuals killed depends largely on a stochastic process uncorrelated with other determinants of violent activity—once we control adequately for factors affecting the long-run trends in insurgent violence—then a first-difference or lag-dependent variable specification can identify the effect of civilian casualties on security and stability, as measured by SIGACTs. The validity of this identifying assumption is easily assessed with a placebo test that places the lead of civilian casualties on the RHS.[14]

[INSERT FIGURE 2 ABOUT HERE]

It is important to note that the vast majority of ISAF recorded civilian casualties are generated by insurgents, although such a distinction may not matter in terms of public perception or support (we return to this point later). From January 2009 through March 2010, over 86 percent of civilian casualties were perpetrated by insurgents. In addition, there is an order of magnitude more casualties of men than of women and children.

[INSERT FIGURE 3 ABOUT HERE]

Figure 3 shows the rough distribution of civilian casualties by event type and party responsible for males and women and children. Unsurprisingly, most civilian casualties for which insurgents are responsible are generated by IED attacks (60 %) with the other two predominant forms of violence being indirect fire (IDF) and direct fire (DF). Civilian casualties generated by ISAF forces, on the other hand, are more evenly distributed. Direct fire accounts for 21 percent of women and children casualties and indirect fire accounts for 35 percent. Escalation

[14] We present such the results of this test for our core specifications in appendix tables 4 and 5.

of force (EOF) accounts for 11 percent.[15] Despite the negative publicity they receive, air strikes account for only about 6 percent of casualties, a little less than a third that of road and traffic incidents, which account for over 16 percent of casualties of women or children.

Table 2 provides descriptive statistics for our core variables.

[INSERT TABLE 2 ABOUT HERE.]

3. What we know from Afghanistan

We now move to an analysis of the relationship between civilian casualties and insurgent violence in Afghanistan. We begin by using the randomness in the number of civilians killed to estimate the impact of violence against civilians. We then turn to a more sophisticated matching approach to capture the sources of unobserved heterogeneity in motivations to mistreat civilians.

3.1 Estimating a Short-Run relationship between Civilian Casualties and Violence

We begin our analysis by estimating the relationship between total incidents (SIGACTs) and civilian casualties caused by either ISAF or insurgents. The unit of analysis is a district bi-month. In Table 3, we predict the relationship between total incidents in a given period and civilian casualties from the previous 4 periods (8 weeks). The estimation relies on an event-study design where the *number* of women and children killed at time t is assumed to be uncorrelated with violence in period $t+1$ when controlling for district and month-year fixed effects as well as the level of violence in period t. We estimate the following model:

[15] "Escalation of Force" incidents typically involve ambiguous situations when convoys or checkpoints are approached by unknown vehicles or individuals on foot. In such situations, there are a series of steps soldiers are trained to take to make the person stop if they are deemed to be a threat. The steps involve verbal and visual warnings, non-lethal force, and then finally lethal actions.

In equation (1), SIGACT is the total number of incidents per 1000 people in a district at time *t*, and similarly for IED attacks and direct fire attacks in columns (3) and (5) respectively. We see IEDs as a particularly relevant category of violent incident for our analysis. Unlike other categories, IEDs are initiated almost completely by insurgents; the only ISAF behavior that contributes to them is the frequency of patrols. Direct fire incidents, by contrast, can occur either because insurgents initiate contact or because ISAF forces are engaged in raids and offensive actions. IED attacks therefore represent the cleanest measure we have of how insurgent violence responds to civilian casualties.

The core specification includes current and 4 lagged periods of civilian casualties separated into ISAF responsible civilian casualties ($CivCas^{ISAF}$) and insurgent responsible civilian casualties ($CivCas^{INS}$). We include district fixed effects ( ) and month-year fixed effects ( ), as well. This approach is designed to test whether the cumulative impact of civilian casualties on insurgent violence is positive.

At first glance there appears to be a statistically significant increase in violence after a civilian casualty, even controlling for district fixed effects and seasonal effects. Interestingly, a similar increase in violence occurs after insurgent-generated civilian casualties. The ISAF effect is strongest for IED attacks and the insurgent effect is strongest for direct fire attacks.

[INSERT TABLE 3 ABOUT HERE]

In this simple specification, we find a positive effect for ISAF and insurgent responsible civilian casualties. To formally test whether past civilian casualties affect current violence we report a joint significance test on the sum of the lagged coefficients. We can reject the null of a jointly zero impact of past Coalition-caused civilian casualties on current violence at the 95% confidence level for IED attacks and for insurgent-caused civilian casualties we can reject the null for total SIGACTs.

A natural concern with this core specification is that increased civilian casualty rates are associated with violence trends in a given district. In particular, the event-study identifying assumption relies on the fixed effect controlling for all future determinants of violence. A simple dependent variable lag may be inappropriate to control for underlying trends in violence as it will control for both the long-run trend in violence and the short-term fluctuations. Because the primary threat to the identifying assumption comes from the long-run trend, we include a 3-period (6 week) lagged moving average in columns (2), (4), and (6). The three period moving average is estimated as – . Including this moving average of violent incidents in the fixed effects specification controls for long-run trends in violence, leaving variation generated by short-run, high frequency events. If our results are being generated by the impact of civilian casualties on the short-run variation in violence, including the lagged moving average should not alter our results.

Columns (2), (4), and (6) of table 3 report the results of including the 3-period (six week) lagged moving average of the dependent variable. Controlling for the moving average eliminates any significant positive effect of past civilian casualties on insurgent violence. The joint test on the sum of the lagged civilian casualty coefficients is insignificant in all the models once we include the lagged moving average of insurgent violence. This is consistent with civilian casualties operating on more long-run trends, rather than short-run effects. Such an effect is more consistent with the long-run mechanism such as recruitment or revenge, rather than the mechanisms we would expect to affect short-run fluctuations such as information or capacity.

Once we control for the lagged moving average, the core model passes a placebo test for ISAF-generated casualties but not for insurgent-generated ones (Appendix table 4, column 2). This suggests we should be more concerned with reverse-causality for the insurgent results but can have some confidence in the ISAF result.

3.2 Estimating a Long-Run relationship between Civilian Casualties and Violence

As we alluded to above, civilian casualties may affect two different components of violence: long-run trends or short-run fluctuations. Table 2 shows that the long-run trends in violence, proxied by the 3-period moving average, are not substantially less volatile then the period-to-period rate. Any ability to predict long-run trends is therefore unlikely to be an artifact of their reduced volatility. The distinction between short-term fluctuations and long-term trends is, however, valuable for distinguishing mechanisms through which civilian casualties may affect insurgent violence.

In particular, the long-run trends are more likely influenced by recruitment and population disaffection than more rapid changes in information and intelligence. Given this, we estimate the relationship between civilian casualties and proxies for long-run trends and short-run fluctuations. To measure long-run trends, we estimate a three-period (six-week) moving average. We then estimate the relationship of current and lagged civilian casualties on the future 3 period moving average, – . Table 4 presents the results from regressions with the lead moving average of different kinds of SIGACTs on the RHS.[16]

[INSERT TABLE 4 ABOUT HERE]

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[16] All regressions in table 4 contain the spatial lag of the dependent variable to control for spatial auto-correlation.

ISAF-caused civilian casualties predict an increase in violence for the following 2 months, and this effect is driven largely by IED attacks, as shown in column 5. We prefer the IED specification because IED incidents are a cleaner measure of insurgent imitated violence, while other forms of attack can be responsive to ISAF activities. The results in column (5) suggest that ISAF-generated civilian casualties are associated with a substantively and statistically large increase in attacks. An incident which results in 10 civilian casualties will generate about 1 additional IED attack in the following 2 months. The effect for insurgents is much weaker and not jointly significant.

We can also test if the volitiliy of the insurgent attacks time series is affected civilian casualties. To do this, we estimate the effect of civilian casualties on the mean 3-period absolute deviation of insurgent attacks. To do this, we estimate the absolute deviation for three periods: for *n*= 1, 2, 3. We then use mean absolute deviation over three periods as the dependent variable: – . The results for all violent incidents are presented in column (2) and the results for IED attacks are presented in column (6). Again we focus on IED attacks which appear largely unaffected by civilian casualties. In general, the coefficients are both small in magnitude and insignificant.

The results from Table 3 and Table 4 present a consistent story; civilian casualties do not appear to affect the short-run fluctuations in violence but do impact the long-run trends. This largely rules out the short-run mechanisms of information and capacity. Because these short-run effects are expected to operate in opposite directions for ISAF-generated civilian casualties—the information mechanism predicts ISAF-caused casualties predict increased violence and the capacity mechanism predicts the opposite—we test the extent whether the reaction to ISAF-caused casualties differs by the gender of the civilians killed or injured. The logic is that the capacity effect should be more pronounced when ISAF forces kill male civilians and the revenge effect should be more pronounced when ISAF forces kill women and children. We find no significant short-run effect when controlling for the lagged moving average regardless of the gender or age of the civilian casualty. [17]

It appears that the two long-run mechanisms—revenge and recruitment—are more consistent with the data. We can distinguish these as the revenge mechanism relies on personal exposure to violence whereas the recruitment effect depends only on violence against a relevant peer group, implying the relationship between violent incidents and civilian casualties in surrounding districts is informative. If the effect of civilian casualties is to increase violence via increased ability to recruit, then the relationship between civilian casualties and violence should spill over to nearby districts. On the other hand, if the increase in violence after a civilian casualty is driven by revenge, it should be more localized. The impact of the spatial lag of civilian casualties is presented in columns (3) and (7) for all violent incidents and IED incidents respectively.

The main result of note here is that the neighboring districts effect is much smaller than the in-district one when ISAF is responsible for civilian casualties. This is consistent with a strong revenge mechanism in which ISAF-generated civilian casualties increase participation and support for insurgent activity because of personal loss or exposure to violence. Recall that if revenge is the motivating factor, we expect a null result on the spatial lag, since revenge is triggered when family and friends are killed – which is most likely to occur within one's own district, not in neighboring areas.

[17] Results by gender are presented in Appendix Table 3.

While it appears that insurgent-caused civilian casualties in neighboring districts might also have a weak effect on violent incidents in a district, the effect is substantively and statistically small and out-of-district insurgent-generated civilian casualties fail the placebo test.

In summary, the relationship between civilian casualties and violent incidents in Afghanistan is characterized by three important facts:

(1) There is a positive relationship between civilian casualties and levels of future violence in an area and that relationship is much stronger for ISAF-caused civilian casualties.

(2) Civilian casualties affect the long-run trends in violence, not short-term fluctuations.

(3) The relationship between civilian casualties and violence does not appear to spill over district boundaries.

We do not find evidence of significant short run effects, casting doubt on the possibility that either the information or the capacity mechanisms are driving behavior. Instead, the data are consistent with the claim that civilian casualties are affecting future violence primarily through the revenge mechanism.[18]

3.3 Matched Sample Estimates of the relationship between Civilian Casualties and Violence

An alternative approach to estimating the causal effect of civilian casualties on subsequent violence is to compare outcomes across districts/bi-months that are matched on factors influencing the propensity of both sides to kill civilians. In previous sections we showed that civilian casualties predict the long-run trends in violence, but we could not rule out reverse-causality for insurgent-generated casualties. If it is the case the trends in violence predict the propensity of both sides to harm civilian casualties, but the realized level is largely random, then

[18] Appendix tables 1-8 present more complete results of the model specifications and robustness checks for Afghanistan discussed in this section.

if we match on those long-run trends we can treat the particular occurrence of civilian casualties as quasi-random, potentially providing a more robust solution to omitted variable bias than the parametric approach applied above. Many of the factors which affect both violence and civilian casualties are unobservable but are likely captured in the long-run trends in violence over past weeks, the history of violence through time *t* in district *i*. If we look at the set of units that experienced similar levels of violence in the past—say *t-7* through *t*—we expect ISAF and insurgent forces operating in those districts/bi-months to face similar incentives regarding the use of force and level of care taken to avoid civilian casualties.

This expectation suggests a simple analytical path: [19] (1) use a matching algorithm to identify district/bi-months with similar histories; (2) within each stratum use a simple bivariate regression model to estimate the relationship between the number of civilians killed today and the average rate of attacks in the next 3 periods (the same long-run trend analyzed above); and (3) take the average of these results weighting by the size of the strata. The resulting estimate provides the average treatment effect for district/bi-months that experience any history of violence represented in the set of strata used at step (2).

We match district/bi-months using the Coarsened Exact Matching (CEM) algorithm implemented in the *cem* package for Stata (Iacus, King, and Porro 2008). The procedure is quite simple. First, we coarsen the data on each matching variable so that it falls into meaningful bins, just as one would when constructing a histogram. Second, perform exact matching on the coarsened data so that all district/bi-months with roughly the same history are placed in a common stratum. This procedure has a variety of desirable properties relative to more commonly-used methods such as propensity score matching, including reduced model

[19] Condra and Shapiro (2010) apply this approach to studying the impact of civilian casualties on insurgent violence in Iraq.

dependence and ease of use for matching on continuous variables.[20] Our matching solution uses current incidents per 1,000 population, the moving average of incidents in the previous three periods, and seven lags of that moving average. For current incidents and the lags we use the 10th, 33rd, 66th, and 90th percentiles of the variables as the cut-points between bins. The intuition for this choice is that places with very high or very low violence are fundamentally different than areas with moderate levels of violence.[21] This approach is justified to the extent that we believe matching on long-run trends in past insurgent violence effectively controls for characteristics impacting the propensity of actors to kill civilians.

The results of this matching approach are summarized in figure 4 which plots the marginal effect of civilian casualties in period 0 on the lead three week moving average of incidents. The x-axis in each plot is the number of weeks before or after the period in which civilian casualties occur, period *t*. The y-axis in the top plot is the average marginal effect of ISAF civilian killings in time *t* on SIGACTs/1000 population *x* periods before or after the incident. The y-axis in the bottom plot is the average marginal effect of insurgent civilian killings for the same sample. We estimate the mean of the marginal effects for each strata, weighting by strata size and providing the 95% confidence interval around the mean.[22]

[INSERT FIGURE 4 ABOUT HERE]

If our procedure matched effectively and there is no causal impact of past insurgent attacks against Coalition forces on current civilian casualties within matched strata, then these differences will be close to zero through period *t* and will then spike up (or down) for at least one

[20] See Iacus, King, and Porro (2008) for a detailed comparison of CEM to other matching techniques.
[21] The challenge in doing this matching is to coarsen the data so that in matched strata there is zero contemporaneous correlation (or close to it) between insurgent attacks and civilian killings—i.e. within matched strata civilian killings are uncorrelated with insurgent violence—without matching so finely that there are too few district/bi-months in each history. Full replication code available from the authors.
[22] Appendix table 9 provides estimates and confidence intervals for this matching exercise.

period after week *t* reflecting the effect of killing civilians. These plots confirm that our matching exercise effectively controls for selection on unobservable characteristics. Greater violence against civilians by the Coalition predicted higher levels of attacks, while greater violence by insurgents has no such effect. These plots also show that the Coalition effect is enduring, peaking 16 weeks after the event. This confirms the intuition that civilian casualties by ISAF forces predict greater violence through a long-run effect. The insurgent effect is statistically insignificant.[23]

Two facts stand out from this matching exercise. First, we can confirm our previous findings that ISAF-caused casualties have a statistically significant effect on the long-run trend in civilian casualties. In the entire country we find a significant positive treatment such that each civilian killed by ISAF predicts an additional 0.03 attacks per 1,000 population in the next 6-week period. The average ISAF-caused incident resulted in 2 civilian casualties. Thus, in an average-sized district of 83,000 people this amounts to 6 additional SIGACTs over the next 6 weeks. Parametric estimates of the lead moving average of SIGACTs are consistent with these estimates; there an additional civilian casualty accounts for 0.03 to 0.08 more IED attacks per 1,000 in the population. Second, there is no evidence that insurgent-caused civilian casualties affect the number of attacks. Insurgent-generated civilian casualties' estimates are more subject to reverse-causality concerns: they fail a placebo test even with spatial lags of the DV included.[24] The matching approach controls for underlying trends in insurgent activity that may be otherwise

[23] Results of the average marginal effect of killing one additional civilian in period *t* on the average attack rates over the next three months are shown in the appendix. The coefficient for period *t*-2, for example, captures the correlation within matched strata between civilian casualties in time *t* and the average of SIGACTs over period *t*-1, *t*, and *t*+1. That this average is zero helps to verify that this approach controls appropriately for contemporaneous correlation and reverse causality.

[24] See appendix table 4 for results from placebo tests.

omitted in the fixed effects approaches, making us a bit more skeptical about the positive finding on insurgent-caused casualties in table 3 (models 1 and 3).

4. Civilian Casualties and Insurgent Violence in Iraq

Any intensive study of micro-data from one conflict raises issues of external validity. While there are many important differences between the two conflicts, Iraq provides a useful outside comparison to Afghanistan. There are three important reasons to compare insurgent behavior in Iraq and Afghanistan. First, many policy makers and strategists base policy and planning in Afghanistan on the lessons learned in Iraq. A similar analysis of Iraq can shed light on whether the patterns that we observe in Afghanistan are particular to that conflict or whether they represent a more general trend of behavior in these types of insurgencies. Second, the comparison can shed light on whether there are Afghanistan-specific factors driving the results in section 3. If these underlying mechanisms are dominant in Afghanistan, Iraq provides a natural falsification check for these theories. Third, while the conflicts in Afghanistan and Iraq have some similarities, the underlying structure of the insurgencies and their operating environments differ dramatically. In Iraq, the insurgency operated in an urban environment and was largely decentralized, with competitive subgroups vying for political and social influence. In Afghanistan, the insurgency operates in a largely-rural environment and appears more centralized and coordinated. To the extent that the structure and environment are relevant for predicting violent behavior, the response to civilian casualties should vary substantially across these conflicts.[25]

We therefore replicate the analysis above on data from the war in Iraq. The time series for Iraq is much longer, almost five years as opposed to just over one for Afghanistan. In contrast

[25] For more detailed discussion of insurgent group structure and empirical evidence, see Iyengar and Monten (2009).

to Afghanistan, it appears that there is little to no long-run effect of civilian casualties on violence. Indeed, at the district/bi-month level there is no consistent relationship between civilian casualties and violence. To the extent that civilian casualties in Iraq affect insurgent violence they do so on a week-to-week level, impacting short-term fluctuations. As Condra and Shapiro (2010) argue, that pattern is most consistent with the information mechanism whereby the local population withholds (shares) information on insurgents when Coalition forces (insurgents) are responsible for civilian casualties.

4.1 Data on Civilian Casualties and Violence in Iraq

The civilian casualty data for Iraq come from Iraq Body Count (IBC), a non-profit organization dedicated to tracking civilian casualties using media reports, as well as hospital, morgue and other figures.[26] These data capture 18,474 incidents in which civilians were killed that can be accurately geo-located to the district level, accounting for 59,245 civilian deaths. We divide these killings into four categories: (1) Insurgent killings of civilians in the course of attacking Coalition or Iraqi government targets; (2) Coalition killings of civilians; (3) Sectarian killings which capture all killing that are reported as being conducted by an organization representing an ethnic group that did not occur in the context of attacks on Coalition or Iraqi forces; and (4) Unknown killings which capture all other violence, including much of the ethnic cleansing, reprisal killings, and the like. To replicate the Afghanistan results we use only categories (1) and (2) which most closely match the coding rules used by the CCTC.

[23] See http://www.iraqbodycount.org/. The data we use were produced through a multi-year collaboration with IBC and contain several improvements on the publicly available IBC data including more consistent geo-coding. See Condra and Shapiro (2010) for more details.

Unlike the data from Afghanistan the Iraq data do not include reliable information on the gender or age of the victims. As such we cannot separately control for the impact of incidents that kill men from that of incidents that kill women and children. Thus while we can use the Iraq data to do a first-order check for the external validity of our Afghanistan results, we cannot replicate the full analysis.

Since the data from Iraq are based on press reporting, they are subject to biases which are not as much of a concern for the Afghanistan data. The first concern is that there is likely to be enormous noise associated with attributing casualties across these categories and that such 0measurement error would be non-random with respect to violence, posing significant problems for our analysis. To check for such a possibility, we investigate whether the percent of civilian casualties (both the number of casualties and the number of casualty-related incidents) in the "unknown" category is a function of incidents of violence (variable described in next subsection). Once we control for the sectarian composition of the area, or when we introduce district and time fixed effects, there is no significant relationship between unknown casualty events and violence between insurgents and Coalition forces. This suggests that our attempt to code civilian casualties is not contaminated by systematic measurement error.

The second concern is that the probability an incident is excluded from our analysis because it lacks the information necessary to match it to a district location may be correlated with violence. If reporters avoid high-violence areas, for example, then districts with high levels of violence would have more missing data. By contrast, if the desire for a good story (or other career concerns) pushed reporters to cover the most dangerous places, we might see the opposite bias. Because our data include 2,612 incidents for which the governorate is known but the district is not, we are able test for this possibility by analyzing whether the proportion of incidents at the governorate level that cannot be attributed to a specific district correlates with levels of violence. There is no significant relationship between levels of insurgent violence and the proportion of incidents that cannot be resolved to the district level.

Our measure of attacks against Coalition and Iraqi government forces is based on 193,264 'significant activity' (SIGACT) reports by Coalition forces that capture a wide variety of information about "…executed enemy attacks targeted against coalition, Iraqi Security Forces (ISF), civilians, Iraqi infrastructure and government organizations" occurring from February 2004 through December 2008. Unclassified fields were drawn from the Multi-National Forces Iraq SIGACTS III Database and provide the location, date, time, and type of attack incidents but do not include any information pertaining to the Coalition Force units involved, Coalition Force casualties or battle damage incurred. Moreover, they exclude coalition-initiated events where no one returned fire, such as indirect fire attacks not triggered by initiating insurgent attacks. We filter the data to remove attacks we can positively identify as being directed at civilians or other insurgent groups, leaving us with a sample of 168,730 attack incidents.

For this paper we created bimonthly data from February 4, 2004 through December 31, 2008. Descriptive statistics of key variables for all of Iraq across this time period are presented in Table 2.

4.2 Estimating a Relationship between Civilian Casualties and Violence

We replicate the short-run Afghanistan results with data from Iraq in Table 5 and the long-run results in Table 6. In neither case do we find any significant effect of civilian casualties on violent incidents.[27]

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[27] Appendix tables 10-17 present more complete results of the model specifications and robustness checks for Iraq discussed in this section.

These results contrast strongly with Condra and Shapiro (2010) who find civilian casualties have a robust week-to-week impact on insurgent violence. Analyzing a weekly time-series for Iraq, they find that Coalition-caused casualties predict increased violence, with each death predicting approximately 0.038 additional attacks in the following week per 100,000 population. The effect is especially strong for Sunni areas where a median Coalition-caused incident resulted in 2 civilian deaths, so that for an average Sunni district in Iraq – which has 146,365 residents – an average Coalition-caused incident results in roughly 0.63 extra attacks on Coalition forces in the subsequent week. Condra and Shapiro (2010) also find the reactions are symmetric: insurgent-caused civilian casualties lead to fewer insurgent attacks. An average insurgent-caused incident involves 3.7 civilian deaths, meaning that it predicts roughly 0.43 fewer insurgent attacks on Coalition forces in the next week in an average district of roughly 277,238 people.

The disparity between the two sets of Iraq results is due to the fact that Condra and Shapiro (2010) analyze the effects of casualties on violence on a weekly basis, while in this paper we replicate the analysis on Afghanistan at the bimonthly level.[28] The differences between these conflicts are quite stark. In Afghanistan we find robust evidence of a local revenge effect against ISAF forces. In Iraq, there is no such effect. Instead, there is strong evidence in the weekly time series of an information effect.

5. Conclusion

A key question motivating of the study of intrastate conflict is how insurgents are able to mobilize supporters to participate in violent and risky activities. A common explanation is that

[28] The results presented here apply specifications most appropriate for the Afghan data to the Iraq case. Condra and Shapiro's (2010) results replicate with the bimonthly data, albeit with less precision (likely due to smaller sample).

violence committed by counterinsurgent forces generates resentment and antipathy that enable political violence through a range of mechanisms. These arguments merit testing as there is no *a priori* reason to expect violence against civilians would have an angering effect, as opposed to intimidating the population into quiescence (Birtle 2008).

There are also important policy reasons to consider the relationship between civilian casualties and violence. In 2010 Afghan and Western counterinsurgents are being asked to accept high levels of personal risk, and some are dying for it, on the theory that doing so will be militarily advantageous in the long-run. Both policymakers and military commanders must determine the degree of risk they are willing to accept in order to reduce civilian casualties. A better understanding of the extent to which such casualties increase future violence can inform efforts to balance short-term versus long-term trade-off in terms of violence and risk when determining standards and practices for rules of engagement.

This paper contributes to the existing literature on this issue in four ways. First, we use fixed effects and a more nuanced matching strategy to estimate the causal effect of civilian casualties on violence. We find that if the average ISAF-caused incident (which resulted in 2 civilian casualties) was eliminated, then in an average-sized Afghan district there would be 1 fewer insurgent attack over the next 6 weeks. This evidence supports the contention that in order to reduce violence to ISAF forces, units should seek to minimize civilian casualties during operations.

Second, we find evidence that the civilian response to casualties in Afghanistan is asymmetric with respect to the armed actor responsible. If civilians were willing and able to respond in a way that punished armed actor responsible for civilian casualties, we would expect that ISAF-generated casualties would meet with higher subsequent violence, while insurgent-generated casualties would lead to fewer attacks—perhaps through the sharing of more intelligence with counterinsurgents. Instead, violence changes only when ISAF is responsible for the casualties.

Third, we attempt to systematically distinguish between four theories that explain the relationships we observe between civilian casualties and insurgent violence: information, capacity, recruitment, and revenge. Our approach uses differing levels of temporal aggregation as well as analyzing the geospatial effect of violence to find evidence consistent with particular theories. Given the long-run effect in Afghanistan and weak evidence of geospatial spillovers, the effects in Afghanistan appear consistent with a revenge effect, rather than a recruitment, capacity, or information effect.

Fourth, we test the external validity of our findings by running the same analysis on the conflict in Iraq where previous research has shown there is a symmetric, short-run reaction to civilian casualties. The evidence shows that the conflicts in Afghanistan and Iraq are quite different in how civilian casualties affect the ability of insurgents to produce violence. In Afghanistan, we find strong evidence of a revenge effect. In Iraq, we find no such effect. This highlights two important differences in these insurgencies. The insurgency in Afghanistan is rural and centralized while that in Iraq was urban and featured a decentralized command. We suspect that the greater population density in Iraq made insurgent activity easier to observe and, combined with higher counterinsurgent force levels, increased insurgents' reliance on the general populations' reluctance to cooperate with counterinsurgents. In Afghanistan, the more dispersed population and lower counterinsurgent force levels mean the supply of insurgents is much more likely to be the binding constraint. The centralized structure of the Afghan insurgency also bears directly on their ability to engage in more sophisticated information operations. If an insurgent organization is to capitalize on the activities of the counterinsurgent, it requires a coordinated response targeted to key areas without any other sources of information. This is only possible in a consolidated, non-competitive insurgency.

In sum, the empirical evidence from Afghanistan sheds light on the way in which insurgent groups operate. In particular, it appears that while in high population-density, urban conflicts (such as Iraq) information flows are a critical component to counterinsurgency operations, in more rural insurgencies the most salient factor is recruitment. To the extent that counterinsurgent forces engage in unpopular and aggressive operations that generate specific local grievances, they are likely to facilitate increased recruitment and support for insurgent groups. Thus, the counterinsurgent force faces an asymmetric problem. The response to such a situation requires both population protection and a great deal of restraint on the part of the counterinsurgent military. It also demands improved information and population engagement at the local level, where counterinsurgent-generated grievances seem to operate. In order to minimize recruitment for insurgent forces, counterinsurgent forces should minimize harm to civilians, despite the greater risk to their own troops.

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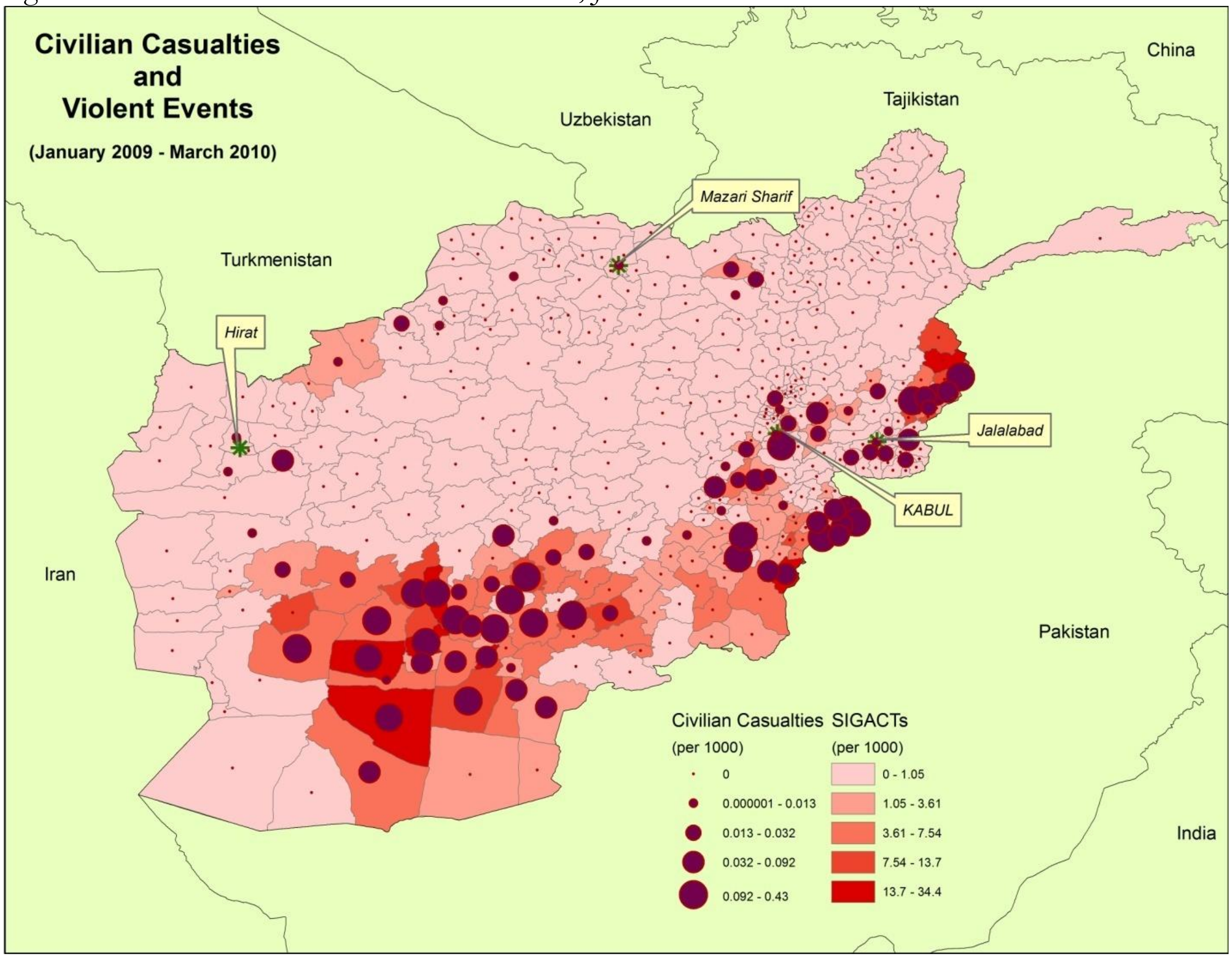
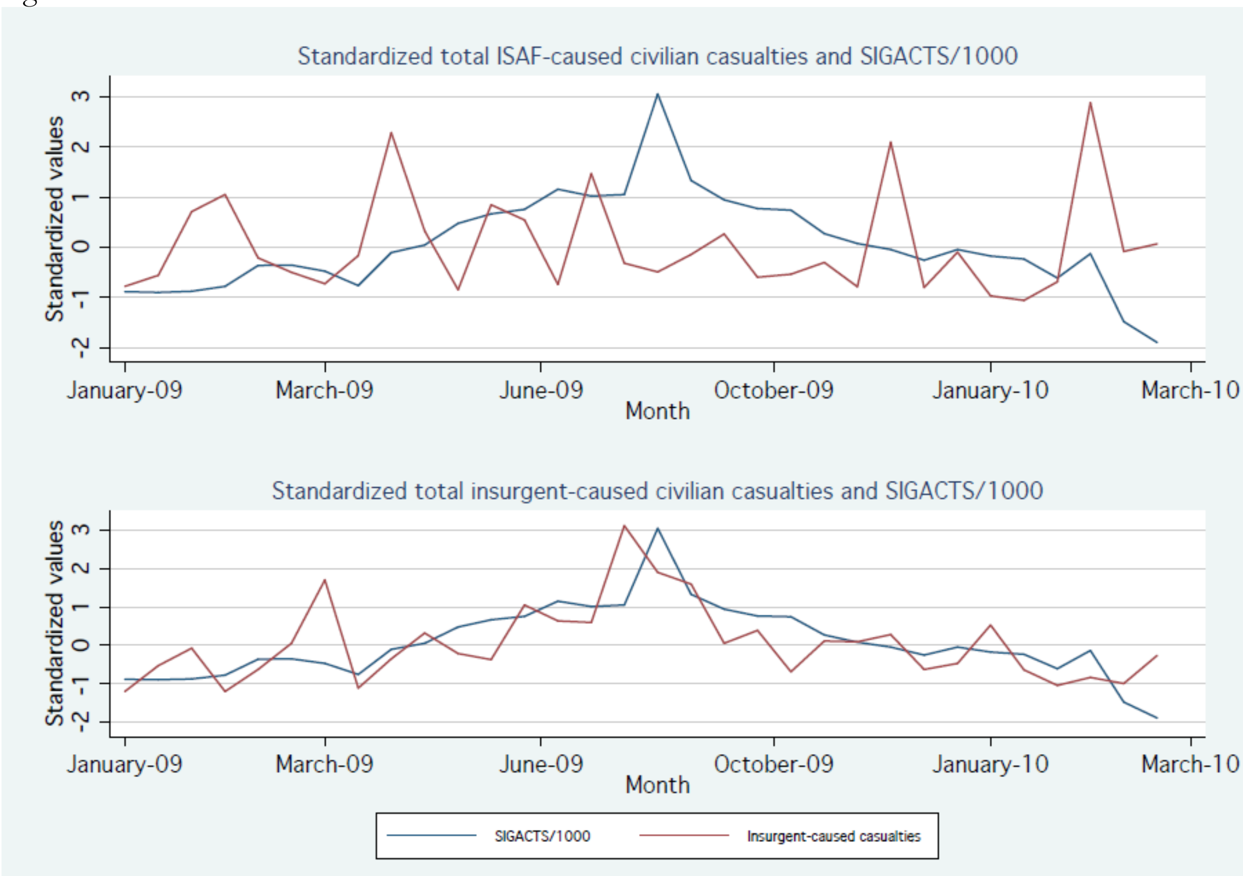
Figure 1. Civilian Casualties and Violent Events, Jan 2009-March 2010



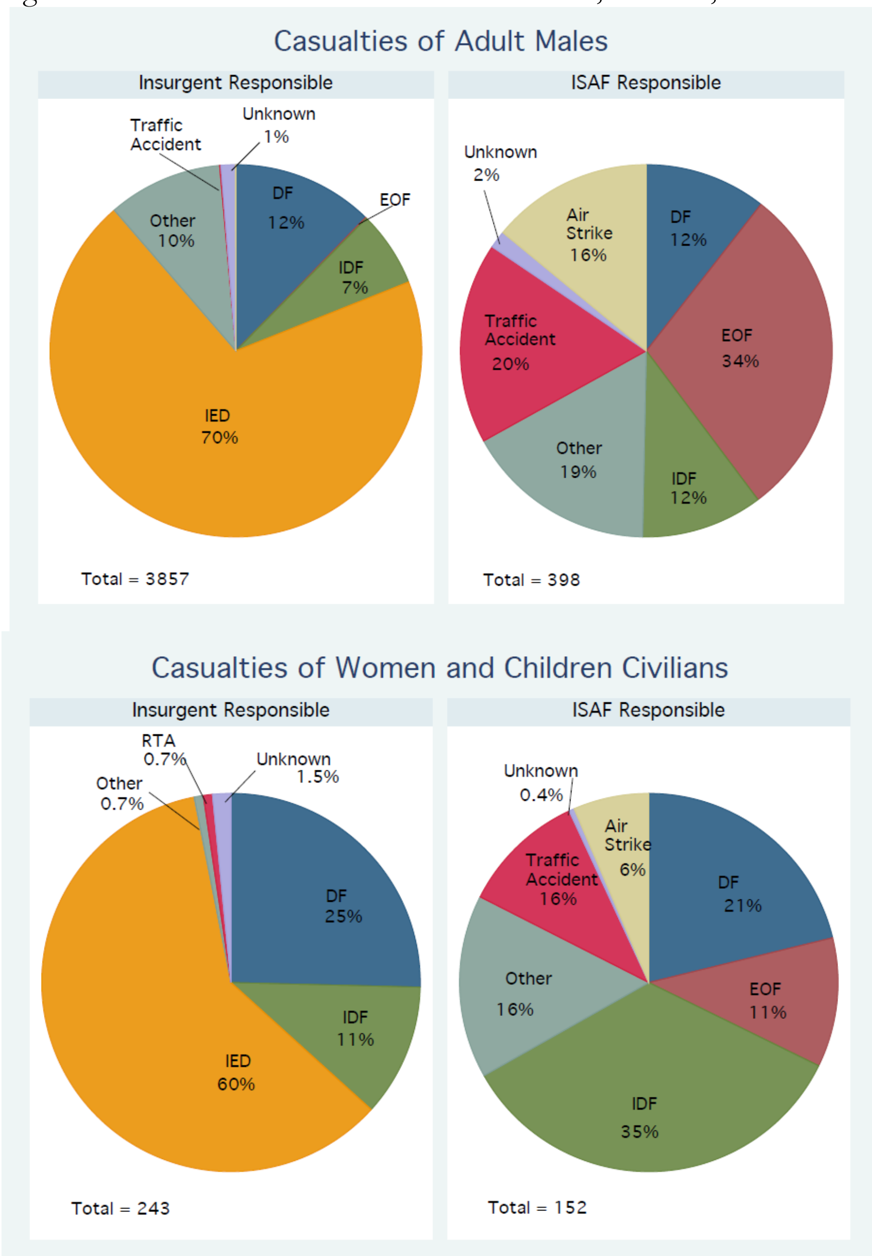
Notes: Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on LandScan population estimates. Civilian casualties' estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Violent Events based on data on significant actions (SIGACTs) against ISAF. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Figure 2. Deviations from mean in Civilian Casualties and Violent Events



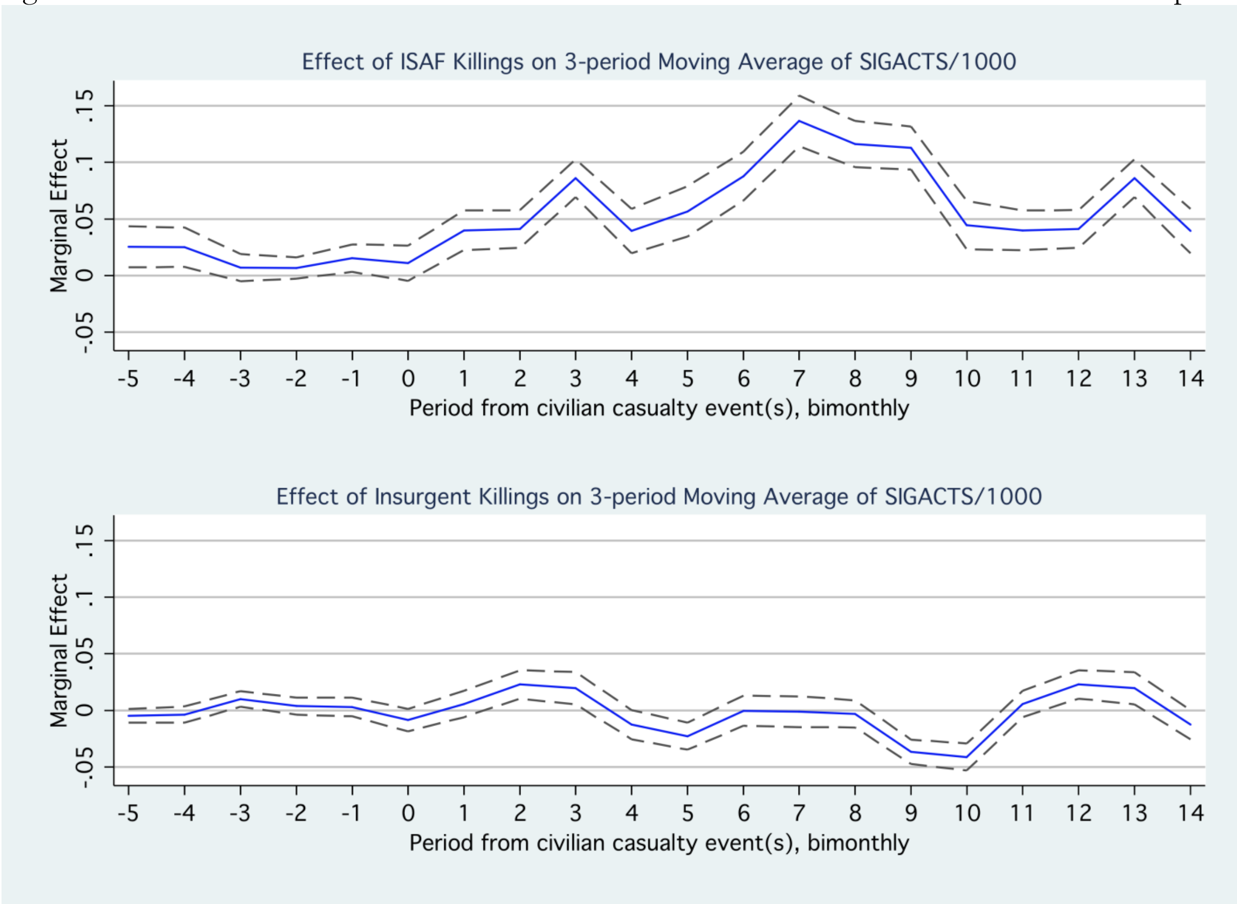
Notes: Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on LandScan population estimates. Civilian casualties estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Violent Events based on data on significant actions (SIGACTs) against ISAF. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Figure 3. Sources of Civilian Casualties for Men, Women, and Children



Notes: Civilian casualties estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Event type based on description available in first incident report provided to ISAF by military sources. Categories include direct fire (DF), Escalation of Force (EOF), Indirect Fire (IDF), Road and Traffic Accidents, Air Strikes, and Improvised Explosive Devices (IED). Descriptions available not in these categories were assigned to "other" categories. Events with no description were assigned to "unknown" category.

Figure 4. Estimates of the effect of Civilian Casualties on Violent Incidents from Matched Sample



Notes: Matched on SIGACTs/1,000 population in period *t* and three-period lagged moving average of SIGACTs in *t* through *t-7*. This created 5,109 strata of which 1,133 had three or more district/bi-months. 160 of 902 district/bi-months with civilian casualties had no matching unit without civilian casualties. Multivariate L_1 distance for match = 0.809. Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on LandScan population estimates. Civilian casualties estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Violent Events based on data on significant actions (SIGACTs) against ISAF. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Table 1: Mechanisms and Expected Relationships

Mechanisms	Party Responsible	Short-Run Total	Short-Run Men	Short-Run Women	Long-Run Total	Long-Run Men	Long-Run Women
Panel A: In Area							
Revenge	ISAF	0	0	0	+	+	+
	Insurgents	0	0	0	–	–	–
Recruitment	ISAF	0	0	0	+	+	+
	Insurgents	0	0	0	–	–	–
Information	ISAF	+	+	+	0	0	0
	Insurgents	–	–	–	0	0	0
Capacity	ISAF	–	–	0	0	0	0
	Insurgents	0	0	0	0	0	0
Panel B: Out-Area							
		Short-Run Total	Short-Run Men	Short-Run Women	Long-Run Total	Long-Run Men	Long-Run Women
Revenge	ISAF	0	0	0	0	0	0
	Insurgents	0	0	0	0	0	0
Recruitment	ISAF	0	0	0	+	+	+
	Insurgents	0	0	0	–	–	–
Information	ISAF	+	+	+	0	0	0
	Insurgents	–	–	–	0	0	0
Capacity	ISAF	0	0	0	0	0	0
	Insurgents	0	0	0	0	0	0

Table 2: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Panel A: All Afghanistan					
SIGACTs	32640	0.0226	0.0715	0	2.21
3-period MA of SIGACTs	32256	0.0226	0.0657	0	1.86
IEDs	32640	0.0072	0.0270	0	0.73
Direct Fire	32640	0.0097	0.0413	0	1.99
IEDs Found & Cleared	32640	0.0035	0.0157	0	0.41
Civilians Killed (Coalition)	32640	0.0003	0.0055	0	0.34
Civilians Killed (Insurgents)	32640	0.0019	0.0321	0	3.17
Panel B: Iraq					
SIGACTs	13312	0.0527	0.151	0	2.41
3-period MA of SIGACTs	13208	0.0532	0.147	0	2.20
IEDs	13312	0.0230	0.0664	0	1.20
Direct Fire	13312	0.0150	0.0543	0	1.18
IEDs Found & Cleared	13312	0.00706	0.0309	0	0.853
Civilians Killed (Coalition)	13312	0.00138	0.0217	0	1.50
Civilians Killed (Insurgents)	13312	0.00247	0.0178	0	1.00

Notes: Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on LandScan population estimates. Civilian casualties estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Violent Events based on data on significant actions (SIGACTs) against ISAF. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Table 3. Linear Regression Estimates of the Relationship between Civilian Casualties and SIGACTs in Afghanistan

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	SIGACTs per 1000		IEDs per 1000		Direct Fire per 1000	
(mean)	0.0226		0.0072		0.0097	
Panel A: ISAF Generated Civilian Casualties						
Civilian casualties at *t*	0.342**	0.120	0.147*	0.0727	0.178*	0.0483
	(0.16)	(0.11)	(0.076)	(0.058)	(0.091)	(0.072)
Civilian casualties at *t-1*	0.144	-0.0665	0.0400	-0.0365	0.0621	-0.0409
	(0.11)	(0.084)	(0.047)	(0.034)	(0.069)	(0.064)
Civilian casualties at *t-2*	0.255*	0.0997	0.128*	0.0698	0.0966	0.0326
	(0.13)	(0.14)	(0.068)	(0.069)	(0.10)	(0.12)
Civilian casualties at *t-3*	0.0240	-0.168*	0.131**	0.0645	-0.0318	-0.120*
	(0.12)	(0.098)	(0.061)	(0.047)	(0.087)	(0.065)
Civilian casualties at *t-4*	0.199	0.0379	0.0994**	0.0224	0.0723	0.0114
	(0.17)	(0.12)	(0.048)	(0.046)	(0.14)	(0.086)
Joint F-test of lags	1.44	-0.34	2.57	1.34	0.62	-0.55
(p-value)	(0.15)	(0.73)	(0.01)	(0.18)	(0.53)	(0.59)
Panel B: Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.123***	0.0978**	0.0551**	0.0484*	0.0502***	0.0357**
	(0.044)	(0.039)	(0.027)	(0.025)	(0.017)	(0.015)
Civilian casualties at *t-1*	0.0992**	0.0550*	0.0242	0.0102	0.0440*	0.0236
	(0.040)	(0.033)	(0.015)	(0.013)	(0.026)	(0.023)
Civilian casualties at *t-2*	0.0602	-0.00128	0.0162*	-0.000554	0.0400	0.0112
	(0.042)	(0.026)	(0.0094)	(0.0055)	(0.033)	(0.025)
Civilian casualties at *t-3*	0.0763**	0.0130	0.0190*	0.00103	0.0467**	0.0169**
	(0.032)	(0.011)	(0.011)	(0.0062)	(0.021)	(0.0078)
Civilian casualties at *t-4*	0.0386	-0.0154	0.0132	0.00169	0.0212	-0.00837
	(0.024)	(0.015)	(0.0088)	(0.0052)	(0.015)	(0.0090)
Joint F-test of lags	2.11	0.97	1.84	0.63	1.68	0.93
(p-value)	(0.04)	(0.33)	(0.07)	(0.53)	(0.09)	(0.35)
3-Period Moving Average	N	Y	N	Y	N	Y
Observations	31104	31104	31104	31104	31104	31104
R-squared	0.50	0.64	0.36	0.46	0.42	0.58

Notes: The Dependent variable is significant actions, IED incidents or Direct Fire incidents per 1000 in the population respectively. Robust standard errors, clustered at the district level are reported in parentheses. All specifications include district and month-year fixed effect. Estimates which are significant at the 0.05 (0.10, 0.01) level are marked with at ** (*, ***). Moving average estimates are 3-period (6 week) previous week linear estimate of the moving average of the dependent variable. Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on LandScan population estimates. Civilian casualties estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Violent Events based on data on significant actions (SIGACTs) against ISAF. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Table 4. Linear Regression of the Relationship between Civilian Casualties and Moving Average or Mean Absolute Deviation of SIGACTs and IEDs in Afghanistan

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	SIGACTs per 1000				IEDs per 1000			
Civilian Casualty Location	In-District		Out-of-District		In-District		Out-of-District	
Dependent Variable	Lead MA	Lead MAD	Lead MA	Lead MAD	Lead MA	Lead MAD	Lead MA	Lead MAD
Panel A: ISAF Generated Civilian Casualties								
Civilian casualties at *t*	-0.0140	0.0197	-0.00732	-0.00939	0.0288	0.0242	-0.00396	-0.000741
	(0.088)	(0.022)	(0.030)	(0.011)	(0.041)	-0.024	(0.017)	(0.0073)
Civilian casualties at *t-1*	-0.00375	0.0571	0.0386	0.0148	0.0415	0.0394	0.00904	0.0120*
	(0.10)	(0.036)	(0.030)	(0.016)	(0.039)	-0.026	(0.016)	(0.0069)
Civilian casualties at *t-2*	-0.0710	-0.0175	0.0301	0.0194	0.0320	0.0169	0.00846	-0.000710
	(0.099)	(0.042)	(0.034)	(0.016)	(0.029)	-0.024	(0.019)	(0.0080)
Civilian casualties at *t-3*	0.0133	-0.00412	0.0369	0.00823	0.0896**	0.0522	0.0215	-0.00324
	(0.10)	(0.022)	(0.038)	(0.012)	(0.037)	-0.037	(0.018)	(0.0065)
Civilian casualties at *t-4*	-0.00197	-0.0140	-0.00959	-0.0209	0.0753**	0.0375	0.0217	-0.00332
	(0.081)	(0.024)	(0.033)	(0.013)	(0.034)	-0.037	(0.016)	(0.0056)
Joint *F*-test of lags	-0.20	0.26	0.90	0.57	2.13	1.25	1.00	0.27
(p-value)	(0.84)	(0.80)	(0.37)	(0.57)	(0.03)	(0.21)	(0.32)	(0.79)
Panel B: Insurgent Generated Civilian Casualties								
Civilian casualties at *t*	0.0545	0.0152*	0.00579	-0.00148	0.0109	0.00284	0.00390*	0.000495
	(0.034)	(0.0078)	(0.0042)	(0.0021)	(0.0074)	-0.0052	(0.0024)	(0.0013)
Civilian casualties at *t-1*	0.0227	0.00474	0.00702*	-0.000736	0.00114	-0.00354	0.00394**	0.000896
	(0.025)	(0.0072)	(0.0041)	(0.0018)	(0.0058)	-0.0031	(0.0019)	(0.0011)
Civilian casualties at *t-2*	0.00924	0.0101	0.00752**	-0.000386	0.00321	0.00328	0.00318	0.000798
	(0.011)	(0.0082)	(0.0035)	(0.0016)	(0.0056)	-0.0047	(0.0020)	(0.0014)
Civilian casualties at *t-3*	-0.00459	0.00115	0.00176	-0.00112	0.00210	0.00297	0.00182	0.00154*
	(0.012)	(0.0055)	(0.0032)	(0.0014)	(0.0052)	-0.0047	(0.0018)	(0.00092)
Civilian casualties at *t-4*	-0.0127	-0.000388	0.000574	0.00255	0.00454	0.00265	0.00258	0.00240*
	(0.016)	(0.0076)	(0.0035)	(0.0027)	(0.0042)	-0.0047	(0.0024)	(0.0014)
Joint *F*-test of lags	0.49	0.86	1.63	0.07	0.64	0.37	1.76	1.81
(p-value)	(0.62)	(0.39)	(0.10)	(0.94)	(0.52)	(0.71)	(0.08)	(0.07)
Observations	30696	29928	30692	29924	30696	29928	30692	29924
R-squared	0.66	0.47	0.66	0.47	0.58	0.41	0.58	0.40

Notes: The Dependent variable is significant actions, IED incidents or Direct Fire incidents per 1000 in the population respectively. Robust standard errors, clustered at the district level are reported in parentheses. All specifications include district and month-year fixed effect. Estimates which are significant at the 0.05 (0.10, 0.01) level are marked with at ** (*, ***). Moving average estimates are 3-period (6 week) previous week linear estimate of the moving average of the dependent variable. All regressions include the spatial lag of the DV. Spatial lags are estimated as the average dependent variable value for all adjacent districts. Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on LandScan population estimates. Civilian casualties estimates based on data from the Civilian Casualties Tracking Cell, International Security Assistance Forces (ISAF) headquarters. Violent Events based on data on significant actions (SIGACTs) against ISAF. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Table 5. Linear Regression Estimates of the Relationship between Civilian Casualties and SIGACTs in Iraq

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	SIGACTs per 1000		IEDs per 1000		Direct Fire per 1000	
(mean)	0.0527		0.0230		0.0150	
Panel A: Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.000149	0.000113*	0.0000269	0.0000247	0.0000721	0.0000588*
	(0.00015)	(0.000060)	(0.000044)	(0.000018)	(0.000067)	(0.000031)
Civilian casualties at *t-1*	0.000103	0.00000133	0.00000386	-0.0000108	0.0000533	0.0000144*
	(0.00015)	(0.000044)	(0.000045)	(0.000016)	(0.000050)	(0.0000078)
Civilian casualties at *t-2*	0.000139	0.00000407	0.0000141	-0.000043	0.000102*	0.0000461**
	(0.00015)	(0.000045)	(0.000061)	(0.000033)	(0.000058)	(0.000022)
Civilian casualties at *t-3*	0.000156	0.0000342	0.0000261	0.0000114	0.0000734	0.00000620
	(0.00018)	(0.000061)	(0.000068)	(0.000033)	(0.000060)	(0.000018)
Civilian casualties at *t-4*	0.0000895	-0.0000394	0.0000449	0.0000279	0.0000389	-0.0000297
	(0.00014)	(0.000039)	(0.000060)	(0.000021)	(0.000060)	(0.000022)
Joint significance test	0.80	0.00	0.39	0.30	1.20	0.66
(p-value)	(0.43)	(1.00)	(0.70)	(0.77)	(0.23)	(0.51)
Panel B: Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.00112**	0.000406	0.000229*	0.0000428	0.000582*	0.000171
	(0.00054)	(0.00026)	(0.00013)	(0.000057)	(0.00031)	(0.00015)
Civilian casualties at *t-1*	0.00100*	0.000173	0.000480*	0.000284	0.000435	-0.0000169
	(0.00059)	(0.00025)	(0.00025)	(0.00018)	(0.00027)	(0.000076)
Civilian casualties at *t-2*	0.00108	0.000196	0.000386*	0.000124	0.000600	0.000173
	(0.00068)	(0.00029)	(0.00021)	(0.000089)	(0.00039)	(0.00018)
Civilian casualties at *t-3*	0.00121	0.000247	0.000386	0.0000631	0.000534	0.0000867
	(0.0010)	(0.00053)	(0.00037)	(0.00021)	(0.00043)	(0.00020)
Civilian casualties at *t-4*	0.00111	0.000125	0.000478	0.000114	0.000550	0.000127
	(0.00090)	(0.00024)	(0.00042)	(0.00020)	(0.00038)	(0.000099)
Joint significance test	1.40	0.59	1.41	0.95	1.46	0.71
(p-value)	(0.16)	(0.56)	(0.16)	(0.34)	(0.15)	(0.48)
3-Period Moving Average	N	Y	N	Y	N	Y
Spatial Lag of DV	N	N	N	N	N	N
Observations	12896	12896	12896	12896	12896	12896
R-squared	0.59	0.88	0.57	0.83	0.49	0.78

Notes: Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on World Food Program population estimates. Scaling per 100,000 to make coefficients appropriately sized does not change results. All specifications include district and month-year fixed effect.   Civilian casualties estimates based on data from Iraq Body Count. Violent incidents based on data on significant actions (SIGACTs) from the Multi-National Forces Iraq (MNF-I) SIGACT-III database. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Table 6. Linear Regression Estimates of the Relationship between Civilian Casualties and All SIGACTs in Iraq

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	SIGACTs (*t*)	SIGACTs (*t*)	Lead MA	Lead MA	Lead MAD	Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.000149	0.000113*	0.000100	0.000100	0.0000373	0.0000371
	(0.00015)	(0.000060)	(0.000069)	(0.000070)	(0.000027)	(0.000028)
Civilian casualties at *t-1*	0.000103	0.00000133	0.0000295	0.0000315	0.0000207	0.0000216
	(0.00015)	(0.000044)	(0.000065)	(0.000067)	(0.000014)	(0.000014)
Civilian casualties at *t-2*	0.000139	0.00000407	-0.00000747	-0.00000505	0.0000336	0.0000346
	(0.00015)	(0.000045)	(0.000072)	(0.000073)	(0.000023)	(0.000024)
Civilian casualties at *t-3*	0.000156	0.0000342	0.000000169	0.00000152	0.0000298	0.0000303
	(0.00018)	(0.000061)	(0.000067)	(0.000067)	(0.000031)	(0.000031)
Civilian casualties at *t-4*	0.0000895	-0.0000394	0.00000388	0.00000625	0.0000281	0.0000292
	(0.00014)	(0.000039)	(0.000065)	(0.000066)	(0.000033)	(0.000033)
Joint significance test	0.80	0.000	0.10	0.13	1.15	1.48
(p-value)	(0.43)	(1.00)	(0.92)	(0.90)	(0.25)	(0.24)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.00112**	0.000406	0.000490	0.000502	0.000232	0.000237
	(0.00054)	(0.00026)	(0.00057)	(0.00057)	(0.00018)	(0.00018)
Civilian casualties at *t-1*	0.00100*	0.000173	0.000439	0.000455	0.000149	0.000156
	(0.00059)	(0.00025)	(0.00063)	(0.00063)	(0.00012)	(0.00012)
Civilian casualties at *t-2*	0.00108	0.000196	0.000317	0.000336	-0.0000348	-0.0000269
	(0.00068)	(0.00029)	(0.00058)	(0.00058)	(0.000046)	(0.000046)
Civilian casualties at *t-3*	0.00121	0.000247	0.000204	0.000221	-0.000000570	0.00000631
	(0.0010)	(0.00053)	(0.00044)	(0.00044)	(0.000053)	(0.000054)
Civilian casualties at *t-4*	0.00111	0.000125	0.000222	0.000244	0.000143	0.000152
	(0.00090)	(0.00024)	(0.00021)	(0.00022)	(0.00012)	(0.00012)
Joint significance test	1.40	0.59	0.64	0.67	1.04	1.14
(p-value)	(0.16)	(0.56)	(0.52)	(0.50)	(0.30)	(0.26)
3-Period Moving Average	N	Y	Y	Y	Y	Y
Spatial Lag of DV	N	N	N	Y	N	Y
Observations	12896	12896	12792	12792	12584	12584
R-squared	0.59	0.88	0.85	0.85	0.60	0.61

Notes: Estimates of Civilian Casualties and SIGACTs scaled per 1000 in the population based on World Food Program population estimates. All specifications include district and month-year fixed effect. Scaling per 100,000 to make coefficients appropriately sized does not change results. Civilian casualties estimates based on data from Iraq Body Count. Violent incidents based on data on significant actions (SIGACTs) from the Multi-National Forces Iraq (MNF-I) SIGACT-III database. SIGACTs include direct fire, indirect fire, improvised explosive device explosions, improvised explosive devices found and cleared, improvised explosive device hoaxes, and premature detonations.

Appendix Table 1. Linear Regression Estimates of the Relationship between Civilian Casualties and IEDs (Afghanistan)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: IEDs (*t*)	Base Model	Lagged MA	Lead MA	Lead MA	Lead MAD	Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t*	0.147*	0.0727	0.0463	0.0506***	0.0290	0.0134***
	(0.076)	(0.058)	(0.042)	(0.0064)	(0.024)	(0.0038)
Civilian casualties at *t-1*	0.0400	-0.0365	0.0484	0.0288	0.0432	0.0242
	(0.047)	(0.034)	(0.042)	(0.041)	(0.027)	(0.024)
Civilian casualties at *t-2*	0.128*	0.0698	0.0438	0.0415	0.0226	0.0394
	(0.068)	(0.069)	(0.030)	(0.039)	(0.024)	(0.026)
Civilian casualties at *t-3*	0.131**	0.0645	0.106***	0.0320	0.0564	0.0169
	(0.061)	(0.047)	(0.036)	(0.029)	(0.037)	(0.024)
Civilian casualties at *t-4*	0.0994**	0.0224	0.0958***	0.0896**	0.0424	0.0522
	(0.048)	(0.046)	(0.035)	(0.037)	(0.036)	(0.037)
Joint *F*-test	2.57	1.34	2.56	2.13	1.41	1.25
(p-value)	(0.01)	(0.18)	(0.01)	(0.03)	(0.16)	(0.21)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.0551**	0.0484*	0.0147*	0.0753**	0.00387	0.0375
	(0.027)	(0.025)	(0.0086)	(0.034)	(0.0054)	(0.037)
Civilian casualties at *t-1*	0.0242	0.0102	0.00508	0.0109	-0.00250	0.00284
	(0.015)	(0.013)	(0.0063)	(0.0074)	(0.0031)	(0.0052)
Civilian casualties at *t-2*	0.0162*	-0.000554	0.00570	0.00114	0.00393	-0.00354
	(0.0094)	(0.0055)	(0.0057)	(0.0058)	(0.0045)	(0.0031)
Civilian casualties at *t-3*	0.0190*	0.00103	0.00494	0.00321	0.00370	0.00328
	(0.011)	(0.0062)	(0.0058)	(0.0056)	(0.0047)	(0.0047)
Civilian casualties at *t-4*	0.0132	0.00169	0.00744*	0.00210	0.00343	0.00297
	(0.0088)	(0.0052)	(0.0043)	(0.0052)	(0.0046)	(0.0047)
Joint *F*-test	1.84	0.63	1.23	0.64	0.61	0.37
(p-value)	(0.07)	(0.53)	(0.22)	(0.52)	(0.54)	(0.71)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	31104	31104	30720	30696	29952	29928
R-squared	0.36	0.46	0.56	0.58	0.40	0.41

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 2. Linear Regression Estimates of the Relationship between Civilian Casualties and Direct Fire (Afghanistan)

Dependent Variable: Direct Fire (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t*	0.0427**	-0.00571	0.0140	0.0412***	-0.00582	0.00911
	(0.021)	(0.013)	(0.014)	(0.015)	(0.0074)	(0.0059)
Civilian casualties at *t-1*	0.0149	-0.0258	0.0346**	0.00193	0.00980	-0.00866
	(0.020)	(0.017)	(0.017)	(0.014)	(0.0096)	(0.0079)
Civilian casualties at *t-2*	0.0464*	0.0276	0.0464**	0.0292*	0.0127	0.00744
	(0.025)	(0.024)	(0.021)	(0.017)	(0.0089)	(0.0099)
Civilian casualties at *t-3*	0.0691**	0.0397*	0.0408*	0.0370*	0.00154	0.00906
	(0.029)	(0.022)	(0.024)	(0.020)	(0.0066)	(0.0094)
Civilian casualties at *t-4*	0.0997**	0.0489	0.00537	0.0320	-0.0174*	-0.000251
	(0.045)	(0.034)	(0.020)	(0.023)	(0.0091)	(0.0069)
Joint *F*-test	0.62	-0.55	-0.41	-0.70	-0.87	-1.06
(p-value)	(0.53)	(0.59)	(0.68)	(0.49)	(0.39)	(0.29)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.0146**	0.00828**	0.00501	-0.00783	-0.000710	-0.0201**
	(0.0069)	(0.0041)	(0.0031)	(0.020)	(0.0011)	(0.0095)
Civilian casualties at *t-1*	0.0110**	0.00331	0.00478	0.00173	-0.000755	-0.00147
	(0.0054)	(0.0027)	(0.0032)	(0.0022)	(0.0013)	(0.0011)
Civilian casualties at *t-2*	0.00191	-0.00620*	0.00560**	0.00225	-0.000504	-0.00130
	(0.0033)	(0.0032)	(0.0028)	(0.0026)	(0.0011)	(0.0013)
Civilian casualties at *t-3*	0.0113**	0.00462	0.00496**	0.00430*	-0.000154	-0.000793
	(0.0046)	(0.0029)	(0.0021)	(0.0023)	(0.0010)	(0.0011)
Civilian casualties at *t-4*	0.0142***	0.00763**	0.00428*	0.00212	0.00195	-0.000761
	(0.0051)	(0.0030)	(0.0023)	(0.0021)	(0.0013)	(0.0011)
Joint *F*-test	1.68	0.93	1.56	1.30	2.21	2.19
(p-value)	(0.09)	(0.35)	(0.12)	(0.20)	(0.03)	(0.03)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	31076	31076	30692	30692	29924	29924
R-squared	0.42	0.58	0.58	0.59	0.43	0.43

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 3. Linear Regression Estimates of the Relationship between Civilian Casualties and SIGACTs by Gender (Afghanistan)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Men				Women			
IED per 1000	In-District Lead MA	In-District Lead MAD	Out-of-District MA	Out-of-District MAD	In-District Lead MA	In-District Lead MAD	Out-of-District MA	Out-of-District MAD
Panel A: ISAF Generated Civilian Casualties								
Civilian casualties at *t*	0.0499	0.0134	0.00555	-0.00147	0.186	0.163***	0.0827	0.0460***
	(0.032)	(0.015)	(0.017)	(0.0082)	(0.13)	(0.062)	(0.063)	(0.018)
Civilian casualties at *t-1*	0.0818**	0.0334*	0.0388*	0.0175**	0.155	0.123**	0.0451	0.0343
	(0.034)	(0.018)	(0.020)	(0.0079)	(0.12)	(0.060)	(0.052)	(0.023)
Civilian casualties at *t-2*	0.0748*	0.00901	0.0346	0.00538	0.0131	0.0371	-0.0423	-0.0279
	(0.039)	(0.019)	(0.023)	(0.0093)	(0.065)	(0.047)	(0.035)	(0.020)
Civilian casualties at *t-3*	0.119**	0.0292	0.0491**	0.00220	0.219***	0.240**	-0.00872	-0.00766
	(0.055)	(0.021)	(0.023)	(0.0089)	(0.073)	(0.093)	(0.031)	(0.018)
Civilian casualties at *t-4*	0.0982*	0.00772	0.0388*	-0.00592	0.272***	0.254***	0.0690**	0.0392**
	(0.055)	(0.019)	(0.023)	(0.0074)	(0.042)	(0.093)	(0.030)	(0.019)
Joint *F*-test	2.22	1.27	1.95	0.81	2.73	2.43	0.58	0.62
(p-value)	(0.03)	(0.21)	(0.05)	(0.42)	(0.01)	(0.02)	(0.56)	(0.54)
Panel B: Insurgent Generated Civilian Casualties								
Civilian casualties at *t*	0.0124	0.00327	0.00529**	0.000765	0.0580	0.0272	0.0677**	0.0258**
	(0.0083)	(0.0055)	(0.0026)	(0.0012)	(0.071)	(0.035)	(0.029)	(0.012)
Civilian casualties at *t-1*	0.00692	-0.00148	0.00682***	0.00174*	0.0569	0.00207	0.0473**	0.0212*
	(0.0073)	(0.0034)	(0.0024)	(0.0011)	(0.072)	(0.032)	(0.022)	(0.011)
Civilian casualties at *t-2*	0.0113**	0.00630	0.00679***	0.00193	0.0686	0.0113	0.00265	0.00543
	(0.0050)	(0.0040)	(0.0022)	(0.0014)	(0.069)	(0.028)	(0.018)	(0.012)
Civilian casualties at *t-3*	0.0105**	0.00590	0.00513**	0.00248***	0.0596	0.00625	0.00239	0.0120
	(0.0048)	(0.0040)	(0.0022)	(0.00088)	(0.062)	(0.025)	(0.017)	(0.013)
Civilian casualties at *t-4*	0.00886**	0.00417	0.00644**	0.00388**	0.114	0.0353	0.00313	-0.00664
	(0.0045)	(0.0043)	(0.0030)	(0.0015)	(0.079)	(0.032)	(0.021)	(0.012)
Joint *F*-test	1.97	1.21	2.91	3.13	1.11	0.54	0.90	0.96
(p-value)	(0.05)	(0.23)	(0.00)	(0.00)	(0.27)	(0.59)	(0.37)	(0.34)
Observations	30696	29928	30692	29924	30696	29928	30692	29924
R-squared	0.53	0.39	0.53	0.39	0.53	0.39	0.53	0.39

Note: All models include district and month fixed effects and spatial lag of IED attacks. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 4: Placebo Tests for Main Tables 3 and 4, Linear Regression Estimates of All SIGACTs on Leads of Civilian Casualties (Afghanistan)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	SIGACTs (*t*)	SIGACTs (*t*)	Lead MA	Lead MA	Lead MAD	Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t*	0.317***	0.0923	0.0882	0.0427***	0.0236	0.00586**
	(0.11)	(0.11)	(0.093)	(0.010)	(0.031)	(0.0027)
Civilian casualties at *t+1*	0.278**	0.0204	0.125*	0.0626	0.0527	0.0201
	(0.13)	(0.082)	(0.064)	(0.092)	(0.046)	(0.030)
Civilian casualties at *t+2*	0.336*	0.0772	0.0810	0.0970	0.00903	0.0488
	(0.18)	(0.14)	(0.073)	(0.063)	(0.037)	(0.046)
Civilian casualties at *t+3*	0.402**	0.133	0.157*	0.0450	0.0755	0.00408
	(0.16)	(0.11)	(0.093)	(0.074)	(0.054)	(0.037)
Civilian casualties at *t+4*	0.371**	0.101	0.172	0.123	0.0210	0.0708
	(0.15)	(0.084)	(0.10)	(0.090)	(0.047)	(0.053)
Joint *F*-test	2.69	1.51	1.91	1.45	1.05	0.93
(p-value)	(0.01)	(0.13)	(0.06)	(0.15)	(0.29)	(0.35)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.127***	0.100**	0.0659*	0.127	0.0157**	0.0149
	(0.047)	(0.040)	(0.037)	(0.099)	(0.0076)	(0.046)
Civilian casualties at *t+1*	0.0646***	0.0443***	0.0854**	0.0577*	0.0336**	0.0145*
	(0.022)	(0.016)	(0.039)	(0.034)	(0.013)	(0.0075)
Civilian casualties at *t+2*	0.0212	-0.00125	0.0825**	0.0773**	0.0305*	0.0325**
	(0.016)	(0.014)	(0.032)	(0.036)	(0.016)	(0.013)
Civilian casualties at *t+3*	0.0353***	0.0112	0.0529**	0.0749**	0.0233**	0.0295*
	(0.012)	(0.0073)	(0.023)	(0.029)	(0.011)	(0.015)
Civilian casualties at *t+4*	0.0331**	0.0143	0.0268**	0.0481**	0.00755	0.0226**
	(0.013)	(0.010)	(0.011)	(0.021)	(0.0050)	(0.011)
Joint *F*-test	2.92	2.42	2.47	2.44	2.30	2.27
(p-value)	(0.004)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Lagged MA of DV	N	Y	Y	Y	Y	Y
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	31104	30720	30720	30696	30720	30696
R-squared	0.51	0.65	0.68	0.69	0.47	0.47

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 4: Placebo Tests for Main Tables 3 and 4: Linear Regression Estimates of IEDs on Leads of Civilian Casualties (Afghanistan)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: IEDs (*t*)	Base Model	Lagged MA	Lead MA	Lead MA	Lead MAD	Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t*	0.125**	0.0585	0.0890*	0.0469***	0.0281	0.0131***
	(0.052)	(0.037)	(0.047)	(0.0057)	(0.029)	(0.0035)
Civilian casualties at *t+1*	0.156***	0.0777*	0.0616	0.0751*	0.0352	0.0242
	(0.057)	(0.044)	(0.040)	(0.044)	(0.024)	(0.028)
Civilian casualties at *t+2*	0.112**	0.0339	0.0517	0.0444	0.0293	0.0303
	(0.056)	(0.047)	(0.038)	(0.036)	(0.020)	(0.023)
Civilian casualties at *t+3*	0.126**	0.0428*	0.0808*	0.0366	0.0321	0.0250
	(0.056)	(0.026)	(0.045)	(0.036)	(0.025)	(0.020)
Civilian casualties at *t+4*	0.173**	0.0901	0.0771**	0.0646	0.0220	0.0276
	(0.081)	(0.056)	(0.037)	(0.043)	(0.016)	(0.024)
Joint *F*-test	2.65	2.46	1.89	1.57	1.63	1.41
(p-value)	(0.01)	(0.01)	(0.06)	(0.11)	(0.10)	(0.16)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.0564**	0.0497*	0.0164*	0.0595*	0.00345	0.0171
	(0.028)	(0.026)	(0.0090)	(0.033)	(0.0051)	(0.017)
Civilian casualties at *t+1*	0.0152	0.00841	0.0288**	0.0126	0.0175*	0.00240
	(0.0099)	(0.0073)	(0.013)	(0.0079)	(0.011)	(0.0050)
Civilian casualties at *t+2*	0.00917	0.00132	0.0258**	0.0246**	0.0167	0.0163
	(0.0063)	(0.0044)	(0.013)	(0.012)	(0.010)	(0.010)
Civilian casualties at *t+3*	0.0133**	0.00507	0.0199**	0.0215*	0.0137	0.0155
	(0.0060)	(0.0036)	(0.0100)	(0.012)	(0.0092)	(0.010)
Civilian casualties at *t+4*	0.0117	0.00356	0.00615	0.0171*	0.00121	0.0129
	(0.0076)	(0.0045)	(0.0038)	(0.0092)	(0.0027)	(0.0090)
Joint *F*-test	1.91	1.68	2.17	1.97	1.65	1.57
(p-value)	(0.06)	(0.09)	(0.03)	(0.05)	(0.10)	(0.12)
Spatial Lag of Dependent Variable						
Observations	31104	30720	30720	30696	30720	30696
R-squared	0.36	0.48	0.59	0.61	0.41	0.41

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 5. Placebo Tests for Main Tables 3 and 4: Linear Regression Estimates of Direct Fire on Leads of Civilian Casualties (Afghanistan)

Dependent Variable: Direct Fire (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t*	0.164**	0.0201	-0.00412	0.0375**	-0.000974	0.00874
	(0.073)	(0.083)	(0.054)	(0.015)	(0.032)	(0.0054)
Civilian casualties at *t+1*	0.0801	-0.0681	0.0409	-0.0144	0.0329	-0.00337
	(0.082)	(0.076)	(0.037)	(0.054)	(0.028)	(0.032)
Civilian casualties at *t+2*	0.194	0.0523	0.0128	0.0331	-0.0397	0.0310
	(0.14)	(0.10)	(0.054)	(0.036)	(0.031)	(0.028)
Civilian casualties at *t+3*	0.306**	0.174	0.0786	-0.00517	0.0439	-0.0439
	(0.14)	(0.11)	(0.055)	(0.057)	(0.045)	(0.032)
Civilian casualties at *t+4*	0.125	-0.0211	0.108	0.0611	0.0366	0.0398
	(0.092)	(0.051)	(0.080)	(0.052)	(0.047)	(0.044)
Joint *F*-test	1.94	0.88	1.47	1.14	0.67	0.56
(p-value)	(0.05)	(0.38)	(0.14)	(0.03)	(0.50)	(0.58)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.0518***	0.0359**	0.0353	0.0912	0.00803	0.0326
	(0.018)	(0.015)	(0.028)	(0.078)	(0.0060)	(0.046)
Civilian casualties at *t+1*	0.0404***	0.0286***	0.0385	0.0320	0.0141	0.00725
	(0.0100)	(0.0076)	(0.025)	(0.026)	(0.0090)	(0.0056)
Civilian casualties at *t+2*	0.00644	-0.00719	0.0368**	0.0353	0.00867	0.0133
	(0.0078)	(0.0089)	(0.018)	(0.024)	(0.011)	(0.0085)
Civilian casualties at *t+3*	0.0240***	0.0101***	0.0229**	0.0344**	0.0107**	0.00811
	(0.0076)	(0.0037)	(0.010)	(0.016)	(0.0045)	(0.011)
Civilian casualties at *t+4*	0.0236**	0.0148*	0.0172***	0.0213**	0.00591***	0.0104**
	(0.0096)	(0.0077)	(0.0052)	(0.0094)	(0.0022)	(0.0043)
Joint *F*-test	3.51	3.14	2.07	2.09	1.61	1.60
(p-value)	(0.00)	(0.00)	(0.04)	(0.04)	(0.11)	(0.11)
Spatial Lag of Dependent Variable						
Observations	31104	30720	30720	30696	30720	30696
R-squared	0.42	0.59	0.61	0.61	0.43	0.43

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 6. Linear Regression Estimates. Effect of Civilian Casualties on SIGACTs, Including Spatial Lags for All Civilian Casualty Variables (Afghanistan)

Dependent Variable: SIGACTs (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.114**	0.0120	0.0209	0.0488***	-0.00526	0.00688**
	(0.045)	(0.029)	(0.030)	(0.011)	(0.011)	(0.0032)
Civilian casualties at *t-1* (spatial lag)	0.0379	-0.0559**	0.0481	-0.00732	0.0181	-0.00939
	(0.033)	(0.028)	(0.031)	(0.030)	(0.015)	(0.011)
Civilian casualties at *t-2* (spatial lag)	0.103**	0.0473	0.0557*	0.0386	0.0257*	0.0148
	(0.045)	(0.042)	(0.034)	(0.030)	(0.014)	(0.016)
Civilian casualties at *t-3* (spatial lag)	0.100**	0.0325	0.0587	0.0301	0.0110	0.0194
	(0.045)	(0.034)	(0.038)	(0.034)	(0.011)	(0.016)
Civilian casualties at *t-4* (spatial lag)	0.184***	0.0862*	0.0209	0.0369	-0.0170	0.00823
	(0.064)	(0.052)	(0.034)	(0.038)	(0.013)	(0.012)
Joint *F*-test	0.426	0.110	0.183	0.0960	0.0378	0.0216
(p-value)	(0.003)	(0.120)	(0.092)	(0.368)	(0.273)	(0.568)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.0334***	0.0162**	0.0161***	-0.00959	0.0000395	-0.0209
	(0.011)	(0.0068)	(0.0056)	(0.033)	(0.0021)	(0.013)
Civilian casualties at *t-1* (spatial lag)	0.0290***	0.00951*	0.0144***	0.00579	0.000267	-0.00148
	(0.0087)	(0.0052)	(0.0051)	(0.0042)	(0.0018)	(0.0021)
Civilian casualties at *t-2* (spatial lag)	0.0165**	-0.00245	0.0119***	0.00702*	0.000232	-0.000736
	(0.0072)	(0.0049)	(0.0042)	(0.0041)	(0.0017)	(0.0018)
Civilian casualties at *t-3* (spatial lag)	0.0268***	0.00899**	0.00849**	0.00752**	-0.000206	-0.000386
	(0.0072)	(0.0045)	(0.0034)	(0.0035)	(0.0014)	(0.0016)
Civilian casualties at *t-4* (spatial lag)	0.0298***	0.0118***	0.00684*	0.00176	0.00345	-0.00112
	(0.0072)	(0.0043)	(0.0041)	(0.0032)	(0.0027)	(0.0014)
Joint *F*-test	0.102	0.0279	0.0417	0.0169	0.00375	0.000308
(p-value)	(0.000)	(0.004)	(0.003)	(0.104)	(0.376)	(0.942)
Spatial Lag of Dependent Variable						
Observations	31076	31076	30692	30692	29924	29924
R-squared	0.50	0.64	0.65	0.66	0.47	0.47

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 7: Linear Regression Estimates. Effect of Civilian Casualties on IEDs, Including Spatial Lags for All Civilian Casualty Variables (Afghanistan)

Dependent Variable: IEDs (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.0713***	0.0319*	0.00968	0.0486***	0.00292	0.0132***
	(0.024)	(0.019)	(0.017)	(0.0061)	(0.0077)	(0.0035)
Civilian casualties at *t-1* (spatial lag)	0.0314*	-0.00751	0.0129	-0.00396	0.0143**	-0.000741
	(0.017)	(0.015)	(0.017)	(0.017)	(0.0072)	(0.0073)
Civilian casualties at *t-2* (spatial lag)	0.0401*	0.0114	0.0188	0.00904	0.00422	0.0120*
	(0.021)	(0.021)	(0.019)	(0.016)	(0.0073)	(0.0069)
Civilian casualties at *t-3* (spatial lag)	0.0376	0.0100	0.0380**	0.00846	0.00102	-0.000710
	(0.024)	(0.021)	(0.019)	(0.019)	(0.0060)	(0.0080)
Civilian casualties at *t-4* (spatial lag)	0.0788***	0.0453**	0.0361**	0.0215	0.000342	-0.00324
	(0.023)	(0.021)	(0.017)	(0.018)	(0.0058)	(0.0065)
Joint *F*-test	0.188	0.0593	0.106	0.0607	0.0199	0.00469
(p-value)	(0.002)	(0.117)	(0.084)	(0.317)	(0.241)	(0.788)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.0139***	0.00611**	0.00919***	0.0217	0.00198	-0.00332
	(0.0043)	(0.0031)	(0.0026)	(0.016)	(0.0015)	(0.0056)
Civilian casualties at *t-1* (spatial lag)	0.0164***	0.00862***	0.00706***	0.00390*	0.00170	0.000495
	(0.0042)	(0.0030)	(0.0021)	(0.0024)	(0.0012)	(0.0013)
Civilian casualties at *t-2* (spatial lag)	0.0119**	0.00434	0.00600***	0.00394**	0.00156	0.000896
	(0.0048)	(0.0034)	(0.0021)	(0.0019)	(0.0015)	(0.0011)
Civilian casualties at *t-3* (spatial lag)	0.0136***	0.00627***	0.00504***	0.00318	0.00238**	0.000798
	(0.0031)	(0.0022)	(0.0019)	(0.0020)	(0.00099)	(0.0014)
Civilian casualties at *t-4* (spatial lag)	0.0113***	0.00349	0.00526*	0.00182	0.00312**	0.00154*
	(0.0031)	(0.0023)	(0.0027)	(0.0018)	(0.0014)	(0.00092)
Joint *F*-test	0.0531	0.0227	0.0234	0.0115	0.00875	0.00563
(p-value)	(0.000)	(0.000)	(0.001)	(0.079)	(0.015)	(0.072)
Spatial Lag of Dependent Variable						
Observations	31076	31076	30692	30692	29924	29924
R-squared	0.36	0.46	0.56	0.58	0.40	0.40

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All specifications include district and month-year fixed effect.

Appendix Table 8: Linear Regression Estimates. Effect of Civilian Casualties on Direct Fire, Including Spatial Lags for All Civilian Casualty Variables (Afghanistan)

Dependent Variable: Direct Fire (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
ISAF Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.0427**	-0.00571	0.0140	0.0412***	-0.00582	0.00911
	(0.021)	(0.013)	(0.014)	(0.015)	(0.0074)	(0.0059)
Civilian casualties at *t-1* (spatial lag)	0.0149	-0.0258	0.0346**	0.00193	0.00980	-0.00866
	(0.020)	(0.017)	(0.017)	(0.014)	(0.0096)	(0.0079)
Civilian casualties at *t-2* (spatial lag)	0.0464*	0.0276	0.0464**	0.0292*	0.0127	0.00744
	(0.025)	(0.024)	(0.021)	(0.017)	(0.0089)	(0.0099)
Civilian casualties at *t-3* (spatial lag)	0.0691**	0.0397*	0.0408*	0.0370*	0.00154	0.00906
	(0.029)	(0.022)	(0.024)	(0.020)	(0.0066)	(0.0094)
Civilian casualties at *t-4* (spatial lag)	0.0997**	0.0489	0.00537	0.0320	-0.0174*	-0.000251
	(0.045)	(0.034)	(0.020)	(0.023)	(0.0091)	(0.0069)
Joint *F*-test	0.230	0.0905	0.127	0.0903	0.00657	-0.00383
(p-value)	(0.011)	(0.036)	(0.063)	(0.172)	(0.794)	(0.887)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.0146**	0.00828**	0.00501	-0.00783	-0.000710	-0.0201**
	(0.0069)	(0.0041)	(0.0031)	(0.020)	(0.0011)	(0.0095)
Civilian casualties at *t-1* (spatial lag)	0.0110**	0.00331	0.00478	0.00173	-0.000755	-0.00147
	(0.0054)	(0.0027)	(0.0032)	(0.0022)	(0.0013)	(0.0011)
Civilian casualties at *t-2* (spatial lag)	0.00191	-0.00620*	0.00560**	0.00225	-0.000504	-0.00130
	(0.0033)	(0.0032)	(0.0028)	(0.0026)	(0.0011)	(0.0013)
Civilian casualties at *t-3* (spatial lag)	0.0113**	0.00462	0.00496**	0.00430*	-0.000154	-0.000793
	(0.0046)	(0.0029)	(0.0021)	(0.0023)	(0.0010)	(0.0011)
Civilian casualties at *t-4* (spatial lag)	0.0142***	0.00763**	0.00428*	0.00212	0.00195	-0.000761
	(0.0051)	(0.0030)	(0.0023)	(0.0021)	(0.0013)	(0.0011)
Joint *F*-test	0.0385	0.00935	0.0196	0.0103	0.000540	-0.00150
(p-value)	(0.017)	(0.139)	(0.022)	(0.134)	(0.873)	(0.670)
Spatial Lag of Dependent Variable						
Observations	31076	31076	30692	30692	29924	29924
R-squared	0.42	0.58	0.58	0.59	0.43	0.43

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.01. All specifications include district and month-year fixed effect.

Appendix Table 9: Matching Estimate of Impact of ISAF or Insurgent Killings in period *t* on SIGACTs/1,000 (Afghanistan)

DV = 3-period lead moving average, SIGACTs/1,000 from period *t*		(1) *t-2*	(2) *t-1*	(3) *t*	(4) *t* +1	(5) t +2
Panel A: Effect of ISAF-caused civilian casualties	Marginal Effects	0.007	**0.015**	0.011	**0.040**	**0.041**
		[-0.00 – 0.02]	[0.00 – 0.03]	[-0.00 – 0.03]	[0.02 – 0.06]	[0.02 – 0.06]
	N of Matched District Weeks	14821	15192	15576	15576	15566
Panel B: Effect of insurgent-caused civilian casualties	Marginal Effects	0.004	0.0003	-0.009	0.006	**0.023**
		[-0.00 – 0.01]	[-0.01 – 0.01]	[-0.02 – 0.00]	[-0.01 – 0.02]	[0.01 – 0.04]
	N of Matched District Weeks	14821	15192	15576	15576	15566

Results significant at 95% level in two-tailed test in bold with 95% confidence intervals in brackets. Matched on SIGACTs/1,000 population in period *t* and three-period lagged moving average of SIGACTs in *t* through *t-7*. This created 5,109 strata of which 1,133 had three or more district/bi-months. 160 of 902 district/bi-months with civilian casualties had no matching unit without civilian casualties. Multivariate L_1 distance for match = 0.809. All specifications include district and month-year fixed effect.

Appendix Table 10. Linear Regression Estimates of the Relationship between Civilian Casualties and IEDs (Iraq)

Dependent Variable: IEDs (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.0000269	0.0000247	0.0000112	0.0000105	0.0000117	0.0000113
	(0.000044)	(0.000018)	(0.000027)	(0.000027)	(0.000010)	(0.000010)
Civilian casualties at *t-1*	0.00000386	-0.0000108	0.00000935	0.00000915	0.0000123	0.0000122
	(0.000045)	(0.000016)	(0.000035)	(0.000035)	(0.0000085)	(0.0000088)
Civilian casualties at *t-2*	0.0000141	-0.00000431	0.0000208	0.0000206	0.0000238	0.0000237
	(0.000061)	(0.000033)	(0.000040)	(0.000040)	(0.000023)	(0.000023)
Civilian casualties at *t-3*	0.0000261	0.0000114	0.0000286	0.0000279	0.0000196	0.0000193
	(0.000068)	(0.000033)	(0.000033)	(0.000032)	(0.000020)	(0.000020)
Civilian casualties at *t-4*	0.0000449	0.0000279	0.0000297	0.0000291	0.0000205	0.0000201
	(0.000060)	(0.000021)	(0.000023)	(0.000024)	(0.000015)	(0.000016)
Joint *F*-test	8.90e-05	2.43e-05	8.84e-05	8.66e-05	7.62e-05	7.53e-05
(p-value)	(0.696)	(0.766)	(0.498)	(0.509)	(0.246)	(0.254)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.000229*	0.0000428	0.000258	0.000263	0.000141*	0.000143*
	(0.00013)	(0.000057)	(0.00022)	(0.00022)	(0.000082)	(0.000082)
Civilian casualties at *t-1*	0.000480*	0.000284	0.000260	0.000264	0.0000977*	0.0000998*
	(0.00025)	(0.00018)	(0.00026)	(0.00026)	(0.000056)	(0.000057)
Civilian casualties at *t-2*	0.000386*	0.000124	0.000153	0.000160	0.00000424	0.00000777
	(0.00021)	(0.000089)	(0.00024)	(0.00024)	(0.000035)	(0.000036)
Civilian casualties at *t-3*	0.000386	0.0000631	0.0000870	0.0000962	0.00000427	0.00000850
	(0.00037)	(0.00021)	(0.00020)	(0.00020)	(0.000037)	(0.000037)
Civilian casualties at *t-4*	0.000478	0.000114	0.0000614	0.0000731	0.0000223	0.0000278
	(0.00042)	(0.00020)	(0.000084)	(0.000085)	(0.000021)	(0.000021)
Joint *F*-test	0.00173	0.000585	0.000561	0.000593	0.000123	0.000144
(p-value)	(0.160)	(0.343)	(0.458)	(0.435)	(0.297)	(0.255)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12896	12792	12792	12584	12584
R-squared	0.57	0.83	0.83	0.83	0.60	0.61

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 11. Linear Regression Estimates of the Relationship between Civilian Casualties and Direct Fire (Iraq)

Dependent Variable: Direct Fire (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.0000721	0.0000588*	0.0000657**	0.0000652**	0.0000310*	0.0000307*
	(0.000067)	(0.000031)	(0.000025)	(0.000026)	(0.000016)	(0.000016)
Civilian casualties at *t-1*	0.0000533	0.0000144*	0.0000372	0.0000384	0.0000244***	0.0000250***
	(0.000050)	(0.0000078)	(0.000026)	(0.000027)	(0.0000060)	(0.0000062)
Civilian casualties at *t-2*	0.000102*	0.0000461**	0.00000661	0.00000822	0.0000151	0.0000158
	(0.000058)	(0.000022)	(0.000034)	(0.000034)	(0.0000097)	(0.0000097)
Civilian casualties at *t-3*	0.0000734	0.00000620	0.00000169	0.00000298	0.0000116	0.0000122
	(0.000060)	(0.000018)	(0.000042)	(0.000042)	(0.000017)	(0.000016)
Civilian casualties at *t-4*	0.0000389	-0.0000297	0.00000497	0.00000687	0.00000937	0.0000103
	(0.000060)	(0.000022)	(0.000050)	(0.000050)	(0.000014)	(0.000014)
Joint *F*-test	0.000268	3.70e-05	5.05e-05	5.65e-05	6.04e-05	6.33e-05
(p-value)	(0.232)	(0.511)	(0.736)	(0.708)	(0.173)	(0.155)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.000582*	0.000171	0.000212	0.000220	0.0000497	0.0000535
	(0.00031)	(0.00015)	(0.00027)	(0.00027)	(0.000078)	(0.000079)
Civilian casualties at *t-1*	0.000435	-0.0000169	0.000223	0.000234	0.0000268	0.0000318
	(0.00027)	(0.000076)	(0.00029)	(0.00029)	(0.000045)	(0.000045)
Civilian casualties at *t-2*	0.000600	0.000173	0.000196	0.000207	-0.0000105	-0.00000551
	(0.00039)	(0.00018)	(0.00027)	(0.00027)	(0.000020)	(0.000020)
Civilian casualties at *t-3*	0.000534	0.0000867	0.000216	0.000225	0.0000142	0.0000184
	(0.00043)	(0.00020)	(0.00026)	(0.00026)	(0.000040)	(0.000040)
Civilian casualties at *t-4*	0.000550	0.000127	0.000208	0.000219	0.0000649	0.0000700
	(0.00038)	(0.000099)	(0.00020)	(0.00021)	(0.000086)	(0.000087)
Joint *F*-test	0.00212	0.000370	0.000844	0.000885	9.54e-05	0.000115
(p-value)	(0.147)	(0.479)	(0.408)	(0.391)	(0.574)	(0.506)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12896	12792	12792	12584	12584
R-squared	0.49	0.78	0.72	0.72	0.57	0.58

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 12. Placebo Tests for Main Table 6: Linear Regression Estimates of All SIGACTs on Leads of Civilian Casualties (Iraq)

Dependent Variable: SIGACTs (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.000173	0.000107**	0.0000868	0.0000867	0.0000320	0.0000320
	(0.00015)	(0.000051)	(0.000064)	(0.000065)	(0.000027)	(0.000028)
Civilian casualties at *t+1*	0.000188	0.000174***	0.000123**	0.000123**	0.0000586	0.0000586
	(0.00013)	(0.000035)	(0.000058)	(0.000059)	(0.000036)	(0.000037)
Civilian casualties at *t+2*	0.0000343	0.0000417	0.000155***	0.000156***	0.0000424**	0.0000429**
	(0.00013)	(0.000034)	(0.000059)	(0.000059)	(0.000020)	(0.000021)
Civilian casualties at *t+3*	-0.0000333	-0.00000905	0.000134**	0.000135**	0.0000499***	0.0000503***
	(0.00012)	(0.000030)	(0.000061)	(0.000062)	(0.000014)	(0.000015)
Civilian casualties at *t+4*	-0.0000153	0.0000294	0.000121	0.000123	0.000113***	0.000114***
	(0.00013)	(0.00011)	(0.00010)	(0.00010)	(0.000012)	(0.000012)
Joint *F*-test	0.000174	0.000236	0.000534	0.000539	0.000264	0.000266
(p-value)	(0.733)	(0.140)	(0.043)	(0.044)	(0.000)	(0.000)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.00116*	0.000414	0.000469	0.000483	0.000198	0.000204
	(0.00060)	(0.00029)	(0.00059)	(0.00060)	(0.00016)	(0.00016)
Civilian casualties at *t+1*	0.000809**	0.00000878	0.000403	0.000417	0.000203	0.000209
	(0.00039)	(0.00018)	(0.00039)	(0.00040)	(0.00016)	(0.00016)
Civilian casualties at *t+2*	0.000828*	0.0000682	0.000346	0.000360	0.000187	0.000193
	(0.00042)	(0.00017)	(0.00033)	(0.00034)	(0.00014)	(0.00014)
Civilian casualties at *t+3*	0.000895*	0.000170	0.000309	0.000323	0.000189	0.000195
	(0.00047)	(0.00022)	(0.00030)	(0.00030)	(0.00012)	(0.00012)
Civilian casualties at *t+4*	0.000903**	0.000268	0.000239	0.000252	0.000111*	0.000117*
	(0.00044)	(0.00026)	(0.00027)	(0.00027)	(0.000064)	(0.000065)
Joint *F*-test	0.00344	0.000515	0.00130	0.00135	0.000690	0.000714
(p-value)	(0.039)	(0.417)	(0.305)	(0.290)	(0.132)	(0.122)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12792	12792	12792	12792	12792
R-squared	0.59	0.88	0.85	0.85	0.60	0.61

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix Table 13. Placebo Tests for Appendix Table 10: Linear Regression Estimates of IEDs on Leads of Civilian Casualties (Iraq)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: IEDs (*t*)	Base Model	Lagged MA	Lead MA	Lead MA	Lead MAD	Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.0000329	0.0000241	0.0000128	0.0000122	0.0000128	0.0000124
	(0.000044)	(0.000016)	(0.000027)	(0.000027)	(0.000011)	(0.000011)
Civilian casualties at *t+1*	0.0000262	0.0000225**	0.0000139	0.0000130	0.0000200	0.0000196
	(0.000043)	(0.000010)	(0.000018)	(0.000019)	(0.000014)	(0.000015)
Civilian casualties at *t+2*	0.00000153	-0.000000776	0.0000190	0.0000190	0.0000129	0.0000129
	(0.000047)	(0.000013)	(0.000015)	(0.000015)	(0.0000087)	(0.0000088)
Civilian casualties at *t+3*	-0.000000467	0.00000448	0.0000215	0.0000220	0.0000136***	0.0000139***
	(0.000049)	(0.000018)	(0.000017)	(0.000017)	(0.0000050)	(0.0000050)
Civilian casualties at *t+4*	-0.00000223	0.0000104	0.0000163	0.0000172	0.0000149**	0.0000153**
	(0.000047)	(0.000039)	(0.000039)	(0.000039)	(0.0000072)	(0.0000072)
Joint *F*-test	2.50e-05	3.65e-05	7.07e-05	7.12e-05	6.15e-05	6.17e-05
(p-value)	(0.892)	(0.539)	(0.355)	(0.360)	(0.057)	(0.060)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.000262*	0.0000570	0.000248	0.000254	0.000126	0.000129
	(0.00015)	(0.000067)	(0.00023)	(0.00024)	(0.000078)	(0.000079)
Civilian casualties at *t+1*	0.000194	-0.0000186	0.000201	0.000209	0.0000659	0.0000696
	(0.00014)	(0.00010)	(0.00014)	(0.00014)	(0.000071)	(0.000072)
Civilian casualties at *t+2*	0.000266*	0.0000682	0.000144	0.000150	0.0000881	0.0000912
	(0.00016)	(0.000090)	(0.00012)	(0.00012)	(0.000057)	(0.000057)
Civilian casualties at *t+3*	0.000283**	0.0000948	0.0000647	0.0000712	0.0000813**	0.0000845**
	(0.00013)	(0.000067)	(0.000093)	(0.000094)	(0.000034)	(0.000035)
Civilian casualties at *t+4*	0.000191	0.00000234	0.0000529	0.0000632	0.0000368*	0.0000420*
	(0.00015)	(0.000099)	(0.000087)	(0.000089)	(0.000022)	(0.000024)
Joint *F*-test	0.000934	0.000147	0.000463	0.000493	0.000272	0.000287
(p-value)	(0.070)	(0.505)	(0.249)	(0.224)	(0.110)	(0.098)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12792	12792	12792	12792	12792
R-squared	0.57	0.83	0.83	0.83	0.60	0.61

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 14. Placebo Tests for Appendix Table 11: Linear Regression Estimates of Direct Fire on Leads of Civilian Casualties (Iraq)

Dependent Variable: Direct Fire (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t*	0.0000835	0.0000573**	0.0000657**	0.0000623***	0.0000296*	0.0000294*
	(0.000066)	(0.000027)	(0.000025)	(0.000024)	(0.000016)	(0.000016)
Civilian casualties at *t+1*	0.0000678	0.0000562***	0.0000372	0.0000717***	0.0000265	0.0000267
	(0.000053)	(0.000020)	(0.000026)	(0.000025)	(0.000018)	(0.000018)
Civilian casualties at *t+2*	0.0000174	0.0000106	0.00000661	0.0000622**	0.0000167**	0.0000172**
	(0.000054)	(0.000019)	(0.000034)	(0.000029)	(0.0000080)	(0.0000082)
Civilian casualties at *t+3*	-0.00000856	-0.0000114	0.00000169	0.0000448	0.0000180**	0.0000182**
	(0.000045)	(0.000011)	(0.000042)	(0.000033)	(0.0000078)	(0.0000079)
Civilian casualties at *t+4*	0.00000816	0.0000229	0.00000497	0.0000386	0.0000318***	0.0000323***
	(0.000060)	(0.000058)	(0.000050)	(0.000053)	(0.0000079)	(0.0000080)
Joint *F*-test	8.48e-05	7.84e-05	0.000214	0.000217	9.31e-05	9.45e-05
(p-value)	(0.683)	(0.344)	(0.106)	(0.106)	(0.006)	(0.007)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t*	0.000573*	0.000160	0.000212	0.000208	0.0000294	0.0000338
	(0.00032)	(0.00015)	(0.00027)	(0.00027)	(0.000071)	(0.000071)
Civilian casualties at *t+1*	0.000523**	0.000108	0.000223	0.000226	0.000123	0.000127
	(0.00026)	(0.00012)	(0.00029)	(0.00023)	(0.00011)	(0.00011)
Civilian casualties at *t+2*	0.000509**	0.000154	0.000196	0.000251	0.000121	0.000125
	(0.00025)	(0.00011)	(0.00027)	(0.00021)	(0.000084)	(0.000085)
Civilian casualties at *t+3*	0.000455**	0.000130	0.000216	0.000300	0.0000992	0.000102
	(0.00022)	(0.000092)	(0.00026)	(0.00020)	(0.000066)	(0.000066)
Civilian casualties at *t+4*	0.000487**	0.000229*	0.000208	0.000293*	0.0000687	0.0000705*
	(0.00021)	(0.00013)	(0.00020)	(0.00017)	(0.000042)	(0.000042)
Joint *F*-test	0.00197	0.000621	0.00104	0.00107	0.000412	0.000425
(p-value)	(0.032)	(0.117)	(0.192)	(0.183)	(0.163)	(0.151)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12792	12792	12792	12792	12792
R-squared	0.49	0.78	0.72	0.72	0.58	0.58

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 15: Linear Regression Estimates of Effect of Civilian Casualties on SIGACTs, Including Spatial Lags for All Civilian Casualty Variables (Iraq)

Dependent Variable: SIGACTs (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	-0.0000302	0.000102**	0.0000134	0.0000122	0.00000150	0.00000106
	(0.000061)	(0.000045)	(0.000022)	(0.000021)	(0.0000089)	(0.0000087)
Civilian casualties at *t-1* (spatial lag)	-0.000110	-0.0000414**	-0.0000359	-0.0000338	0.00000122	0.00000224
	(0.000083)	(0.000021)	(0.000022)	(0.000021)	(0.0000072)	(0.0000067)
Civilian casualties at *t-2* (spatial lag)	-0.0000921	-0.0000398**	-0.0000483**	-0.0000463**	-0.00000319	-0.00000222
	(0.000074)	(0.000020)	(0.000021)	(0.000020)	(0.0000060)	(0.0000053)
Civilian casualties at *t-3* (spatial lag)	-0.0000902	-0.0000217	-0.0000346**	-0.0000335**	-0.00000513	-0.00000457
	(0.000079)	(0.000018)	(0.000017)	(0.000017)	(0.0000045)	(0.0000043)
Civilian casualties at *t-4* (spatial lag)	-0.0000941	-0.0000167	-0.0000218**	-0.0000197**	-0.000000911	0.000000110
	(0.000062)	(0.000013)	(0.0000094)	(0.0000088)	(0.0000063)	(0.0000067)
Joint *F*-test	-0.000386	-0.000120	-0.000141	-0.000133	-8.01e-06	-4.44e06
(p-value)	(0.194)	(0.019)	(0.034)	(0.034)	(0.528)	(0.688)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.000584**	0.0000534	-0.0000199	-0.0000557	-0.00000806	-0.0000241
	(0.00026)	(0.000047)	(0.000096)	(0.00010)	(0.000029)	(0.000037)
Civilian casualties at *t-1* (spatial lag)	0.000453**	-0.0000457	-0.00000480	-0.0000299	0.0000189	0.00000788
	(0.00020)	(0.000083)	(0.00011)	(0.00012)	(0.000027)	(0.000028)
Civilian casualties at *t-2* (spatial lag)	0.000393**	-0.0000570	0.0000117	-0.0000107	-0.0000137	-0.0000234
	(0.00019)	(0.00011)	(0.00011)	(0.00012)	(0.000021)	(0.000020)
Civilian casualties at *t-3* (spatial lag)	0.000375*	-0.0000374	-0.0000148	-0.0000325	-0.0000229	-0.0000305
	(0.00020)	(0.000089)	(0.00013)	(0.00013)	(0.000019)	(0.000019)
Civilian casualties at *t-4* (spatial lag)	0.000432**	0.0000809	-0.0000152	-0.0000331	-0.0000430**	-0.0000506***
	(0.00017)	(0.00011)	(0.00014)	(0.00014)	(0.000018)	(0.000019)
Joint *F*-test	0.00165	-5.91e-05	-2.30e-05	-0.000106	-6.07e-05	-9.66e-05
(p-value)	(0.023)	(0.811)	(0.958)	(0.811)	(0.265)	(0.092)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12896	12792	12792	12584	12584
R-squared	0.59	0.88	0.85	0.85	0.60	0.61

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Appendix Table 16. Linear Regression Estimates of Effect of Civilian Casualties on IEDs, Including Spatial Lags for All Civilian Casualty Variables (Iraq)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: IEDs (*t*)	Base Model	Lagged MA	Lead MA	Lead MA	Lead MAD	Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	-0.0000291	0.0000257	0.00000828	0.00000818	-0.00000201	-0.00000201
	(0.000037)	(0.000025)	(0.0000093)	(0.0000092)	(0.0000046)	(0.0000045)
Civilian casualties at *t-1* (spatial lag)	-0.0000511	-0.0000200**	-0.00000481	-0.00000294	0.00000169	0.00000266
	(0.000040)	(0.0000096)	(0.0000067)	(0.0000064)	(0.0000034)	(0.0000034)
Civilian casualties at *t-2* (spatial lag)	-0.0000349	-0.00000772	-0.00000373	-0.00000134	-0.000000780	0.000000448
	(0.000032)	(0.0000076)	(0.0000084)	(0.0000082)	(0.0000028)	(0.0000026)
Civilian casualties at *t-3* (spatial lag)	-0.0000280	0.00000414	-0.00000275	-0.00000104	-0.00000459	-0.00000370
	(0.000032)	(0.0000060)	(0.0000077)	(0.0000077)	(0.0000033)	(0.0000030)
Civilian casualties at *t-4* (spatial lag)	-0.0000239	0.00000416	-0.00000713	-0.00000682	-0.00000393	-0.00000373
	(0.000024)	(0.000015)	(0.0000059)	(0.0000056)	(0.0000024)	(0.0000024)
Joint *F*-test	-0.000138	-1.94e-05	-1.84e-05	-1.12e-05	-7.61e-06	-4.31e-06
(p-value)	(0.274)	(0.278)	(0.486)	(0.632)	(0.377)	(0.574)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.000162*	0.0000146	-0.0000215	-0.0000315	-0.0000222	-0.0000271
	(0.000084)	(0.000027)	(0.000050)	(0.000052)	(0.000023)	(0.000025)
Civilian casualties at *t-1* (spatial lag)	0.000125*	0.00000447	0.0000158	0.00000513	-0.00000102	-0.00000620
	(0.000072)	(0.000044)	(0.000057)	(0.000059)	(0.000019)	(0.000020)
Civilian casualties at *t-2* (spatial lag)	0.0000906	-0.0000212	0.0000423	0.0000370	0.00000499	0.00000252
	(0.000082)	(0.000055)	(0.000058)	(0.000059)	(0.0000093)	(0.0000094)
Civilian casualties at *t-3* (spatial lag)	0.000100	-0.0000114	0.0000172	0.0000145	0.00000244	0.00000130
	(0.000084)	(0.000052)	(0.000054)	(0.000054)	(0.0000088)	(0.0000085)
Civilian casualties at *t-4* (spatial lag)	0.000162**	0.0000680	0.0000116	0.00000414	-0.0000183	-0.0000219
	(0.000074)	(0.000042)	(0.000050)	(0.000051)	(0.000014)	(0.000014)
Joint *F*-test	0.000478	3.99e-05	8.69e-05	6.07e-05	-1.19e-05	-2.42e-05
(p-value)	(0.101)	(0.764)	(0.661)	(0.763)	(0.752)	(0.538)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12896	12792	12792	12584	12584
R-squared	0.57	0.83	0.83	0.83	0.60	0.61

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 17. Linear Regression Estimates of Effect of Civilian Casualties on Direct Fire, Including Spatial Lags for All Civilian Casualty Variables (Iraq)

Dependent Variable: Direct Fire (*t*)	(1) Base Model	(2) Lagged MA	(3) Lead MA	(4) Lead MA	(5) Lead MAD	(6) Lead MAD
Coalition Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.0000235	0.0000531***	0.000000186	-0.00000138	0.00000146	0.000000716
	(0.000014)	(0.000017)	(0.0000086)	(0.0000087)	(0.0000035)	(0.0000035)
Civilian casualties at *t-1* (spatial lag)	-0.0000189	-0.0000130	-0.0000207*	-0.0000207*	-0.00000393	-0.00000388
	(0.000021)	(0.0000087)	(0.000012)	(0.000012)	(0.0000037)	(0.0000035)
Civilian casualties at *t-2* (spatial lag)	-0.0000283	-0.0000297***	-0.0000287**	-0.0000292**	-0.00000616*	-0.00000635**
	(0.000020)	(0.0000098)	(0.000014)	(0.000014)	(0.0000034)	(0.0000032)
Civilian casualties at *t-3* (spatial lag)	-0.0000195	-0.0000130	-0.0000269**	-0.0000271**	-0.00000394	-0.00000396
	(0.000023)	(0.000010)	(0.000014)	(0.000013)	(0.0000033)	(0.0000032)
Civilian casualties at *t-4* (spatial lag)	-0.0000310	-0.0000137*	-0.0000144**	-0.0000130**	-0.00000293	-0.00000213
	(0.000023)	(0.0000074)	(0.0000067)	(0.0000061)	(0.0000029)	(0.0000028)
Joint *F*-test	-9.77e-05	-6.94e05	-9.08e-05	-9.00e-05	-1.70e-05	-1.63e-05
(p-value)	(0.258)	(0.030)	(0.049)	(0.044)	(0.163)	(0.150)
Insurgent Generated Civilian Casualties						
Civilian casualties at *t* (spatial lag)	0.000199**	0.0000341	0.0000270	0.00000322	0.00000924	-0.00000296
	(0.000088)	(0.000021)	(0.000021)	(0.000025)	(0.0000089)	(0.000011)
Civilian casualties at *t-1* (spatial lag)	0.000165**	0.0000111	0.0000211	0.00000443	0.00000280	-0.00000561
	(0.000075)	(0.000025)	(0.000025)	(0.000026)	(0.0000088)	(0.0000088)
Civilian casualties at *t-2* (spatial lag)	0.000134**	-0.00000535	0.0000177	0.00000300	-0.0000119	-0.0000192
	(0.000063)	(0.000041)	(0.000037)	(0.000036)	(0.000011)	(0.000012)
Civilian casualties at *t-3* (spatial lag)	0.000131**	-0.00000229	0.0000124	0.00000171	-0.0000263**	-0.0000316***
	(0.000060)	(0.000029)	(0.000052)	(0.000050)	(0.000011)	(0.000011)
Civilian casualties at *t-4* (spatial lag)	0.000113*	0.00000477	0.0000324	0.0000228	-0.0000121	-0.0000168
	(0.000059)	(0.000033)	(0.000066)	(0.000064)	(0.000012)	(0.000012)
Joint *F*-test	0.000543	8.20e-06	8.37e-05	3.19e-05	-4.74e-05	-7.32e-05
(p-value)	(0.024)	(0.886)	(0.601)	(0.835)	(0.071)	(0.011)
Spatial Lag of Dependent Variable	N	N	N	Y	N	Y
Observations	12896	12896	12792	12792	12584	12584
R-squared	0.48	0.78	0.72	0.72	0.57	0.58

Note: All models include district and month fixed effects. Where included, coefficients for moving average, mean absolute deviation, and spatial lag of the dependent variable not shown. Robust standard errors, clustered on district, in parentheses. *** p<0.01, ** p<0.05, * p<0.01