HOW EMOTIONS SHAPE ORGANIZED
SUB-STATE CONFLICT

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Abstract

This dissertation consists of three studies of sub-state conflict. The first two explore particular emotional influences on the judgments and behaviors of combatants and civilians during organized conflict. The third examines information dynamics during insurgency. Chapter 1 explores the combined role of a war-fighting institution’s strategic calculations and its combatants’ individual emotional reactions in producing violence. Using newly declassified micro-conflict data and leveraging the firmly established phenomenon of ambient temperature’s effect on aggression, this chapter shows that during the Afghanistan and Iraq wars temperature exercised substantively large and non-strategic effects on the attitudes and behaviors of conflict participants. Temperature influenced the type and intensity of insurgent attacks, the odds of insurgent fatalities during skirmishes, and the willingness of military-age men to endorse the use of violence against international forces. Chapter 2 considers the effect of civilians’ employment status during conflict on their support for political violence. Although the unemployed are often inculpated in violence production during sub-state conflict, the results of prior work on the relationship between unemployment and wartime violence are ambiguous. This chapter contends that loss of employment during conflict increases feelings of depression, anxiety and helplessness, affecting perceptions of efficacy and the desire for retribution. Using data from a large Iraq War survey, the chapter shows that underemployed Iraqis were consistently less optimistic than other citizens; displayed diminished perceptions of efficacy; and were much less likely to support the use of violence against international forces. Chapter 3 explores the relationship between wartime informing by civilians and the production of violence by insurgents. Using newly available data on calls placed to a “tips” telephone hotline operated during the Iraq War, the chapter reveals that insurgents’ efforts to overwhelm the platform were extensive and that intelligence received through the hotline was associated with reductions in the most organized forms of violence and increases
in the least organized forms. These patterns are consistent with informing enabling
operations against insurgents’ weapons supplies and managers, leading to the substi-
tution of highly planned attacks with attacks requiring the least coordination.
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Chapter 1

Even if brought about by cold strategic calculation, military combat is an emotional experience. Clausewitz articulated this duality as the difference between hostile feelings experienced by warriors and their political leadership’s hostile intentions, devoting his studies to the latter (Von Clausewitz et al. 2011: p. 137-8). Subsequent conflict scholarship has maintained this emphasis, illuminating aspects of the causes and consequences of war with reference to the strategic incentives faced by combatants.

Recent studies have deepened our understanding of the dynamics of war by treating combatants as non-emotional actors producing optimal quantities of violence that further their broader strategic goals. The evident effort by political institutions to direct their fighters’ violence toward their strategic objectives makes this assumption reasonable. The task of an officer corps is the “management of violence” to ensure that the type, target, and frequency of violence is optimized for strategic ends (Huntington 1957: p. 13). This structure is also found among violent non-state groups (Shapiro 2013). Even if some fighters deviate on the margins, institutions manage the behaviors of these individuals for the purpose of the state or other political organizations. As a result, rationality can be imputed as a net and aggregate effect in which idiosyncratic behaviors grounded in emotion disappear into the error term.

Social research in non-conflict settings suggests in contrast that the manifestation of emotionally motivated behavior is common. Literature on the effects of individuals’ emotional states on their judgments and decision making provides evidence that emotional stimuli are both more pervasive than commonly believed and operate on individuals in ways in which they do not recognize. Emotional factors have been shown empirically to operate in “least likely” domains. For instance, Saunders (1993) found
that stock prices were negatively affected by unpleasant local weather. Despite strong economic incentives to make purely instrumental decisions, the psychological effects of weather partially determined traders’ behavior. These empirical findings of human behavior provide grounds for interrogating the sanitized rational choice logic, raising questions about the actual success of violent political organizations in translating their strategic objectives into the application of force by fighters who are continually emoting.

The answers matter most for theories that permit the least deviation from the as-if-rational assumption. For a rational choice theory of political violence to retain its explanatory power, individual idiosyncrasies or passing emotional states of the critical decision-makers must be peripheral to the outcome of the strategic interaction. When they describe knife-edge equilibria, theories of strategic interaction are especially vulnerable to individual outlier behavior out of step with institutional strategy. Proponents of rational choice-based research programs recognize that they are ill-suited for “actions taken in non-iterative situations by individual decision makers (such as in crisis situations)” (Tsebelis 1990: p. 38). But emotions do not have to act on individuals occupying high offices of state to influence conflict outcomes. If particular emotions systematically shape the judgments and behaviors of large numbers of conflict participants, they may have substantial effects on conflict outcomes, indiscernible to empirical research that begins with a rational choice framework.¹

Previously, the main barrier to research that accounts seriously for both emotional and strategic factors has been empirical, “because scholars lack microlevel data to see the operation of these emotional influences, thereby forcing them to make inferences from highly aggregated phenomena” (McDoom 2012: p. 129-30). Equipped with fine-

¹Emotion experienced by an individual combatant is not inherently in competition with the strategic requirements of the violence-organizing political group of which he is a member. For instance, desire for self-sacrificing heroic status inside the group would be an emotional motivation for violence with strategic value for the institution.
grained conflict data recorded during the recent Afghanistan and Iraq wars, it is now possible to test whether emotional influences on individual fighters have shaped the conflicts’ patterns of violence.

Ensuring that the link between the emotional cause and its behavioral effect is not strategic requires precise measurements and a robust identification strategy. Direct evidence for the effect of emotion on combat patterns also requires a variable whose effect produces an emotion that is incidental to the strategic objectives of individual combatants’ behaviors. Should the variable have any effect on the strategic choices of individual combatants, these must be identifiable so that the emotional influence can be isolated. Ambient temperature fulfills these criteria.

We present evidence that during periods of intense fighting in Afghanistan and Iraq, ambient temperature affected how and when insurgents elected to initiate attacks, their fatality likelihood, and combat-age males’ support for violence. We first show that the less institutional control that existed over a given form of attack, the more responsive fighters were to the effects of ambient temperature. Next, we show that Taliban fighters in Afghanistan were more likely to perish in attacks they initiated at hotter temperatures with (and only with) the least organizationally constrained weaponry. That is, insurgents were no more likely to die when they carried out attacks at higher temperatures except when they did so with weapons over which they exercised the greatest discretion, which we interpret as evidence of spontaneous, non-strategic (indeed, strategically disadvantageous) combatant behavior. Finally, we demonstrate that military-age Iraqi males’ expressions of aggression varied predictably with ambient temperature. At higher temperatures, these citizens experienced significantly greater support for violent attacks on the country’s multinational occupying forces.

These findings are based on the U.S. Defense Department’s full and official record of Iraq War insurgent violence committed against Iraqi, American, and other in-
ternational forces. Although abridged versions of this dataset have previously been available, the complete war dataset had remain classified by the U.S. Government. Two other recent datasets provide further data for testing: First, we use the complete Afghanistan War dataset on insurgent violence recently prepared and released by Shaver and Wright (2016) to assess fatality likelihood as a function of temperature. Evidence for expressed support of violence is taken from a monthly survey carried out by a local Iraqi survey firm throughout the Iraq War, introduced previously by Klor et al. (2016). The survey elicited responses from some 175,000 Baghdad residents over the course of the war.

1.1 Emotional and Strategic Violence

The dominant current of recent sub-state conflict research treats both combatants and civilians as strategic actors and presumes that their actions reflect the pursuit of rationally calculated political and military strategies. For instance, de Mesquita (2013) conceptualizes insurgents’ choice of targets as a rational response to an insurgent organization’s environment. An expansive catalogue of empirical evidence is consistent with these assumptions (Berman et al. 2011b). Kalyvas and Balcells persuasively find strategic and political motivations in violence against non-combatants in civil war settings (Kalyvas 1999; Kalyvas et al. 2006; Balcells 2011). Under this line of scholarship, any civilian harm inflicted by combatants that does not advance their strategic goals should be rare and unintentional. Explaining the choice to relegate emotion to the error term, Kalyvas argues that political and non-political violence are separate phenomena, in part because individuals “involved in the production of political violence appear to lack the kind of ‘extreme’ personality features that tend to correlate with expressive violence” (Kalyvas et al. 2006: p. 25).

The literature on terrorism has debated whether that form of political violence can be considered a rational tactic in pursuit of strategic goals. One side holds that
terrorist violence is the result of a rational calculation on the part of political actors reacting to their strategic environment (Kydd and Walter 2006; Pape 2006). The opposing view proposes that terrorists depart “from narrow self-interest and rational expectations, and suicidal terrorists probably violate both” (Caplan 2006: p. 91). Psychologists involved in the rehabilitation of former terrorists propose that there are strong emotional components to perpetrating violence against non-combatants (Horgan 2004). However, these debates are not reflected in the recent empirical sub-state conflict literature, which focuses overwhelmingly on strategic behavior during periods of political violence (Carter 2016; Humphreys and Weinstein 2008; de Mesquita 2013; Berman et al. 2011a,b; Shapiro and Weidmann 2015).

When addressed in the study of violent political conflict, emotion has traditionally been invoked to explain errors and deviations from ostensibly correct or rational actions. Mercer (2005) proposes instead that all acts will have a combination of emotional and cognitive sources. Some political scientists have embarked on empirical research programs that account for psychological biases, with a focus on the implication for the literature’s rationality assumption (Sasley 2010; Ross 2013). McDermott (2004) argues that affective and strategic behavior sources are not zero sum: “emotion is part of rationality itself, and that the two are intimately intertwined and interconnected processes, psychologically and neurologically” (p. 693). Insofar as emotions have behavioral consequences in the realm of violence, they are the first reason to expect that not all political violence will be purely instrumentally motivated.

Another existing approach to integrating emotion into conflict research has been to acknowledge that both emotion and strategy combine to produce the general preference structures within which human agents will seek to maximize their payoffs. For instance, Posen (1993) and Kalyvas (2003) argue that emotion-based, in this case, ethnic-, grievances can motivate strategic behavior, as when individuals join violent groups for emotionally motivated reasons, then pursue the group’s strategic goals.
with violent means.

While it would be tempting to subsume all emotional variables in a cost or utility function, Petersen makes a strong case against converting emotions into utility: “The emotion-based approach does not need to create these dubious rank-orderings. Emotions create a sense of urgency, they dramatically raise the salience of a particular desire, they explain compulsion. The trade-offs between revenge and self-esteem, for example, cannot be realistically calculated or represented with an indifference curve. In rational choice, the stability of preferences is a simplifying assumption. Most practitioners of rational choice would probably agree that this simplification is not always useful for every type of human behavior.” (Petersen 2002: p. 33)

Fortunately, the foundations of a more promising approach are available. Evidence in support of attitude and behavior-shaping emotional stimuli is well established in psychology. Renshon and Lerner (2012) divide the catalogue of emotional drivers into integral and incidental. We are particularly interested in the latter, which are “normatively unrelated to the decision at hand [yet] affect decision-making in critical and often unappreciated ways” (Renshon and Lerner 2012: p. 1). The process by which incidental emotions affect individuals’ judgments and behaviors is non-conscious and beyond the “control” of rational calculation (Lerner et al. 2015). The empirical evidence of this phenomenon is substantial (Lerner et al. 2015; Schwarz and Clore 1983; Gallagher and Clore 1985; Lerner and Keltner 2000, 2001; Han et al. 2007; Bodenhausen 1993). As an example of the operation of incidental emotion, Lerner and Keltner (2000: p. 483) find that individuals experimentally primed to experience fear assign higher risk likelihoods to various causes of death. Treated subjects not only do so without conscious awareness, but the source of fearful emotional priming is unrelated to the risk profiles they are asked to assess.
2 Incidental Emotion and Ambient Temperature

The effects of incidental emotion are hard to find in observational data. Indeed, the overwhelming empirical and theoretical emphasis on strategic and tactical motivations for acts of violence stems from necessity. After all, it “is extremely difficult to uncover with an acceptable level of accuracy the individual motives behind violent acts” (Greenstein and Polsby 1975: p. 75). Absent an ability to distinguish proportional emotional and strategic motivations for individual acts of violence in war, the literature has given combatants the benefit of the doubt and interpreted their behavior as manifestations of rational behavior in pursuit of their goals. We propose that we can identify the role of incidental emotion in conflict by leveraging temperature’s well studied effects on human aggression.

In laboratory settings, hotter temperatures have been shown to produce increases in verbally reported hostile attitudes, impaired cognitive performance, and experience of generally negative emotional states (Anderson et al. 1995; Pilcher et al. 2002). At elevated temperature ranges, Vrij et al. (1994a) demonstrate that police officers discharged more bullets in a shooting simulator, Nathan DeWall and Bushman (2009) find that subjects experience aggressive thoughts, and Gockel et al. (2014a) conclude that subjects were more likely to judge a murderer’s motive as emotional impulse.

The tendency of individuals to behave more violently at higher temperatures is also well established empirically, leaving “little doubt or controversy about the exis-

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2Humans are not the only organisms that react aggressively to heat. In the marine environment, coral reef fish and sea turtles are more aggressive at higher temperatures (Biro et al. 2009).

3Research has repeatedly shown that the effect of incidental emotions is typically eliminated when affected individuals are made aware of the source of stimulation. For example, Schwarz and Clore (1983) find that individuals report lower happiness on rainy days. By contrast, subjects who were either directly reminded that weather can affect mood or indirectly primed by being asked about their local weather conditions did not report lower life satisfaction. These reminders are uncommon, leaving human behavior sensitive to affective stimuli. Research on the effects of temperature on aggression finds precisely the same. For instance, (Palamarek and Rule 1979) demonstrate in a laboratory experiment that individuals who were more aggressive at higher ambient temperatures became less so once they were made aware of the actual temperature.
tence of a heat-violence relation in real-world data” (Anderson et al. 2000: p. 67). This relationship has been theorized and empirically investigated by psychologists, criminologists, sociologists, and other scholars for centuries (Anderson et al. 1997; Ranson 2012; Anderson 2001; Dodge and Lentzner 1980; Kenrick and MacFarlane 1986; Reifman et al. 1991; Gamble and Hess 2012; Rotton and Cohn 2000a, 2001; Pilcher et al. 2002; Vrij et al. 1994b; Nathan DeWall and Bushman 2009; Gockel et al. 2014b). Anderson et al. (1997) find that temperature is positively correlated with “serious and deadly assault even after time series, linear year, poverty, and population age effects were statistically controlled.” Property crime, which is unrelated to ephemeral changes in aggressive tendencies, shows no such covariance with temperature. Ranson (2012) concurs, demonstrating that the effect is immediate.\footnote{Studies that “measure temperature at the exact time that aggressive behaviors occurred” corroborate earlier findings by Anderson (2001) that “[t]emperature has a strong positive effect on criminal behavior, with little evidence of lagged impacts.”}

Analyses of law enforcement records have similarly found that much variation in violent offenses can be explained by temperature (Dodge and Lentzner 1980).

The resulting body of observational and experimental evidence points to a causal effect that is statistically significant, substantively large, and expected to take a specified nonlinear functional form. The temperature-conflict relationship has been identified at many points on a spectrum that spans spontaneous violence between individuals up to organized group violence.

Of the identifiable emotional sources of violence, ambient temperature also offers several methodological and empirical advantages for testing in wartime. First, combatants are invariably exposed to ambient temperature and its fluctuations. The vast majority of fighting in wars occurs outdoors, even if electricity may allow a select number of commanders to avoid exposure to battlefield temperatures. Second, there is no risk of reverse causality in statistical testing. Third, temperature has been objectively and precisely recorded in many conflict settings. Fourth, ambient
temperatures vary significantly over time.

In sum, the overwhelming evidence holds that individuals will be inclined to more violence at certain temperature ranges. This makes temperature a purely emotional motivation for violence that can demonstrate an emotional component of violence.\(^5\)

3 Research Design

We conduct four complementary sets of empirical tests to determine whether temperature affects violence in non-strategic ways during periods of organized political violence. The approach consists of determining whether the preponderance of evidence generated by these tests coheres with theoretical expectations. To increase confidence in a causal interpretation of our findings, our approach consists in part of testing the theory across distinct contexts and with different units of analysis so as to limit the possibility that any single unobserved variable is responsible for influencing our results. Fine-grained, voluminous, and geo-referenced data on combatant and civilian judgments and behavior generated throughout the US-led counterinsurgent wars in Afghanistan and Iraq, introduced in full below, makes this possible.

This research design exploits a number of characteristics that were central to the ways in which the Afghanistan and Iraq conflicts were fought by insurgents. We introduce hypotheses below that exploit variation in specific characteristics from these conflicts, although there is no reason to believe this evidence would not appear in other conflict settings.

\(^5\)While the evidence for the temperature-violence relationship is preponderant, disagreement persists over its functional form. Gamble and Hess (2012) conclude that “daily mean ambient temperature is related in a curvilinear fashion to daily rates of violent crime with a positive and increasing relationship between temperature and aggravated crime that moderates beyond temperatures of \([26.7^\circ C]\) and then turns negative beyond \([32.2^\circ C]\).” The main arguments over the functional form are found in Cohn and Rotton (1997), Rotton and Cohn (2000a), Rotton and Cohn (2001), Anderson et al. (2000), and Anderson and Anderson (1984). Linear results were likely an artifact of studied environments that do not reach sufficiently high temperatures to induce a reduction in violence, but heat is abundant in Iraq and Afghanistan.
We proceed as follows to test for the presence of an emotional aggressive effect, while excluding alternative explanations. First, we verify the presence of a relationship between ambient temperature and insurgent violence that is consistent with a causal effect of temperature on violence mediated through a psychological response. We test this in two ways. This first set of tests involve analyzing the temperature-violence relationship as relates to the type of attack. The second set relates to the precise timing of attack.

Next, we test whether insurgent attacks undertaken at higher temperatures during the ongoing Afghanistan conflict have been more likely to result in battlefield fatalities for their perpetrators than those undertaken at cooler temperatures. This outcome would be expected if insurgents’ use of violence at higher temperatures follows aggressive impulse. Finally, the fourth set of tests confirm that a temperature-aggression relationship manifests attitudinally in a conflict setting by measuring ambient temperature and attitudes toward the use of violence among combat-age male citizens in Baghdad during the recent Iraq War.

3.1 Attack-Temperature Covariation

Detailed data on insurgent violence collected by U.S. forces during the recent Afghanistan and Iraq wars paired with data on temperature and relevant covariates provide an opportunity to empirically test hypotheses relating temperature to insurgent violence. Covariation in daily insurgent attack and temperature levels can be evaluated to determine whether insurgents undertake greater numbers of attacks on hotter or cooler days. If such a relationship exists, we can further establish whether its estimated functional form is linear or curvilinear.

**Hypothesis 1** *Combatants attack more frequently at higher temperatures.*

The extant literature remains divided over whether violence displays decreasing
returns to temperature above a threshold. Laboratory and observational data in support of such a relationship cluster around an inflection point of 90°Fahrenheit.

**Hypothesis 2** *Attack frequency increases up to a threshold temperature above which it decreases.*

### 3.2 Attack Frequency By Type

Strategic considerations can moderate aggressive tendencies provoked by specific temperatures. When carrying out attacks that are closely directed by senior combatants – attacks, for instance with predetermined targets and dates – insurgents should show little or no response to temperature. On the other hand, individual insurgents whose manner of attack provides significant autonomy over decisions such as when and how intensely to engage enemy targets should vary their behavior with temperature.

Whether attacks over which individual combatants exercise significant discretion vary with temperature while those subject to organizational constraints do not can be identified by exploiting variation in daily temperature and insurgent attacks in which specific weapons are employed. Weapons employed by insurgents during the Afghanistan and Iraq wars varied in their characteristics, which can be divided into two general classes for this purpose.

The first class is highly mobile weaponry, which is subject to the fewest institutional constraints. It includes small arms consisting, for instance, of pistols and automatic and semi-automatic rifles. Insurgents enjoyed significant discretion in the use of these weapons, which are designed to be fired by a single individual and are accordingly small and mobile. They can be rapidly and repeatedly directed against both stationary and mobile targets. While these weapons can be employed during highly coordinated offensive measures such as planned ambushes, their use was not restricted to such organizational engagements during these conflicts. If individual
combatants are influenced by temperature as posited by the affective stimulus theory, temperature and frequency of these least organizationally constrained attacks should covary.

The second class is institutionally constrained, encompassing vehicle-borne improvised explosive devices, suicide vests, and other weapons whose use was usually strictly governed by the insurgent organizations. Unlike mobile weaponry, many of these are single-use and, especially in the case of car bombings and suicide vests, are typically used in highly planned operations in which the location and timing of the attack are determined in advance by senior combatants. While an individual combatant will ultimately exercise responsibility for the detonation, this discretion exists within narrow temporal and geographic bounds proscribed by operational planning. The simultaneous bombings of the United Nations’ headquarters, Jordan’s embassy, and Iraq’s parliament were all perpetrated with such weapons (Roberts 2003; bbc 2003, 2007).6

If temperature acts on the production of insurgent violence by affecting only individual combatants, the frequency with which such organizationally constrained attack types are employed should not vary with temperature, except perhaps through unmeasured covariates.

Hypothesis 3 Frequency of attack types over which individual combatants exercise discretion varies with temperature; those subject to organizational constraints do not.

3.3 Attack Frequency By Timing

The psychological literature provides a potential alternative explanation for an observed temperature-violence relationship. The skeptical counter-point to observa-

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6This category includes insurgent attacks that are highly strategic even if the weaponry used does not fall into this category, such as assassinations.
tional studies of crime patterns is known as “routine activity theory” and emphasizes the potential for human interaction to turn violent when, as Rotton and Cohn (2000b) argue “contact appears to be a necessary [even if insufficient] condition for violence and aggression” (p. 652). It is plausible that the behavior of insurgents’ targets vary with temperature could therefore account for an observed relationship between temperature and wartime violence.

Strategic interactions and incidental emotional effects are not mutually exclusive, but they are empirically distinguishable. An implication of the strategic interaction explanation is that the relationship should exist for targets whose movement is a function of temperature.

**Hypothesis 4**  *Frequency of attacks against moving targets vary with temperature.*

A second approach exploits information about the timing of the insurgent attacks. During daylight hours, troops observing a population-centric counterinsurgency doctrine would seek contact with civilians. If civilians were more likely to gather in public places in particular temperature ranges, counterinsurgents may be expected to have left their forward operating bases during such periods, rendering themselves more vulnerable to attacks. However, nighttime counterinsurgent patrols in and around Baghdad are unlikely to be correlated with temperature. First, a nighttime curfew was in effect in Baghdad for the entirety of the study period. Civilians found in violation faced the potential use of deadly force (Mansoor 2008). Because civilian movement was constrained, nighttime counterinsurgent patrols in the city are unlikely to have varied with civilian movement. Second, supply convoys traveling at night, which accounted for much of the counterinsurgent’s nighttime activities, did not vary their activities with temperature. Rather the opposite occurred: the convoys were susceptible to IED attacks, and were therefore directed by the military
to “avoid establishing regular patterns of movement” and to “create irregular patterns in routes, convoy composition and organization, vehicle speeds, and convoy timing” (ALSA 2014: p. 52).

Following the strategic interaction explanation, nighttime attacks should not vary with temperature because patrol movement is effectively held constant. However, nighttime temperatures vary across time and Iraqi insurgents remain active at night. If incidental emotions contribute to patterns of attack, variation in temperature at night and attacks using the least organizationally constrained weaponry should be observed. However, no such relationship should be observed with respect to roadside bombs.

**Hypothesis 5** Frequency of organizationally unconstrained attacks varies with temperature at night.

### 3.4 Insurgent Fatalities

If elevated ambient temperature prompts combatants to engage in conflict with greater impulse, we expect such behavior to generate greater costs for the aggressing party than it would otherwise incur. Specifically, the incidental emotions literature emphasizes that these emotions operate on a subconscious level. At higher ambient temperatures, we expect insurgents’ aggressive impulses to arise without conscious awareness. Therefore, we expect their decisions to attack with (and only with) the least institutionally constrained weaponry at higher temperatures to generate greater costs. For instance, a more impulsive attack might be carried out when the insurgent is in a position of greater risk.
Hypothesis 6 Only attack types over which insurgents exercise individual autonomy are more likely to result in insurgent fatalities when carried out at higher ambient temperatures.

3.5 Support for Violence

Most fundamentally, individuals exposed to or involved in the production of conflict should express levels of hostility that vary with their exposure to ambient temperature. We expect that reported support for attacks on foreign counterinsurgents will vary with ambient temperature.\(^7\)

Hypothesis 7 Individuals’ expressions of hostility vary with ambient temperature.

4 Data

We introduce our primary datasets here.

4.1 Insurgent Violence

Data on insurgent violence comes from three sources. Throughout the Afghanistan and Iraq wars, international forces and their local partners maintained records of significant activities (SIGACTs). These include instances of insurgent violence that engaged international and/or Afghan/Iraqi forces directly (e.g. an improvised explosive device (IED) attack on an American patrol) or which these forces observed (e.g. an attack on civilians by insurgents). For this project, we utilize two distinct

\(^7\)Following the large and well established body of evidence in psychology linking emotions to individuals’ judgments and behaviors, we expect this hypothesis to be true so long as such individuals’ conscious attention is not directed toward temperature’s effect on their affective state.
Iraq War SIGACTs datasets and one comprehensive SIGACTs dataset covering the Afghanistan War.

All three datasets share particular characteristics. They all include the precise, geo-referenced location of each recorded insurgent attack, expressed in military grid reference system (MGRS) coordinates. Thus, the location of each attack can be identified within several meters of accuracy. In addition, each set includes the date on which each such attack occurred as well as the general category of attack ("direct fire," "indirect fire," and "improvised explosive device"). The datasets differ in several key respects that are central to the empirical tests later introduced. We describe these differences here.

For the Iraq War, a limited set of SIGACTs data covering the period from February 2004 to February 2009 was originally obtained and released by Berman et al. (2011b) (release I). These data include precise details on the specific weapons type used in attacks carried out against international and Iraqi forces. For instance, an attack perpetrated by an insurgent using a rocket-propelled grenade is identified as such in addition to being assigned to the more general classification of "direct fire". (Attacks using rifles and other small arms would also qualify as direct fire attacks.)

In 2014, the Pentagon released to the authors its full dataset of Iraq war SIGACTs, which covers the period from December 2003 through the end of December 2011, when American forces completed their withdrawal from Iraq (release II). We are introducing this dataset of 253,286 observations to the academic community for the first time. Unfortunately, the more specific attack-type description is absent from the complete Iraq War dataset. However, the second dataset contains several variables that the first does not, including the actual time of insurgent attack.

For the ongoing Afghanistan conflict, Shaver and Wright (2016) secured and prepared the SIGACTs data. Unlike both Iraq SIGACTs datasets, this set includes details on the outcomes of attacks, including whether a given attack resulted in one
or more fatalities to each party associated with each such event. For instance, an IED
attack carried out by insurgents that resulted in civilian and Afghan military deaths
would separately indicate both outcomes. Although the data covers most years of the
ongoing conflict, we employ data covering the period between January 2010 through
October 2014, during which the International Security Assistance Force (ISAF) led
by the United States consistently tracked these casualty outcomes.

We focus specifically on two general classes of outcomes that can extracted from
these data. The first of these involves attack frequency, which can be sub-divided into
a wide variety of outcomes including the frequency of attacks involving weaponry are
most and least organizationally constrained as well as the frequency of particular
attacks by time of day. The second class includes individual instances of insurgent
casualties.

4.2 Iraqi Civilian Attitudes

Survey response data reflecting civilian attitudes toward the use of violence and a
wide variety of other topics was collected by the Independent Institute for Adminis-
tration and Civil Society Studies (IIACSS), a local survey firm operating under U.S.
military contract, throughout the Iraq War. The survey initiative solicited responses
from approximately 175,000 citizens who reside across Baghdad’s ten neighborhoods
(mahalas), themselves divided into the 467 survey blocks depicted in Figure 1. The
firm collected information about respondent attitudes and demographics including,
most notably, their attitudes toward the use of violence against the coalition of multi-
national forces led by the United States. The data was first introduced by Klor et al.
(2016).
4.3 Meteorological Variables

The U.S. Government’s National Climatic Data Center provides individual (day- and hour-level) time series datasets that include ambient temperature and various meteorological covariates including visibility, wind speed, maximum sustained wind speed, precipitation, dewpoint, and cloud cover collected by individual weather stations around the world. We match individual station data to each of the cities and districts in our study.

5 Empirical Testing Strategies

In this section, we carry out three general sets of statistical tests relating ambient temperature to 1) the intensity of insurgent violence, 2) insurgent fatality likelihood, and 3) the hostility of civilian attitudes.

Our overall research strategy establishes evidence in favor of our theory in two
distinct ways. First, we test whether a series of distinct but directly observable implications of incidental emotional effects find consistent support in the empirical results. The second relates to causal identification. The nature of the relationship between temperature and violence levels, fatality likelihood, and, separately, hostile attitudes precludes simultaneity, and causal interpretation is valid so long as no omitted variables bias our results. Because each of the three general sets of tests we carry out vary significantly from one another in both context and units of analysis used, potential confounders from any given set are unlikely to apply to the others. For example, we have previously described the potential confounding influence of target movement, which might be correlated with temperature and insurgents’ decision to attack.

In our second set of tests, we assess the likelihood that an insurgency suffers one or more fatalities at different temperature levels. For these tests, the decision to attack has already been made, rendering irrelevant all variables related to the choice to engage. Target movement should not, therefore, affect fatality likelihood. Similarly, in our last set of tests associating daily temperature with hostility expressed by Iraqi males interviewed in their homes, it is unlikely that target movement would affect temperature’s relationship to aggressive attitudes.

5.1 Temperature and Attack Frequency

The first set of tests associates temperature and insurgent violence during the Iraq War in three distinct ways. First, we analyze temperature’s association with specific attack types. Because release I of the Iraq SIGACTs dataset includes specific information on attack types but not the precise time of day at which such attacks were carried out, we perform this analysis at the day-level. Specifically, we compare temperature’s association with: the least organizationally constrained attacks; the most organizationally constrained attacks; and roadside bomb attacks.

Second, using data from SIGACTs release II, we carry out a variation of this
analysis at the hour level. While release II includes only general categories of insurgent violence (including direct fire and roadside bomb attacks), we know from release I that direct fire attacks consisted overwhelmingly of small arms attacks. We therefore compare direct fire as a proxy for the least organizationally constrained attacks with roadside bomb attacks. This approach has two benefits. First, in analyzing these relationships at the hour level, we associate temperature and insurgent violence at a temporal (near immediate) level that corresponds closely to the influence of incidental emotion. Second, at the hour level, potential day-level confounders are eliminated. This approach does not allow comparison between the least and most organizationally constrained attacks. For this reason, we conduct both sets of tests in the expectation that they will estimate similar relationships between temperature and our outcomes of interest.

Finally, we associate temperature with direct fire and roadside bomb attacks at the hour level during only nighttime hours in Baghdad that were consistently covered by curfew. Qualitative evidence strongly suggests that civilian movement during this period was effectively fixed and that military movement was far more likely to occur at randomized times and along randomized routes than during the day. This test serves as an additional robustness check against the possibility that target movement is influencing test results.

5.1.1 Day-Level Analysis

To estimate a relationship between temperature and insurgent violence by type, we construct two independent time series for the Iraqi cities of Baghdad and Basrah.\(^8\) We select these two cities because the greatest number of relevant controls were available for them. Together, they capture a large portion (approximately 42\%) of all recorded

\(^8\)For each city, we construct the longest time series possible given data availability. For Baghdad, the time series covers the period from 2005-01-01 to 2009-02-24. For Basrah, this period runs from 2004-02-04 through 2008-02-17. Both series cover the period of most intense fighting during the war.
Because insurgent attacks are measured in counts, we separately use poisson, quasi-poisson and negative binomial regression models to generate associations between the variables of interest. Our primary estimating equation is:

\[ E(Y_{t,i} | \sum_{j=1}^{n} Y_{t-j,i}, D_{t,i}, V_{t,i}) = e^{(\sum_{j=1}^{n} \varphi_j Y_{t-j,i} + \beta D_{t,i} + \gamma D_{t,i}^2 + \xi V_{t,i} + \phi v)} , \]

where \( t, v, \) and \( i \) denote days \( \{1, \ldots, m\} \), weeks \( \{1, \ldots, n\} \), and cities \( \{1, \ldots, p\} \), respectively. The least organizationally constrained attacks are denoted by \( Y_{t,i} \), and daily mean temperatures are given by \( D_{t,i} \).

This non-monotonic model allows for diminishing returns to temperature and thereby tests hypotheses 1 and 2. Because temperature is serially correlated, to account for the possible influence of correlation between previous temperature values and that of present violence, the vector \( \sum_{j=1}^{m^*} \beta_j D_{t-j,i} \) is included in the model. Similar logic applies to previous violence values, which may affect the levels of violence insurgents produce in the present period. This is captured by the vector \( \sum_{j=1}^{m^*} \alpha_j Y_{t-j,i} \). The value \( m^* \) is selected from among possible lag lengths \( m \) that minimizes the Bayesian information criterion score. Week fixed effects minimize possible omitted variable bias that the controls themselves do not eliminate.

Finally, the vector \( V_{t,i} \) contains time-variant, city-level control variables, which are described in turn:

Additional Insurgent Violence Types: Other types of insurgent violence (for instance, indirect fire and IED attacks) are likely to be correlated with small arms attacks and might also be correlated with temperature. This controls for all other types of violence produced by insurgents throughout the study period. We also include vectors of each of these variables lagged (again for the period that minimizes the Bayesian information criterion score).

Hours of Daylight: Longer days are warmer. To account for the possibility that more (or fewer) attacks occur in warmer weather because greater numbers of daylight
hours affect insurgents’ opportunity to attack, we include daily daylight hours in the model (Astronomical Applications Department).

**Meteorological Conditions:** Some insurgent tactics may be influenced by weather patterns related to temperature. For instance, sandstorms reportedly provided cover to insurgents firing rockets and mortars against international positions in Baghdad (Samuels 2008). Vector $V_{t,i}$ therefore includes data on visibility, wind speed, maximum wind speed, precipitation, and dew point.\(^9\)

**Hours of Power:** Temperatures in Baghdad and Basrah reach extreme highs. During the study period, maximum temperatures extended into the 120s°F. As temperatures increased, especially at such high levels, electricity demand for cooling is likely to have increased concurrently. The Iraqi Government and its international partners were unable to maintain a regular supply of electricity during the study period. Community dissatisfaction with the government’s inability to supply electricity, particularly during warmer periods when lack of electricity may have been most salient, may have facilitated an increase in insurgent attacks either by diminishing the willingness of community members to share intelligence about insurgents with Iraqi and international forces or by increasing their motivation to participate in the insurgency. To contend with this possibility, we control for the number of hours of power supplied per day (Shaver and Tenorio 2015).

**Seasonal Factors:** Early findings associating ambient temperatures with violent crime levels were initially challenged on the basis that seasonal factors might account for statistical results: “temperatures are highly related to seasonal events such as vacation time, students being out of school, and alcohol consumption, events that might influence crime rates” (Anderson 1987). While patterns of alcohol consumption

\(^9\)These variables are defined as follows: visibility: ‘mean visibility for the day in miles to tenths’; wind speed: “[m]ean wind speed for the day in knots to tenths”; maximum wind speed: “[m]aximum sustained wind speed reported for the day in knots to tenths”; precipitation: total “rain and/or melted snow... reported during the day in inches and hundredths”; and dew point: “[m]ean dew point for the day in degrees Fahrenheit to tenths” (National Climatic Data Center; Manual).
are not appreciably relevant to patterns of insurgency in predominately Muslim Iraq, whether schools are in session may be one such confounding factor. There is some evidence from modern insurgencies that students in recess are recruited to assist insurgents (O’Connell and Benard 2006; Ki-moon et al. 2013). Nor can we discount other seasonal factors. The model’s week fixed effects generate estimates through within-week comparisons, effectively controlling for all potential seasonal factors.

Next, we twice replicate this exercise for the most organizationally constrained violence and roadside bomb attacks as the outcomes of interest. If temperature affects insurgent violence by influencing combatants’ aggressive impulses, there should be little to no effect of temperature on the most organizationally constrained attacks. And if a relationship between temperature and insurgent violence is driven by target movement, it should manifest in a clear correlation.

Mean expected counts of insurgent violence for the range of annual average temperature values observed in the study data\(^{10}\) are calculated as follows: \(\mu = 1/n \sum_{i=1}^{n} (e^{X^T_{t,i}\phi})\) \(\forall d \in [5^\circ C \text{ and } 50^\circ C]\), where \(X^T_{t,i}\phi = \varphi Y_{t-j,i} + \beta D_{t,i} + \xi V_{t,i} + \phi_v\). We generate confidence intervals at the 95% significance level with a quasi-Bayesian Monte Carlo simulation. As a robustness check, we use ordinary least squares regression to estimate these relationships with an autoregressive model.\(^{11}\)

\(^{10}\)To ensure that rarely observed temperature values do not skew results, we generate results with and without these most extreme values. Results are effectively unchanged by this decision.

\(^{11}\)Specifically, we test the following equation \(Y_{t,i} = \vartheta D_{t,i} + \varphi D^2_{t,i} + \sum_{j=1}^{m} (\alpha_j Y_{t-j,i} + \beta_j D_{t-j,i}) + \rho V_{t,i} + v_v + e_{t,i}\). In the OLS specification, we log per capita insurgent attacks. Because many observations take a value of 0, we log the per capita incidents after adding one to the variable. While the distributions of incidents of insurgent violence and per capita incidents of insurgent violence are both positively skewed, that of logged per capita attacks is less so and is therefore used in the primary specification. Finally, to account for possible remaining serial correlation amongst the residuals, standard errors presented are both heteroskedasticity and autocorrelation consistent.
5.1.2 Hour-Level Analysis

Using time-stamped data from SIGACTs release II, we next move to an hour-level analysis. We study nearly every moment of the Iraq War, analyzing every hour of the 2,556 day period between January 1, 2005 and December 31, 2011, the day on which U.S. forces formally exited from the country (restricting focus to Baghdad, for which we were able to obtain the longest hourly time series).

Temperature is hypothesized to affect aggression quickly. Adopting the hour as the unit of analysis allows us to test for near-immediate associations between temperature and violence. The approach also excludes the biasing influence of a wide variety of potential unobserved confounders at the day-level analysis. As with the day-level analysis, we test the following non-monotonic equation using count models:

\[
E(Y_h | \sum_{j=0}^{23} (Y_{h-j}, D_h, M'_h)) = e^{(\sum_{j=0}^{23} (\alpha_j Y_{h-j} + \theta_j D_h + \beta_j M'_h) + \nu_d)}, \text{ where } h \text{ and } d \text{ denote hour of the day and date, respectively.}
\]

Insurgent violence given by \( Y \), where \( t \) denotes violence type: \{direct fire and roadside bomb attacks\}. \( D \) denotes hourly temperature. \( M \) is a vector of those meteorological variables collected by weather stations at the hour level: wind speed, visibility, dew point, and sky cover.\(^{13}\) We include vectors of lagged vectors (for each hour of the past twenty-four hours) of each variable to account for the possible influence of correlation between previous temperature, meteorological, and violence values and that of present violence. Finally, we include time-of-day and week fixed effects so that inferences are drawn by comparing variation in temperature and violence that occurs within a single week at a particular location.

\(^{12}\)At the hour level, observations mostly frequently assume values of 0 and 1. Therefore, as a robustness check, we also replicate this analysis using logistic regression. In that case, we create a binary attack variable, which assumes a value of 1 if one or more attacks occurred on a given hour and 0 otherwise.

\(^{13}\)Specifically, these variables are defined as follows: wind speed: “wind speed in miles per hour”; visibility: “visibility in statute miles to nearest tenth”; dew point: “dew point in farenheit”; and sky cover: a factor variable that indicates whether on a given hour sky cover is “clear”, “scattered”, “broken”, “overcast”, “obscured”, or “partial[ly] obscure[d]”.

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5.1.3 Hour-Level Nighttime Analysis

A stricter testing strategy involves assessing whether the hypothesized temperature-direct fire relationship manifests at the hour-level during nighttime curfew period in Baghdad when civilian movements that might otherwise affect insurgent targeting are effectively held constant.

In this test, we also compare temperature’s association with IED attacks. If target movement is a function of temperature at nighttime, then a relationship between these variables should emerge. We use the same estimating equations described above and use count models as well as logistic regression (with the appropriately transformed outcome variables). Based on a review of the curfew hours imposed throughout the war, we restrict our sample to hours occurring between 11:00 p.m. and 5:00 a.m.  

5.2 Temperature and Insurgent Casualties

Do insurgent attacks carried out at higher temperatures involve a degree of impulsiveness that render them tactically disadvantageous to the perpetrator? The second set of statistical tests associates temperature and insurgent fatalities during the Afghanistan War. Specifically, we associate temperature on the day of an attack with whether one or more of the insurgents were killed in the process of carrying out a given direct fire attack.

Logistic regression tests the estimating equation presented in the preceding day-level analysis, with key modifications. First, we adopt individual insurgent direct fire attacks as the unit of analysis. Second, we replace the outcome variable with an indicator of whether one or more insurgent fatalities resulted during a given insurgent attack.

\[14\] Although curfew hours varied across the conflict, this range was consistently covered.
Observations are drawn from Afghanistan’s fifteen most violent districts, which account for approximately half of all ISAF-documented insurgent attacks that have occurred in the country during the ongoing conflict.\(^{15}\)

Adopting the insurgent attack as the unit of analysis (rather than aggregating to the district level) avoids estimating a mechanical correlation between temperature and fatality incidence that would occur simply because there is more insurgent violence at higher temperatures. Instead, under this approach, there is no need to control for quantity of violence.

We then replicate this test, adopting individual insurgent roadside bomb attacks as the unit of analysis for two purposes. First, this test acts as a placebo check. Roadside bomb attacks are resistant to impulsive aggression because these weapons can only be triggered when targets are near the emplaced device. There should be no relationship between temperature and roadside bomb fatalities. Second, it addresses possible confounding variables relating to the physiological likelihood of death at higher temperatures. For instance, if insurgents are less effective in staunching blood loss at higher temperatures, then a relationship between insurgent fatalities and temperature might be driven by such dynamic. If such a relationship exists, it should manifest with respect to roadside bomb attacks as well. The absence of a relationship between temperature and IED fatality likelihood would rule out this possibility for direct fire attacks.

5.3 Temperature and Aggressive Civilian Attitudes

The final set of tests associates temperature and the expressed hostile attitudes of Iraqi males surveyed throughout the war. They provide a direct test of the incidental emotion.

\(^{15}\)We limit the set of observations we use to these districts because temperature data is not available for all areas of the country.
If temperature’s effect on violence is driven by changes in perpetrator aggression, then a corresponding relationship between ambient temperature and this variable should also be observed. The detailed IIACSS survey data provides an opportunity to empirically test this expectation. In particular, we expect that when indicating whether they support violent attacks on American forces, respondents are more likely to answer in the affirmative at higher ambient temperatures.

Specifically, we test the following equation using logistic regression to generate an association between Baghdad’s recorded daily high temperature and citizen support for violent attacks on international forces in the country:

\[
P(Y_i = 1|T_j, S_i) = \logit^{-1}(\alpha_i + \beta_1 T_{t,i} + \beta_2 T^2_{t,i} + \gamma Z_i + \psi V_{j,i,k} + \rho_j + \upsilon_k).\]

Because we seek to assess the effect of temperature on aggressive ideation in individuals most representative of combatants, we let \(i\) represent male respondents \(\{1, \ldots, p\}\) of fighting age. \(j\) and \(k\) denote Baghdad neighborhoods \(\{1, \ldots, q\}\) and month of response \(\{1, \ldots, r\}\), respectively.\(^{16}\) \(Y_{t,i}\) is a binary indicator assigned a value of 1 for respondents who answer affirmatively the question “Do you support attacks against: Multi-National Forces?” and a value of 0 otherwise.\(^{17}\) Daily temperature high is denoted \(T_k \in \mathbb{R}\). \(Z_i\) is a vector of individual respondent controls and include each respondent’s reported income, education level, age, and household size. Neighborhood fixed effects control for time-invariant characteristics specific to

\(^{16}\) Month fixed effects are used instead of week fixed effects. Surveys were carried out during fixed periods during each month, leaving limited comparable within-week variation in responses. Nevertheless, estimates on temperature and temperature squared in a week fixed effects model are statistically significant at the 99% level.

\(^{17}\) Although direct questions on sensitive topics can elicit biased responses, that is not a concern in this case. First, respondents were permitted to provide an answer of “Don’t Know” to this question. Even with this option, more than 50% of participants nonetheless provided a direct (“yes” or “no”) answer to the question. Therefore, there is no indication that respondents sought to avoid answering this question. Second, although American forces financed the initiative, IIACSS’ Iraqi enumerators introduced themselves to respondents as unaffiliated researchers, which should have alleviated concern over the destination of the survey data. Finally, even if respondents feared answering this question because of possible retaliation by international/federal government forces or insurgents, this should result in a shift in the baseline response but not in changes in response to temperature level.
each neighborhood. Similarly, by absorbing across-time variation, month-of-response indicators reduce potential bias by permitting estimates of interest to be derived on the basis of within-month date variation.

Predicted probabilities of support for attacks on international forces for the range of temperatures observed within the study data are calculated $\mu = 1/n \sum_{i=1}^{n} \left( e^{(X^T_i \phi)}/(e^{(X^T_i \phi) + 1}) \right) \forall \text{temperature } h \in [50 \text{ and } 116]$. Quasi-Bayesian Monte Carlo simulation generate confidence intervals at the 95% significance level.

A second test verifies the results. Although survey respondents were interviewed in their homes, the general dearth of electricity throughout the Iraq War ensures that for most respondents, daily measures of ambient temperature closely approximate actual temperature levels to which individuals were exposed during interviews. However, wealthier citizens were more likely to have access to private generators and fuel with which to power fans or air-conditioning units, among other household appliances. If the inclusion of wealthy citizens in the original sample attenuated the results because these individuals were not actually subject to the treatment, we expect intensified results when replicating this exercise with a subset of respondents that excludes those who report the highest income levels.

Because coefficients of interest in generalized linear models may be biased by the inclusion of fixed effects, we also test the equivalent linear probability models, clustering standard errors at the neighborhood. More stringent tests in which in which survey block and week fixed effects are substituted for neighborhood and month fixed effects produce consistent results.

6 Results

Insurgent violence was widespread across Baghdad and Basrah during the day-level study period. Together, these cities experienced a total of 55,851 major insurgent
attacks (including 21,862 direct fire and 21,767 IED attacks). The fifteen most violent Afghan districts included in the study experienced a total of 44,172 direct fire and 11,927 IED attacks during the study period. Of the 44,284 combat-age male survey respondents who provided responses to all relevant questions included in our analysis, nearly 60% expressed support for violent attacks against multinational forces.

During the various study periods and locations, temperatures varied significantly. In Baghdad, mean daily temperatures spanned 36.50°F and 106.50°F, with a mean of 75.25°F. Hour-level temperatures ranged from 28°F to 124°F, with a mean of 76.62°F. Finally, across all days on which surveys were carried out in Baghdad, temperature minimum, maximum, and mean values were 42.70°F, 79.00°F, and 103.20°F, respectively. In Basrah, mean daily temperatures were slightly higher, ranging from 40.20°F to 104.40°F with a mean of 77.94°F. In Afghanistan, temperatures were much cooler in some of the sampled districts. Across all fifteen districts, temperatures reached a low of 12.10°F, a high of 106.00°F, and had a mean of 74.28°F.

The statistical tests find, in brief, that ambient temperature affects: 1) the production of the least organizationally constrained violence during conflict, 2) the likelihood that insurgents perish when carrying out direct fire attacks; and 3) the likelihood that surveyed Iraqi males express support for violence against multinational forces. All three sets of results are consistent with the hypothesis that temperature’s effects are positive but diminish at particularly high temperatures. Remarkably, the relationship between temperature and all three outcomes are similar both in terms of the estimated functional forms. Finally, the magnitudes of the estimated effects are substantial. These test results demonstrate that temperature’s effects on aggressive impulse are not only identifiable but give rise to meaningful changes in key wartime outcomes.
6.1 Attack Frequency – Day- and Hour-Level Results

Mean daily temperature and small arms fire are positively correlated for all temperature values below 83°F. The relationship attenuates above that temperature. The hour-level analysis is consistent with this result and estimates that direct fire attacks increase in temperature until somewhere between 91°F (logistic regression estimate) and 100°F (count model estimate) and attenuate thereafter.

As expected, we observe no statistically significant relationship between mean daily temperature and the most organizationally constrained insurgent violence. In the day-level analysis, there is no statistically significant relationship in temperature and roadside bomb attacks. Hour-level results suggest that roadside bomb attacks consistently decrease in temperature for all values above 70°F. These results provide clear support that the observed relationships between small arms and, separately, direct fire attacks and temperature are not driven by target movement. Indeed, to the extent that the least organizationally constrained attacks are influenced by target movement, results suggest that target movement biases our results downward. Hour-level nighttime results are consistent with these results – direct fire attacks are estimated to increase with nighttime temperature while roadside bomb attacks decrease. Finally, results are robust across all count, ordinary least squares, and logistic regression models with which they are generated.

Regression results are reported in tables 1, 2, and 3. Graphically, mean attack counts and predicted probabilities of attacks are presented in figures 2 and 3.

Substantively, the results suggest that ambient temperature’s effect on insurgent violence is significant. For instance, drawing from the hour-level results, moving from a temperature of 60°F to 100°F is associated with a more than 30% increase in the number of direct fire attacks.
Figure 2: This figure contrasts estimated mean attack counts across types of insurgent violence as a function of mean daily temperatures in Baghdad and Basrah using data for most days of the Iraq War (with 95% Confidence Intervals). Consistent with findings from criminology and psychology, the least organizationally constrained attacks (those primarily involving pistols and rifles over which individual combatants exercise the greatest discretion) tend to increase in temperature, then attenuate beyond a certain threshold. The most organizationally constrained attacks (for instance, car and suicide bombings) show little relationship with temperature. The absence of a positive relationship between mean daily temperature and IED attacks, directed almost exclusively against moving targets on roadways, provides strong evidence that a general positive relationship between temperature and violence is not driven by movement in the target(s).
Figure 3: This figure contrasts the association between hour-level temperature and direct fire and, separately, IED attacks in Baghdad using data for nearly every hour of the Iraq War (with 95% Confidence Intervals). The upper left image show that temperature is generally linearly associated with direct fire attacks, which consist primarily of attacks carried out with weapons over which combatants exercise the greatest discretion in terms of the timing of their use. The upper middle image reveals this relationship for IED attacks. The absence of a positive relationship between hourly temperature and IED attacks provides strong evidence that a general positive relationship between temperature and violence is not driven by movement in the target(s). The bottom left and center images depict these same relationships using only data from nighttime curfew hours. Finally, the four smaller images in the right column show these same relationships expressed in the predicted probability of attack when estimated with logistic regression.
6.2 Insurgent Fatalities

Insurgents who engaged ISAF and/or Afghan government forces in direct fire combat at higher temperatures were more likely to die than those who did so at cooler temperatures. Consistent with the daily and hourly level insurgent violence results, this relationship attenuates beyond a mean daily temperature just below 80°F. This relationship does not exist for IED attacks, for which the predicted probability of insurgent fatalities is constant across temperatures and statistically insignificant.

In moving from the coolest mean daily temperatures to those around 80°F, the predicted probability of insurgents suffering at least one fatality for a given direct fire attack increases by approximately 4 percentage points. In Afghanistan, where ISAF forces have documented approximately 50,000 incidents of direct fire attacks during the ongoing conflict, this relationship suggests that a substantial number of Taliban fighters are likely to have been affected. This finding provides a separate piece of evidence consistent with a direct psychological effect of temperature on conflict. Results are reported in table 4 and figure 4.

6.3 Hostile Attitudes

Mean daily temperature and support for the use of violence against international forces in Iraq are positively associated. Consistent with the previously reported results, attack support appears to diminish above the mean daily temperature of 85°F. As expected, this relationship is entirely dependent upon income level. When all fighting-age male respondents are included in the sample, irrespective of stated income level, results are attenuated both in terms of statistical and scientific magnitude. The results are more pronounced when individuals who indicate earning $300 per month or more (roughly, the top quarter of respondents and those most likely to have access to air-conditioning units or fans within their residences) are excluded from the analysis. The effect of temperature disappears entirely in an analysis of only
Figure 4: This figure contrasts the predicted probability that insurgents suffered at least one fatality when carrying out direct fire and, separately, IED attacks as a function of mean daily temperatures in Afghanistan’s fifteen most deadly districts during the five year period of most intense fighting during the ongoing Afghanistan conflict (with 95% Confidence Intervals). The image on the left reveals that insurgents were more likely to sustain fatalities when carrying out direct fire attacks at higher temperatures. In contrast, no such relationship is observed with IED attacks.

In moving from the coolest mean daily temperatures to those around 85°F, the predicted probability of an Iraqi male expressing support for violence against multinational forces increases by somewhere between 10 (full sample results) and 15 (sample subset to exclude individuals most likely to have access to cooling technologies) percentage points.

Results are reported in tables 5 and figure 5.
Figure 5: This figure depicts the predicted probability of expressed support for violent attacks on multinational forces by combat-age Iraqi males surveyed throughout the recent Iraq War as a function of mean daily temperature (with 95% Confidence Intervals). The largest image on the left includes all 44,284 male respondents and shows that expressed hostility toward American and other international forces increased predictably with temperature. Consistent with a psychological explanation for this phenomenon, the upper right image shows that this relationship intensifies when respondents most likely to have had access to cooling technologies in their homes at the time of interview are excluded from the sample (the top quartile of income earners). In contrast, as the bottom right-hand image depicts, when only these top income earners were included in the statistical analysis, temperature’s relationship with expressed hostility disappears.
6.4 Scope

Assuming that entry into an insurgent organization requires more than 24 hours, the study’s design allows us to draw inferences about the intensive margins of violence as a function of daily temperature. We measure changes in the frequency of attacks carried out by a fixed number of insurgents willing and able to commit violence against their adversary.\footnote{An individual can carry out an attack without organizational support, but the odds of operational success are smaller.} Our study is not related to the recruitment of new fighters to violent organizations or previously peaceful groupings opting for violent tactics. That is, we do not measure extensive marginal effects.

The case-specific nature of the data raises questions relating to the external validity of these findings. The events recorded in the database reflect the actions of an insurgency in a highly asymmetric contest with counterinsurgent forces. If anything, we would expect temperature’s effect on insurgent violence to be less pronounced in such asymmetric situations, where counterinsurgents with access to airpower, heavily armored vehicles, and precise artillery may force insurgents to adopt a greater level of discipline than they otherwise would in more symmetric conflicts. Furthermore, sampling from Iraq’s major urban settings serve as a hard test: that such results obtain in a setting with relatively high average daily ambient temperatures and are nevertheless consistent with findings connecting temperature and violent crime in areas where such temperatures tend to be much lower suggests that the theorized phenomenon is not an artifact of particular settings but instead a consistent feature of anthropogenic violence.

As with the observational psychological research that established the temperature-violence connection, we also test the wartime relationship in urban settings in Iraq and Afghanistan. Rural combat dynamics may vary, making it difficult to control for the possibility of a tactical incentive to adjust attack patterns to ambient temperature.
6.5 Implications

In the case of violence in insurgency settings, some of the emotional stimuli acting on the combatants may make violent behavior more likely, while others may diminish this likelihood. Together, emotional factors enhancing or inhibiting propensity for violence combine with strategic factors doing the same, culminating in the observed violent act – or the unobserved restraint. In turn, these individual-level effects aggregate to determine the type and frequency of violence in a war. Depending on the circumstances, this could set the course of conflict by influencing the likelihood of escalation and contagion of conflict or by setting in motion events that lead to a reshaping of preferences for the affected actors. The magnitude of the effect challenges the view that “individual motivations alone are unlikely to result in large-scale violence over a long period of time” (Kalyvas et al. 2006: p. 26).

The findings about short-term motivations for violence provides micro-foundational evidence for the observed long-term link between particular climatic and violence. Incorporating the results of 60 prior studies, Hsiang et al. (2013) find that “for each 1 standard deviation (1σ) change in climate toward warmer temperatures or more extreme rainfall, median estimates indicate that the frequency of interpersonal violence rises 4% and the frequency of intergroup conflict rises 14%” (p. 1). This line of inquiry frequently assumes that the effect works through temperature’s economic effects, especially agriculture. The abundance of literature on the violence-inducing effects of temperature at the individual level and the empirical finding that sub-state violence retains its association with temperature in non-agricultural areas of the world combine to suggest that past conflict research may focus too narrowly on only long-term, large-scale mechanisms (Bollfrass and Shaver 2015). Instead, our findings suggest that an observed temperature-conflict correlation in non-agricultural areas of the world partly reflect aggregate and emergent patterns of affective violence and might be incorporated in future models predicting the economic, political, and
social effects of a changing climate.

7 Conclusion

Elevated ambient temperatures induce more aggressive behavior in vehicles, homes, bars, and in the streets. We have demonstrated that this emotional effect persists when individuals are placed in an organized group conflict setting. In datasets of Afghan and Iraqi insurgent attacks on international counterinsurgent forces, attacks whose initiation is in the hands of individual insurgents are strongly correlated with ambient temperatures. Afghan insurgents also suffered higher rates of fatality during these attacks. Attack types subject to greater organizational deliberation and control do not share this correlation. Iraqi military-age males reported higher support for violence at elevated temperature ranges.

The statistically and substantively large contribution of a purely incidental emotion to political violence addresses a core assumption of scholarship on civil war, insurgency, and ethnic violence. Instead of assuming that any observed violence is strategic in nature, the conditions under which violence manifests can be better understood if strategic and emotional motivations are seen to combine to create violent outcomes.

Temperature is not the sole affective contributor to acts of violence and may be responsible for a relatively small amount of wartime violence by itself. The key conclusion is that these findings supply evidence that other emotional stimuli far more integral to conflict than ambient temperature shape the type and frequency of political violence. These remain difficult to measure in observational settings, but we hope our results encourage further investigation and provide cause for caution in assuming that observed acts of violence in political settings arise from higher strategic aims.
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Table 1: Mean daily temperature on 1) the least and 2) most organizationally constrained insurgent attacks and 3) improvised explosive device (IED) attacks during most years of the recent Iraq War. Data from Baghdad and Basrah.

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</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>0.074**</td>
<td>-0.061</td>
<td>0.012</td>
<td>0.067***</td>
<td>-0.045</td>
<td>0.012</td>
<td>0.067***</td>
<td>-0.045</td>
<td>0.012</td>
<td>0.047***</td>
<td>-0.021</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.039)</td>
<td>(0.013)</td>
<td>(0.014)</td>
<td>(0.037)</td>
<td>(0.013)</td>
<td>(0.017)</td>
<td>(0.013)</td>
<td>(0.015)</td>
<td>(0.014)</td>
<td>(0.014)</td>
<td>(0.012)</td>
</tr>
<tr>
<td>Temperature (Squared)</td>
<td>-0.0005***</td>
<td>0.001**</td>
<td>-0.0001</td>
<td>-0.0004***</td>
<td>0.0005</td>
<td>-0.0001</td>
<td>-0.0004***</td>
<td>0.0005</td>
<td>-0.0001</td>
<td>-0.0003***</td>
<td>0.0002**</td>
<td>-0.00003</td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0003)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0002)</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
<td>(0.0003)</td>
<td>(0.0003)</td>
<td>(0.0004)</td>
<td>(0.0004)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>Constant</td>
<td>-8.043***</td>
<td>-4.201</td>
<td>-2.055</td>
<td>-8.006***</td>
<td>-1.798</td>
<td>-1.864</td>
<td>-8.006***</td>
<td>-1.798</td>
<td>-1.864</td>
<td>-3.775***</td>
<td>0.639</td>
<td>-5.489***</td>
</tr>
<tr>
<td></td>
<td>(1.953)</td>
<td>(17,150.890)</td>
<td>(1.466)</td>
<td>(1.719)</td>
<td>(3,467.863)</td>
<td>(1.424)</td>
<td>(2,070)</td>
<td>(4,051.237)</td>
<td>(1.700)</td>
<td>(1.268)</td>
<td>(1.219)</td>
<td>(1.129)</td>
</tr>
</tbody>
</table>

City Fixed Effects: Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Week Fixed Effects: Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Meteorological Controls: Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Hour of Electricity Control: Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Other Violence Controls: Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Vector of Lagged Temperature: Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Vector of Lagged Violence (outcome): Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Vector of Lagged Violence (other type): Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
Observations: 2,348 2,348 2,348 2,348 2,348 2,348 2,348 2,348 2,348 2,348 2,348 2,348
R²: 0.569 0.587 0.932
Adjusted R²: 0.584 0.549 0.902

Note: *p < 0.1; **p < 0.05; ***p < 0.01
Table 2: Hourly temperature on direct fire (DF) and improvised explosive device (IED) attacks during the Iraq War. Data from Baghdad and cover every hour of nearly every day of the entire war period.

<table>
<thead>
<tr>
<th></th>
<th>Negative Binomial</th>
<th>Poisson</th>
<th>Quasipoisson</th>
<th>Logit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DF</td>
<td>IED</td>
<td>DF</td>
<td>IED</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.040***</td>
<td>0.047***</td>
<td>0.040***</td>
<td>0.046***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Temperature (Squared)</td>
<td>-0.0002***</td>
<td>-0.0003***</td>
<td>-0.0002***</td>
<td>-0.0003***</td>
</tr>
<tr>
<td></td>
<td>(0.00003)</td>
<td>(0.00003)</td>
<td>(0.00003)</td>
<td>(0.00003)</td>
</tr>
<tr>
<td></td>
<td>(0.285)</td>
<td>(0.258)</td>
<td>(0.268)</td>
<td>(0.242)</td>
</tr>
</tbody>
</table>

City Fixed Effects: Y Y Y Y Y Y Y
Weather Fixed Effects: Y Y Y Y Y Y Y
Meteorological Controls: Y Y Y Y Y Y Y
Hours of Electricity Control: Y Y Y Y Y Y Y
Other Violence Controls: Y Y Y Y Y Y Y
Vector of Lagged Temperature: Y Y Y Y Y Y Y
Vector of Lagged Violence (outcome): Y Y Y Y Y Y Y
Vector of Lagged Violence (other types): Y Y Y Y Y Y Y
Observations: 58,779 58,779 58,779 58,779 58,779 58,779 58,779 58,779

Note: *p<0.1; **p<0.05; ***p<0.01

Table 3: Hourly temperature on nighttime direct fire (DF) and improvised explosive device (IED) attacks during the Iraq War. Data from Baghdad and cover every hour of nearly every day of the entire war period. Hours of coverage include those from 11:00 p.m through 5:00 a.m., the period consistently covered by curfew during the war.

<table>
<thead>
<tr>
<th></th>
<th>Negative Binomial</th>
<th>Poisson</th>
<th>Quasipoisson</th>
<th>Logit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DF</td>
<td>IED</td>
<td>DF</td>
<td>IED</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.090***</td>
<td>-0.031</td>
<td>0.090***</td>
<td>-0.030</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.030)</td>
<td>(0.027)</td>
<td>(0.029)</td>
</tr>
<tr>
<td>Temperature (Squared)</td>
<td>-0.0004**</td>
<td>0.0001</td>
<td>-0.0005***</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>(0.0002)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
</tr>
<tr>
<td></td>
<td>(0.943)</td>
<td>(1.327)</td>
<td>(0.915)</td>
<td>(1.310)</td>
</tr>
</tbody>
</table>

City Fixed Effects: Y Y Y Y Y Y Y
Weather Fixed Effects: Y Y Y Y Y Y Y
Meteorological Controls: Y Y Y Y Y Y Y
Hours of Electricity Control: Y Y Y Y Y Y Y
Other Violence Controls: Y Y Y Y Y Y Y
Vector of Lagged Temperature: Y Y Y Y Y Y Y
Vector of Lagged Violence (outcome): Y Y Y Y Y Y Y
Vector of Lagged Violence (other types): Y Y Y Y Y Y Y
Observations: 58,779 58,779 58,779 58,779 58,779 58,779 58,779 58,779

Note: *p<0.1; **p<0.05; ***p<0.01
Table 4: Mean daily temperature on insurgent fatalities sustained by Taliban fighters in Afghanistan during 1) direct fire (DF) and 2) improvised explosive device (IED) attacks. Data are from Afghanistan’s fifteen most violent districts between the years of 2010 and 2014.

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>IED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>0.074***</td>
<td>0.046</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.037)</td>
</tr>
<tr>
<td><strong>Temperature (Squared)</strong></td>
<td>−0.056</td>
<td>−0.000</td>
</tr>
<tr>
<td></td>
<td>(0.336)</td>
<td>(0.000)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>−15.681</td>
<td>−51.475</td>
</tr>
<tr>
<td></td>
<td>(790.865)</td>
<td>(21,241.410)</td>
</tr>
</tbody>
</table>

District Fixed Effects: Y
Week Fixed Effects: Y
Time-of-Day Fixed Effects: Y
Meteorological Controls: Y
Other Fatality Controls: Y
Observations: 33,923

Note: *p<0.1; **p<0.05; ***p<0.01

Table 5: Mean daily temperature on combat-age Iraqi males’ expressed support for the use of violence against American and other international forces during the Iraq War. Data were collected from 44,284 men during surveys carried out during most months of the Iraq War.

<table>
<thead>
<tr>
<th></th>
<th>Full Iraqi Male Sample</th>
<th>Top Income-Earners Excluded</th>
<th>Top Income-Earners Only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>0.087***</td>
<td>0.119***</td>
<td>−0.009***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.023)</td>
<td>(0.046)</td>
</tr>
<tr>
<td><strong>Temperature (Squared)</strong></td>
<td>0.003***</td>
<td>0.005***</td>
<td>−0.002*</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td><strong>Insurgent Violence (Past Week Average)</strong></td>
<td>0.0002</td>
<td>0.002**</td>
<td>−0.004***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>−1.338*</td>
<td>−2.557***</td>
<td>2.001</td>
</tr>
<tr>
<td></td>
<td>(0.689)</td>
<td>(0.793)</td>
<td>(1.572)</td>
</tr>
</tbody>
</table>

Neighborhood Fixed Effects: Y
Month Fixed Effects: Y
Meteorological Controls: Y
Demographic Controls: Y
Education Control: Y
Observations: 32,502

Note: *p<0.1; **p<0.05; ***p<0.01
Chapter 2

“It seems intuitively obvious to most observers that such high unemployment [in Iraq] creates unstable social conditions that foster lawlessness, extremism and violence…”


1

Under- and un-employed members of society are frequently inculpated in the production of violence during conflict. A simple explanation of this relationship describes those with limited employment opportunities as angry, disaffected, and prone to engage in affectively motivated violence. The intuitive appeal of this argument is powerful enough that the relationship is often simply assumed.

During the recent Iraq war, for instance, unemployed young men were blamed for much of the insurgent violence. As Michael O’Hanlon, then an adviser to the Iraq Study Group, explained as violence in Iraq surged, stabilizing the country required creating jobs “so the unemployed, disenfranchised, angry 20-year-old Sunni man doesn’t pick up an IED and plant it in the ground…” (C-SPAN 2006). General Raymond Odierno, who would go on to command all U.S. forces in Iraq, argued similarly: “[i]f [Iraqis] can’t get jobs, they will turn on us” (Gordon and Trainor 2012: p. 26). The White House formally adopted a similar position: “Unemployment [in Iraq] is high, which fuels popular dissatisfaction and may generate sympathy for the insurgency… [and] makes some Iraqis more vulnerable to terrorist or insurgent recruiting” (Bush 2005: p. 23, p. 32).

More recently, U.S. State Department officials have argued that defeating Islamic extremism requires “go[ing] after the root causes that [lead] people to join these groups, whether it’s lack of opportunity for jobs… [we can] help them build their economies, so they can have job opportunities for these people” (Harf 2015). The New York Times meanwhile warns that the Islamic State has “no shortage of unemployed
young men who are eager to join the fight” in poor countries within Africa’s Sahel (Schmitt 2016), without offering a logic of participation to substantiate its claim. The National Public Radio warns of growing Islamic radicalization in places like Kosovo resulting from high unemployment rates (Shapiro 2015).

An alternative explanation with some empirical support centers on a theory of opportunity cost. With limited opportunities for licit employment, affected individuals pursue illicit opportunities offering greater compensation. In many conflict settings, violent political organizations are believed to recruit such individuals as mercenaries. This general explanation has received significant academic attention, and several studies focused primarily on areas of Africa where agriculture is a major economic sector have produced results consistent with this general claim.

Yet, firm evidence in support of a general positive relationship between unemployment and violence in conflict settings has yet to be established. Macro-level empirical analyses produce conflicting evidence of such relationship while particular micro-level analyses find in favor of a counter phenomenon: individual combatants tend to be better off socioeconomically than fellow citizens. Alternative theories have been proposed linking unemployment and the incidence of conflict. A theory of information cost holds that the employed are less likely than the unemployed to supply state agents information about insurgents and their activities in exchange for financial reward because they evaluate the potential costs of doing so differently.

I argue that relevant theories of political violence fail to account for a basic but important relationship. A well-established body of scholarship in psychology finds that individuals’ employment status bears meaningfully on their emotional disposition and that their affective (emotional) state\(^1\) frequently and predictably influences their judgments and behaviors. Loss of employment, rather than rendering individuals

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\(^1\)Some psychologists use the terms affect, emotion, and mood interchangeably (Forgas 1992) while others distinguish between these (see, for instance, Schwarz and Clore (2006); Clore et al. (1994)). In this manuscript, I follow the former.
angry and intent on exacting revenge, increases feelings of depression, anxiety and helplessness and the strength of belief in the power of others. Some underemployed members of society may be co-opted by criminal organizations. However, on the whole, these individuals are amongst the most likely to reject the use of violence because they tend to view the effects of violence more pessimistically and to be relatively less desirous of retribution.

In this paper, I draw from previously unreleased data from a major, multi-million dollar survey initiative carried out during most months of the recent Iraq War and find that un- and under-employed Baghdad citizens were amongst the least likely to support the use of violence during conflict. I supplement this finding with a series of statistical results consistent with the central premise of this article that unemployment sways attitudes toward the use of violence by shifting affective disposition. Baghdad’s unemployed citizens were significantly less optimistic than their counterparts and far less likely to indicate that they would engage in a range of behaviors consistent with the hypothesis that they tended to suffer from diminished perceptions of efficacy.

While these findings do not establish an effect of employment status on civilian behavior directly related to violence (e.g. whether an individual elects to join or support an insurgency), they substantiate the general attitudinal tendencies of un- and under-employed citizens toward wartime violence. Previous null findings linking unemployment and wartime violence may reflect competing effects: although opportunity cost dynamics might result in greater proportional numbers of potential fighters in areas with the greatest unemployment rates, the general rejection of the use of violence by citizens in such areas might result in counteracting and potentially counterbalancing behaviors.
2 Dominant Theories and Findings on Unemployment and Conflict

Although the focus of much scholarly attention, the relationship between sub-state conflict and the availability of licit employment opportunities remains a matter of continued academic debate. Empirical analyses have failed to establish a general relationship between these variables. From a social sanctions logic of participation, Humphreys and Weinstein (2008: p. 442) hypothesize that individuals enlist in combat when “[t]hey expect to receive selective incentives from the fighting group.” Insurgent compensation is recognized as one such incentive (de Mesquita 2013). As Bahney et al. (2013: p. 518) explain, at the level of the potential fighter, “political economy theories of crime, insurgency, and rebellion posit some opportunity cost constraint so that the net value of participation must be at least as good as their next best option... That net value may contain a nonpecuniary component, such as soothing personal grievance or gaining prestige, but it also contains monetary rewards.”

A set of empirical findings derived primarily through the study of conflicts on the African continent are consistent with, though not conclusive of, this theory. Miguel et al. (2004) find that negative economic shocks observed across 41 African countries between the final decades of the 21st century increased civil conflict likelihood in those countries. While the mechanism linking these shocks to increased conflict is unidentified, the authors hypothesize that young men in these countries were “more likely to take up arms when income opportunities [were] worse for them in agriculture... relative to their expected income as [fighters]” (Miguel et al. 2004: p. 729). Using detailed croplands data, Shaver et al. (2016: p. 18) produce additional evidence of this mechanism, finding that the “effect of rainfall growth on economic growth is conditional on how much of a country’s territory is used for agriculture dependent on rainfall.”
Burke et al. (2009) similarly observe more frequent civil war outbreak in Africa’s sub-Saharan region during years that experience mean temperature increases, which they suspect results from temperature’s effects on rainfed agriculture. Relatedly, Jablonski and Oliver (2013: p. 701) find that levels of modern-day piracy respond to labor market opportunities: “[I]n countries that produce rice and sugar, the global price of rice and sugar is negatively correlated with attacks.” Finally, in a study of conflict in Colombia, Dube and Vargas (2013: p. 1404) observe that a plausibly exogenous reduction in the price of coffee both “disproportionately reduces the wages and work hours of rural workers in coffee municipalities” and “increases violence differentially in regions that cultivates coffee more intensively.”

Yet, more general research on the relationship between unemployment and the intensity of sub-state violence finds differently. Analyzing patterns of violence in Iraq, Afghanistan, and the Philippines, Berman et al. (2011a) find no association between unemployment and insurgent attacks. These scholars surmise that their finding might reflect employment’s dual effects on the opportunity costs facing potential insurgents and information costs associated with purchasing intelligence from civilians. Counterinsurgency theory holds that information is central to the outcome of insurgency contests (Galula 2006; Lyall et al. 2015; Berman et al. 2011b; Shaver and Shapiro 2016; Leites and Wolf Jr 1970; Shapiro and Siegel 2015), and in various conflict settings, state forces have undertaken significant efforts to procure information from the public. Berman et al. (2011a) hypothesize that in areas with high levels of unemployment, counterinsurgents may be more effective in reducing violence because they can more feasibly source confidential informants.

Studies related to unemployment but focused on socioeconomic status tend to produce similarly counterintuitive results. Analysis of individual combatants from several surveyed conflicts concludes that low socioeconomic status fails to predict participation in rebel organizations. Krueger (2008: p. 36) finds that Hezbollah
militants tend to be “better educated [and] less likely to come from impoverished families [than relevant segments of the population].” He identifies a similar profile amongst Hamas militants. de Mesquita (2005) challenges this latter set of findings on the basis that it may reflect a selection effect: Militant organizations like Hamas that have access to a large supply of potential recruits can screen applicants. Although selected applicants may tend to be of higher socioeconomic status, “one cannot reach conclusions about the composition of the pool of those who are willing to become terrorists by studying only those who actually [are]” (de Mesquita 2005: p. 515). Recent research by Benmelech et al. (2012: p. 113) is consistent with this argument: “High levels of unemployment enable terror organizations to recruit better educated, more mature, and more experienced suicide terrorists...”

In all such research, unemployment itself is not itself of interest. Instead, opportunity- and information-cost theories center on the role of income, for which employment status proxies. Holding income level constant, employment itself has no theoretically expected effect on violence. Yet, as I explore in the following section, by affecting citizens’ judgments and decision-making during conflict, employment status itself may have a direct causal effect on conflict processes independent of the variable’s relationship to income.

3 Unemployment, Emotion, and Civilian Judgments During Conflict

In this section, I explain why employment status may affect citizens’ affective states during conflict and, in doing so, influence their judgments and potentially their behaviors toward important subjects like the use of violence by combatants.
3.1 Employment and Psychological Disposition During Conflict

A growing number of social scientists are incorporating psychological findings into conflict studies (Getmansky and Zeitzoff 2014; Blattman 2009; Grossman et al. 2013; Diaz-Cayeros et al. 2011; Voors et al. 2012; Halperin 2008; Bar-Tal et al. 2007; Shaver and Bollfrass 2016). Yet, the relationship between employment status and affective state during conflict remains widely unacknowledged. A large body of scholarship within psychology establishes the former’s effects on the latter (Murphy and Athanasou 1999; Warr et al. 1988; Wasserman 1984; Marshall 2001; McKee-Ryan et al. 2005; Farré et al. 2015; Friedemann and Webb 1995; Moen et al. 1983; Perrucci 1994; Legerski et al. 2006; Clark et al. 2001). Unemployment’s “reliable (negative) effects on mental health” are well established (Murphy and Athanasou 1999). In perhaps the most comprehensive study carried out on the subject, McKee-Ryan et al. (2005: p. 63) perform meta-analyses of existing cross-sectional and longitudinal studies and uncover a series of consistent trends: compared with the employed, “[u]nemployed workers [have] significantly lower mental health... life satisfaction [and] marital or family satisfaction...”; the reemployed experience “[s]ignificant improvements in mental health [and] life satisfaction”; and workers display “significant reduction[s] in mental health following job displacement.” These findings, they argue, strongly support “a causal relationship [given] consistency in results across multiple... studies” (McKee-Ryan et al. 2005: p. 67). Farré et al. (2015: p. 2) identify a causal effect through Spain’s housing market collapse, which “resulted in exogenous job loss followed by a very low re-employment probability for the most affected workers.” They show that unemployment increases feelings of hopelessness and uselessness and the likelihood of mental disorders amongst afflicted individuals.

Contrary to conventional wisdom, there is little to no evidence that the under- and
unemployed experience increased levels of anger and desire for retribution. Instead, research indicates that such individuals tend to experience a particular set of affective states of negative valence—“higher levels of depression, anxiety, and general distress, together with lower self-esteem and confidence” (Warr et al. 1988: p. 64). (See also Gili et al. (2013); Wasserman (1984); Marshall (2001); Hammarstroem and Janlert (1997); Goldsmith et al. (1996b).) They are also more likely to experience “a decline in marital satisfaction, and strained parent-child relationships” (Friedemann and Webb 1995; Moen et al. 1983; Perrucci 1994; Legerski et al. 2006). Furthermore, such effects do not appear transitory. Clark et al. (2001: p. 68) find life satisfaction to be “lower not only for the current unemployed (relative to the employed), but also for those with higher levels of past unemployment.” (See also Knabe and Rätzel (2011).)

Warr (1987) and Jahoda (1982) theorize that unemployment generates psychological distress because, aside from affecting income, it eliminates individuals’ opportunities for control and interpersonal contact. Conversely, employment “imposes a time structure on the day,” and “encourages activity” (McKee-Ryan et al. 2005: p. 55). Employment’s relationship with one’s sense of control and purpose relates closely to other findings in psychology linking self-esteem and feelings of anxiety and depression. As Pyszczynski et al. (2003: p. 12) observe, “[t]here is no more obvious psychological truth than that people want to feel that they are worthy and valued... [and] a massive array of empirical evidence has shown that low self-esteem is associated with poor physical and mental health and that threats to self-esteem engender anxiety and a host of psychological defenses...” For instance, Greenberg et al. (1992, 1993) show in a series of controlled laboratory tests that self-esteem has causal effects on feelings of anxiety. Similarly, Pyszczynski et al. (2003: p. 44) find that self-esteem “functions to reduce anxiety in stressful situations...”

²Some scholars have documented a relationship between male unemployment and spousal abuse (e.g. Kyriacou et al. (1999)). However, other scholars have failed to find evidence of such relationship (e.g. Jewkes et al. (2002)).
Citizens forced to bear the externalities of conflict within their societies – from chronic exposure to violence to the threat of death to persistent lack of electricity or potable water – are prone to psychological distress. Are the pressures of underemployment attenuated or intensified amongst these individuals? Although some research indicates that unemployment’s psychological effects (in the United States, for instance) are moderated by disparities in the general time schedules of unemployed and employed citizens (Young et al. 2014), research on psychological resilience in conflict settings strongly suggests the unemployment’s pressures are likely exacerbated in conflict settings. In particular, wartime stressors have been shown to be exacerbated amongst more vulnerable populations. Members of these populations have fewer available resources that would otherwise insulate them from the psychological effects of a given source of trauma.

Individuals exposed to conflict are less likely to experience reductions in mental health when they have access to greater material and psychosocial resources (Hobfoll et al. 2011). Hobfoll et al. (2006: p. 215) show that following exposure to terrorism, Jewish Israeli citizens are less likely to suffer post-traumatic stress disorder and depressive symptoms than Palestinian Israeli citizens who, with fewer available resources, are “hinder[ed] in their ability to recover and [are placed nearer to the edge] where further resource loss is critical.” Bleich et al. (2006: p. 9) similarly find that although Arab Israelis “were not targeted by terrorism and proportionately fewer were killed and injured in the attacks than Jews,” these citizens “were 2.5 times more likely than Jews to meet PTSD criteria and 5.9 times less likely to be [traumatic stress] resilient.” Similarly, Kushnir and Melamed (1992: p. 993) find evidence that amongst Israelis “who began the war with depleted energy reserves, the war situation imposed a greater emotional burden.”

Similar results relate lack of social support and inferior mental health outcomes following exposure to disasters (Madakasira and O’Brien 1987; De Jong et al. 2001).

---

3 Similar results relate lack of social support and inferior mental health outcomes following exposure to disasters (Madakasira and O’Brien 1987; De Jong et al. 2001).
to significant violence under the Khmer Rouge, those who perceived significant social support after being resettled in the United States exhibited significantly less PTSD and depression (Berthold 2000).

By providing workers with a sense of normality, continuity, and social community in otherwise turbulent and dangerous environments, employment may attenuate wartime stressors. Those without access to regular employment are conversely more vulnerable to these stressors.

3.1.1 Affective State, Judgments, and Choice

In what ways does employment status matter within conflict settings given its effects on emotion? Within psychology, scholars have converged on the view that non-conscious, automatic thinking is a significant determinant of human judgments and behaviors (Kahneman 2011; Wilson 2004). “According to the modern [psychological] perspective... [the mind] relegates a good deal of high-level, sophisticated thinking to the unconscious...” (Wilson 2004: p. 6). As a result, much “of the interesting stuff about the human mind – judgments, feelings, motives – occur outside of awareness for reasons of efficiency...” (Wilson 2004: p. 8).

A particular line of modern inquiry focuses on the non-conscious effects of individuals’ affective states. It is now well established that individuals’ affective states alter their cognitive tendencies, with specific effects on their judgments, their behaviors, and how they process information (Clore et al. 1994; Schwarz and Clore 1983; Schwarz and Bless 1991; Han et al. 2007). Importantly, individuals’ emotional states have been repeatedly shown to influence judgments and decision-making irrelevant to the circumstances responsible for producing such affective state (Lerner et al. 2015; Schwarz and Clore 1983; Gallagher and Clore 1985; Lerner and Keltner 2000, 2001; Han et al. 2007; Bodenhausen 1993). Such emotions, which Han et al. (2007: p. 159) describe as *incidental emotions*, influence “subjective emotional experiences that should be
normatively irrelevant to present judgments and choices.”

Affective state has been shown to influence a variety of cognitive outcomes including assessments of risk (Lerner and Keltner 2001, 2000); causal judgments (DeSteno et al. 2004); assessments of value; and depth of thought (Tiedens and Linton 2001). Depression and anxiety, which are common effects of unemployment, are connected to a variety of judgments and decision-making processes that may affect citizen attitudes and behavior during periods of conflict. Specifically, by affecting assessments of risk, desire for retribution, and perceptions of external locus of control, these emotions may lead the under- and un-employed to think and behave differently than the employed.

3.1.2 Perceptions of risk and desire for vengeance and aggressive policies

Affective state has been shown to influence assessments of risk; willingness to engage in risky behavior; and desire for retribution. Anxious and fearful individuals, for instance, exhibit elevated perceptions of risk (Lerner and Keltner 2001). Importantly, risk perception amongst anxious individuals is heightened even with respect to events that are not personally relevant to such individuals (Lerner and Keltner 2001, 2000). Lerner and Keltner (2000: p. 483), for instance, ask angry and, separately, anx-

4 There are limits to and bounds on the ways in which affective states influence individuals’ judgments and choices. According to the Appraisal-Tendency Framework developed and subsequently articulated by Lerner and Keltner (2000, 2001) and Han et al. (2007), emotions relate to particular cognitive tendencies through the specific appraisals associated with the former. Thus, for instance, as Han et al. (2007) explain, emotions like anxiety, which “[are] defined by appraisals of uncertainty and lack of individual control,” can affect assessments of risk that are unrelated to the source of anxiety but “should not influence judgments of fairness.” In addition, scholars have found across a series of experimental tests that the effect of particular incidental emotions is reduced or altogether eliminated if affected individuals are made aware of their cognitive predispositions (Lerner et al. 2015; Schwarz and Clore 1983; Palamarek and Rule 1979). For instance, Schwarz and Clore (1983) find that individuals interviewed on rainy days reported less happiness and, as an expected consequence, less satisfaction with their lives (than respondents interviewed on sunny days). Yet, when such individuals were either asked about the weather in their areas (indirectly primed) or told that the interview was designed to assess weather’s effects on mood (directly primed) before reporting their happiness and degree of life satisfaction, the effect of the rainy weather on responses was effectively eliminated.
ious individuals to estimate annual fatality numbers associated with various causes of death including “brain cancer, strokes, floods” and find that anxious individuals assign significantly greater risk profiles than do angry respondents.

Of particular relevance to civilians judgments and behavior during conflict are findings that anger and anxiety manifest through differences in desire for retribution. In a study of the September 11 terrorist attacks on policy preferences, Lerner et al. (2003: p. 148) find that angry “respondents supported the (vengeful) [policy of deporting foreigners in the U.S. lacking valid visas] more strongly and the (conciliatory) contact policy less strongly” than anxious respondents. Related research ties feelings of anxiety to lower support for aggressive national security policies. For instance, Huddy et al. (2005: p. 601) find that although the perception of threat following the September 11, 2001 terrorist attacks was “associated with greater support [amongst Americans] for U.S. military intervention, U.S. over-seas involvement, and approval of Bush”, anxious Americans displayed lower “approval of President Bush’s handling of the situation and [increased] opposition to military action and overseas involvement...”

3.1.3 Perceptions of Efficacy

Affective state has also been shown to affect perceptions of self-efficacy and helplessness. Of particular relevance are findings linking employment status to feelings of hopelessness and sense of control. Tiggemann and Winefield (1984: p. 38) find that young unemployed individuals exhibit significantly more “helplessness” than their employed counterparts. Goldsmith et al. (1996a: p. 339) find that over time the unemployed become “significantly less internal, more external, than the employed.” Layton (1987: p. 149) finds similarly: “the unemployed [are] more inclined to perceive events as being beyond personal control...” Relatedly, O’Brien and Feather (1990: p. 151) find that quality of employment matters: “[S]chool-leavers who obtained good
quality employment were compared with those who were unemployed, they had… higher internal control.” Yet, the effects of unemployment appear to extend beyond perceptions of self-efficacy. For instance, Legerski et al. (2006: p. 1532) find that laid-off steelworkers unable to find subsequent work expressed significantly greater belief in “[p]owerful [o]thers” than their counterparts who were reemployed or retired.

During periods of civil conflict, citizens frequently face choices that are likely to be informed by their assessments of risk, desires for retribution, and expectations of the outcomes of their actions. Activities such as providing logistical support to combatants and sharing intelligence carry the threat of retaliation by opposition forces. By influencing cognitive processes, affective state is likely to influence observed civilian behavior during war.

4 Empirical Strategy and Data

I carry out three complementary sets of statistical tests designed to determine whether the observable implications of the theory align with the results of these tests. The first of these seeks to assess whether employment level affected Iraqi civilians feelings of pessimism. The second set analyzes responses to a series of questions intended to assess perceptions of efficacy. Finally, the last assesses unemployment’s effects on Baghdad citizens’ attitudes toward the use of violence against multi-national forces.

4.1 Data

I test the hypotheses presented above in the Iraq War context, drawing from the following three datasets.

5 In instances in which they are coerced into such activities, the decision to resist carries risk.

6 In one wave of the survey around which the empirical strategy section of this paper is based, for instance, a plurality of respondents indicate that their decision not to report information to counterinsurgents was based on their “[concern] about revenge.”
4.1.1 Baghdad Civilian Survey Data

Under U.S. military contract, a local Baghdad survey firm, the Independent Institute for Administration and Civil Society Studies (IIACSS), surveyed residents of Baghdad city and surrounding rural enclaves for most months of a five-year period during the war. This initiative resulted in responses from more than 175,000 citizens domiciled across 467 survey blocks within the city’s ten *mahalas* (neighborhoods). Data collected by the firm was authorized for release by the U.S. Department of the Army for the purpose of this and related research projects and is being concurrently introduced by Klor et al. (2016).

Survey respondents provided data on a wide variety of topics. Of particular relevance, citizens expressed their degree of support for the use of violence against political entities including Coalition forces. They also described how they expected conditions related to security, government effectiveness, job availability and, separately, public goods to change over the coming months. They discussed their employment status and provided the number of hours, if any, they worked each week. Respondents also supplied various demographic details.

Although the U.S. military financed the initiative, IIACSS employed Iraqi enumerators introduced themselves to participants as unaffiliated researchers. Sampled households were selected using a “multi-stage probability-based” design. (Complete design details are provided in the appendix). Only adults (those at least eighteen years of age) were selected for interviews. The last-birthday selection method was used to sort amongst adults in households with more than one such member. To increase the rate of response amongst women, survey teams comprised both male and female enumerators. Each monthly survey was pretested using a sample of twenty households throughout the Baghdad metropolitan area.

According to this data, during the war, only approximately 16% of respondents reported being unemployed while nearly 50% reported being either unemployed or
having access to only part-time employment.\footnote{Individuals who identify as students, housewives, or retirees are excluded from this calculation. Some individuals who lost employment during the war may have reported belonging to one these non-labor market categories instead of identifying as unemployed. Any such cases would bias downward the un- and under-employment rates reported here.}

### 4.1.2 Insurgent Violence

Data on insurgent violence is drawn from the U.S. Defense Department’s official record of significant activities, which include insurgent attacks carried out against American, Iraqi, and other Coalition partners’ forces throughout the Iraq War. The data covers the period December 2003 through the end of December 2011, when the final set of American forces formally ended Operation Iraqi Freedom. This data was released to the author by the Department for the purposes of this and related research projects and is being released by Shaver and Bollfrass (2016). According to that data, 37.44\% of all attacks recorded throughout the war involving direct fire, indirect fire, improvised explosive devices, surface-to-air fire, and unexploded ordnances (233,025 in total) took place within Baghdad province.

To illustrate the first two datasets, I overlay IIACSS survey blocks with individual insurgent attacks throughout the war in Figure 1.

### 4.1.3 Civilian Casualties

Data on sectarian violence is provided by Condra and Shapiro (2012) and were produced through a multi-year collaboration between Iraq Body Count and Princeton University. These data estimate sectarian casualties using media reports of civilian deaths and cover most months of the war.
Figure 1: This figure depicts the distribution of all recorded Iraq War insurgent attacks carried out across the 476 Baghdad survey blocks used by IIACSS. Data sources: U.S. Central Command; IIACSS.
4.2 Empirical Strategy

4.2.1 Expressions of Optimism

If un- and under-employed citizens in conflict settings are emotionally dispositioned as in non-conflict settings, they should display greater feelings of pessimism toward future events.\(^8\) I first associate employment status with expressed pessimism toward future conditions of a variety of subjects. Specifically, I test a series of eight equations, jointly expressed as follows:

\[
Y_{i}^{l} = \gamma_{0}^{l} + \gamma_{1}^{l}X_{i} + \gamma_{2}^{l}Z_{i}^{l} + \gamma_{3}^{l}V_{j_i,k_i} + \gamma_{4}^{l}S_{j_i,k_i} + \vartheta_{j_i}^{l} + \tau_{k_i}^{l} + \epsilon_{i}
\]  

(1)

where \(i\) represents individual Baghdad respondents. This set of individuals includes all respondents who report being either employed in the public or private sectors or unemployed. Individuals who self-identify as students, housewives, and retirees are excluded from the analysis. \(j\) and \(k\) denote Baghdad neighborhood survey blocks and dates of response, respectively. \(j_i\) and \(k_i\) represent respondent \(i\)'s unique neighborhood block and response date.

For the first seven regressions, \(l\) represents survey questions through which respondents are asked to assess how they expect “conditions of the following... to change in the next 3 months:” Overall conditions in Baghdad, overall conditions for your family, effectiveness of the government, availability of jobs, availability of electricity, security, and the ability of the [Iraqi police] to provide security.” In the eighth regression, using eigendecomposition, I calculate the principal component accounting for the greatest multivariate variability (across the seven correlated responses) and

\(^8\)Forgas and Moylan (1987), for instance, show that, relative to happy, aggressive, and control subjects, sad individuals display the greatest pessimism over the likelihood of future events, assigning the least likelihood to the “avoidability of nuclear war, the performance of the economy, and improvements in their personal fortunes” (Forgas and Moylan 1987: p. 473). Lerner and Keltner (2001) similarly find that, relative to happy and angry subjects, fearful individuals display much greater “pessimism about future life events.” Similar findings are reported by Lerner et al. (2003) and Lerner and Keltner (2000).
include its vector of scores as the dependent variable.

Allowable responses give by the outcome variable $Y_i$ fall on a five-point Likert scale and include “Much Worse”, “Somewhat Worse”, “Same”, “Somewhat Better”, and “Much Better”. Responses of “Don’t Know” were recorded by enumerators but eliminated for this analysis. The reported number of hours worked per week is given by $X_i$ and is winsorized for values above 80.9 $Z_i$ is vector of individual respondent controls included to eliminate likely sources of omitted variable bias including respondents’ individual household income (weighted by household size), education level, gender, age, household size, and past perceptions of the same subject over the past three months (e.g. past perceptions of government effectiveness) and are likely correlated with employment status and potentially associated with patterns of expressed sentiment. Past seven-day averages of incidents of insurgent violence carried out against Coalition and Iraqi Government forces and sectarian casualties are given respectively by $V_{j,k}$ and $S_{j,k}$.

Survey block fixed effects control for time-invariant characteristics specific to each block. As Figure 1 depicts, survey blocks are very small geographic units – there are approximately 52 survey blocks within each of Baghdad’s nine neighborhoods. Thus, individuals living within any given block are immediate neighbors and likely to share a number of unobserved characteristics. For instance, although Baghdad experienced significant resettlement patterns throughout the conflict, at the level of the survey block, residents are likely to share ethnic identity. Thus, these controls likely account for much sectarian (and other forms of) heterogeneity that might otherwise bias estimates.

Similarly, by absorbing across-time variation, date-of-response indicators reduce potential bias by permitting estimates of interest to be derived on the basis of within-survey date variation. Estimates are calculated by grouping and comparing responses

9Estimates are also calculated using non-winsorized data and are reported in the appendix.
based on the exact day in which they were given. Finally, standard errors are clustered at the level of the survey block.

Subjects vary considerably across these questions. Yet, each such question requires respondents to make assessments reflecting their general states of optimism. This attractive feature of the data makes for more credible inference – were a particular variable omitted from the model to raise doubt about the estimated association between employment status and a given expected future state (say, that of government effectiveness), such variable may have no relationship with other expected future states (say, that of overall conditions for one’s family). If research findings linking one’s employment status and emotional disposition are externally valid within conflict settings, employment should associate positively across these questions with more sanguine assessments.

I next retest the equation above, substituting future expectations with past perceptions. Subjects such as overall conditions in Baghdad and the effectiveness of the government refer to more general conditions that can be more objectively measured and are thus unlikely to be influenced by given respondent’s affective state. If unemployed Iraqis’ pessimistic assessments of future conditions on such topics are a psychological manifestation of elevated feelings of anxiety/depression (and not the result of unemployed Iraqis tending to bear, for instance, a greater brunt of actual government ineffectiveness), then these past assessment should tend not to correlate with employment status.\(^{10}\)

### 4.2.2 Perceptions of Efficacy

Next, I test whether unemployed Iraqi citizens tended to display diminished perceptions of efficacy by evaluating responses to several relevant questions. Specifically,\(^{10}\)

\(^{10}\)For tests of future and past perceptions, I also collapse the outcome into a binary measure for the purposes of generating predicted probabilities using logistic regression results. To do so, I follow the approach described in testing attitudes toward the use violence.
respondents were asked: 1) to predict their likelihood of reporting criminal activity to the police if they were aware of such activity; 2) whether they believe Iraqi police are capable of enforcing the rule of law in Baghdad without assistance from Iraq’s military; and 3) whether they planned to vote in an upcoming election. These otherwise largely unrelated questions are similar in that each is related to perceptions of efficacy. An individual’s propensity to vote or report crime is likely to be influenced by her or his perception of probable outcomes associated with such activity. Stronger beliefs that one’s own actions are unlikely to effect change or that Iraq’s police forces are unlikely to be effective should manifest accordingly in responses these questions.

To test these hypotheses, I again regress hours worked and the same set of covariates on responses to these questions. For the question relating to willingness to report crime, I also include a control for self-assessments of past three months changes in security conditions. In this way, willingness to report crime is conditioned on both perceptions of past crime levels and objective measures of insurgent violence and sectarian conflict, both of which might influence willingness to report crime. Like the questions on pessimism, the varied nature of the subjects of these questions reduces the likelihood that any single omitted variable related to employment status and the outcome of interest is driving results.11

4.2.3 Attitudes Toward the Use of Violence

If desires for retribution and perceptions of efficacy tend to be diminished amongst the under- and un-employed during conflict, such individuals may be less likely to support the use of violence against insurgents or state forces because they desire it

11Because the dependent variables in models relating to efficacy are either ordered or binary, results can also be used to check the results of the linear probability models; e.g: P(PolicePerceptionsi > q|Xi, Zi, Vv, k, Sv, k) = logit\(^{-1}\)(η + ξXi + δZi + θVv, k + ψVv, k + κk), where q = {1, ..., 5}. I, therefore, also carry out and report the results of all such alternative specifications. For the purposes of presenting predicted probabilities, I also collapse dependent variables in binary measures and generate results using logistic regression.
Figure 2: This figure depicts surveyed Baghdad citizens’ degree of support for the presence of multi-national forces in Iraq across time. As the figure reveals, although support varied somewhat across time, survey respondents overwhelmingly opposed their presence. “Strongly Oppose”, “Oppose”, “Support”, and “Strongly Support” are denoted above by “s.o.”, “o”, “s”, and “s.s.”, respectively.

less and/or tend to be less hopeful than other members of society that it will result in some favorable outcome (elimination of the insurgent organization, concessions by the state, etc.).

The data reveal that Baghdad citizens overwhelmingly opposed the Coalition’s presence and that this sentiment was largely time invariant, as Figure 2 depicts. On the basis of such universal opposition, Iraqi citizens may have considered violent attacks on Coalition forces a form of retaliation for the occupation. They may have also viewed the use of violence against the country’s multi-national occupiers as a legitimate means of bringing about their withdrawal.
To assess the relationship between support for the use of violence against Coalition forces and reported employment, it is necessary to first determine whether general opposition to the Coalition forces’ presence tended to vary amongst citizens with different levels of employment. Although Figure 2 reveals widespread opposition to their presence, the data presented in this form provide no clear indication of whether employment status predicts an individual’s (lack of) support for Coalition presence. For this first analysis, all members of the workforce are not pooled because there is reason to suspect that support for the Coalition’s presence increases in employment amongst public sector workers. Specifically, of all Baghdad residents, full-time public sector workers were amongst the greatest beneficiaries of the Coalition’s presence.

There is also a potential selection effect: Iraqis most supportive of the Coalition’s presence may have been more likely than other citizens to enlist as civil servants in a government established and closely advised by the multi-national forces.

Thus, to predict this association, I test the following equations:

\[ T_m = \varphi_0 + \varphi_1 X_m + \varphi_2 Z_m + \varphi_3 V_{jm,k_m} + \varphi_4 S_{jm,k_m} + \rho_{jm} + \nu_{km} + \epsilon_m \]  

\[ T_{m^c} = \xi_0 + \xi_1 X_{m^c} + \xi_2 Z_{m^c} + \xi_3 V_{jm^c,k_m^c} + \xi_4 S_{jm^c,k_m^c} + \zeta_{jm^c} + \eta_{km^c} + \delta_{m^c} \]  

where \( m \) represents the subset of Baghdad residents (\( i \)) who identify as either unemployed or members of the private sector. (All public sector workers are thus given by the complement \( m^c \).) \( T_{m/m^c} \) represents support for the Coalition’s presence and is ordered. Possible responses include “Strongly oppose”, “Somewhat oppose”, “Somewhat support”, and “Strongly support”. As before, responses of “Don’t Know” are eliminated. I also supplement this (and all subsequent) analysis with an indicator of labor class – whether respondents identify as full- or part-time workers – to control
for possible differences in attitudes amongst citizens who identify as members of separate labor classes.\textsuperscript{12}

As described in the results below, the unemployed and members of the private sector display no difference in their attitudes toward the Coalition’s presence as a function of weekly employment. As expected, public sector workers do, however. Thus, in testing the final and central hypothesis of the article, I restrict the data to this first set of respondents. For this test, I use a linear probability model to estimate the relationship between support for attacks on Coalition forces and employment status. A modified version of Equation 2 is retested where independent variable $T_m$ is replaced with the binary variable $W_m$, representing expressed support or lack thereof for “attacks against Multi-National Forces.”

Theoretically, I expect the effect of additional hours worked per week on attitudes to depend on the number of hours a given individual is already working. For instance, the expected psychological effect of a given laborer’s movement from unemployment to ten hours of employment per week is expected to be greater than were that same individual to add ten additional hours of work onto a forty-hour per week work schedule. The former adjustment is likely to provide a sense of structure previously missing from such individual’s day while potentially engaging her or him in a new social structure. Any such effects are expected to be marginal in the latter case.

I assess the functional relationship in several ways. First, in addition to the linear specification, I also generate results using various polynomial specifications.\textsuperscript{13} Next, because the outcome of interest is binary, I also use logistic regression to estimate the relationship between employment and support for the use of violence.
against Coalition forces. I test both monotonic (\( P(W_m = 1|X_m, Z_m, V_{vm,k_m}, S_{vm,k_m}) = \logit^{-1}(\psi_0 + \psi_1 X_m + \psi_2 Z_m' + \psi_3 V_{vm,k_m} + \psi_4 S_{vm,k_m} + \varrho_{vm} + \varsigma_{km}) \)) and non-monotonic models (\( P(W_m = 1|X_m, Z_m, V_{vm,k_m}, S_{vm,k_m}) = \logit^{-1}(\psi_0 + \psi_{11} X_m + \psi_{12} X_m^2 + \psi_2 Z_m' + \psi_3 V_{vm,k_m} + \psi_4 S_{vm,k_m} + \varrho_{vm} + \varsigma_{km}) \)). To generate predicted probabilities of support for attacks on Coalition forces for the range of weekly hours indicated worked observed within the study data are calculated \( \mu = 1/n \sum_{i=1}^n (e^{(X_i^T \beta)}/(e^{(X_i^T \beta)} + 1)) \) \( \forall \) work hours \( h \in [0 \text{ and } 80] \). Confidence intervals at the 95% significance level are generated using quasi-Bayesian Monte Carlo simulation. Finally, to allow for even greater functional flexibility, I use a semi-parametric, non-linear general additive model to estimate the relationship.

One potential concern with this regression approach is that a positive relationship between employment status and support for violence might reflect differential exposure to violence. Although I control for both insurgent and sectarian violence at the neighborhood level, survey respondents may have differed in their exposure levels. For instance, unemployed citizens seeking work may have spent more time on average in outdoor locations and/or in public transit and thus were more likely to witness or to be directly affected by violence. The concern is that such exposure might have shifted attitudes toward the use of violence. Indeed, Blair et al. (2013), for instance, find that Pakistan’s poorest citizens tend to express greater dislike for militants than other citizens, which the authors suggest reflects differential exposure to violence across socioeconomic classes. To control for this possibility, I supplement this regression with respondents’ reported level of individual safety, which should condition on any heterogeneous effects of violence across employment level.

Another possible concern is that the unemployed and employed vary in their support for insurgents (despite not varying in opposition to Coalition presence), potentially influencing attitudes toward violence directed against counterinsurgents. Fortunately, an indirect measure of insurgent support can be included in the model to
control for any such variation. In particular, during a subset of survey waves, respondents were asked whether they agreed with the statement: “[S]ome people think that ‘armed groups’ help make Baghdad safer.” The indirect nature of this question is desirable in so much as it may have reduced non-responses that might otherwise have resulted from more explicit wording. I, therefore, supplement the model by including responses to this survey item.

5 Results

5.1 Pessimism

Results strongly support expectations that Baghdad’s un- and under-employed citizens were significantly more pessimistic than gainfully employed citizens. Expressed pessimism on all subjects and reported work hours are negatively and significantly correlated. Not surprisingly, the coefficient on pessimism relating to future job availability is the largest of the estimates – the unemployed are particularly pessimistic about future employment status. Of particular relevance, coefficients on all six remaining subjects, many of which are unrelated to a given individual’s employment status, are very similar, suggesting that employment’s effect on pessimism is a general one (Figure 3, Table 1). In contrast, and as further expected, except for those relating to employment, past perceptions of these same subjects do not tend to vary with employment status (Figure 4, Table 2). Thus, un- and under-employed citizens do not appear to have been differentially exposed to particular treatments that would have led them to having experienced, for instance, Iraqi police effectiveness or general conditions in Baghdad any differently than employed citizens.
Figure 3: This figure shows the predicted probabilities of pessimistic future assessments on a series of topics and employment level, with 95% confidence intervals and rug plots.

Figure 4: This figure shows the predicted probabilities of perceptions of the past (negatively evaluated) and employment level, with 95% confidence intervals and rug plots.
5.2 Perceptions of Efficacy

Across all three test questions, un- and under-employed citizens displayed diminished perceptions of efficacy. They were less likely to indicate that they would report crime; displayed less confidence in the ability of local police forces to operate effectively without Iraqi military assistance; and were less likely to express plans to vote in upcoming elections (Figure 5, Tables 3, 4, and 5). Results are consistent when logistic and ordered logistic regression models are used instead (also, Tables 3, 4, and 5).
5.3 Support for Coalition Presence and the Use of Violence Against those Forces

Amongst public sector employees, attitudes about the Coalition’s presence vary with employment status, as expected. However, results provide no evidence in support of the hypothesis that private sector employees and unemployed individuals express greater or less opposition to the Coalition’s presence as a function of employment. Private sector employees and unemployed individuals were near unanimously opposed to the Coalition’s presence in Iraq, and such sentiment is not altered by the number of hours an individual spends working (Figure 6, Table 6).

Finally, primary model results are consistent with expectations: support for the use of violence against Coalition forces increases with reported hours worked (Figure 6, Table 7). Furthermore, consistent with expectation, in the polynomial specification, estimated attitudes toward the use of violence change most rapidly across lower levels of hours worked and most slowly across high levels. Predicted probabilities estimated with the generalized additive model, which impose the fewest restrictions on the relationship, closely follow those produced using the non-monotonic model results (Figure 9).

The magnitude of the estimated effect is large. As Figure 6 depicts, the predicted probability of support for attacks on Coalition forces amongst the unemployed is less than 45%. Predicted support amongst those who report working 40 hours per week exceeds 60%. Generalized additive model results estimate similar magnitudes of effect. Primary results are also robust to controlling for respondents’ assessments of personal safety. However, the magnitude of employment status is somewhat attenuated when this variable is added to the model, perhaps suggesting that both mechanisms may be at play: unemployed citizens have tended not to support the use of violence against Coalition forces relative to other citizens both because of their emotional disposition
Figure 6: This figure shows the predicted probabilities of opposition to the presence of multi-national forces (left) and support for attacks on multi-national forces (right) as function of employment level, with 95% confidence intervals and rug plots.

and because they desired not to be affected by future violence.\footnote{Results are generally consistent when the labor class variable is omitted from the analyses. With respect to support for Coalition presence, results are effectively unchanged. However, with respect to support for the use of violence against Coalition forces, the estimated functional form no longer displays diminishing returns at higher levels of unemployment. If, on the other hand, this variable is added to the previous statistical tests, those results are unchanged, with the exception of past voting behavior, which maintains its original functional form but loses statistical significance.}

5.4 Robustness

5.4.1 Outliers, Neighborhood Exclusions, and Overtime Workers

Are the results driven by extreme values or specific subsets of the respondent population? To ensure that neither scenario is responsible for producing the results un-
covered, I separately generate primary regression results 1) using a subset of the data in which outlying values are excluded (as determined using Cook’s distance analysis, with a standard $4/n$ exclusion threshold); 2) sequentially excluding with replacement each of the ten neighborhoods from the sample and, finally, 3) using only the subset of respondents who report working between 0 and 40 hours per week. The scientific and statistical significance of the results of all of these exercises is consistent with the primary results (Tables 9, 10, and 11).

5.4.2 Militants, Their Supporters, and Their Potential Selection into the Private Sector

One potential concern with the primary identification strategy is that former Ba’athists and their respective sympathizers – individuals likely to have strongly supported attacks on Coalition forces – may have maintained or secured full-time employment within the private sector following the collapse of Saddam Hussein’s regime with greater success than other citizens. An association between employment status and support for the use of violence directed against Coalition forces might then reflect this particular dispensation of the post-invasion economy. Were this the case, individuals who report greater working hours should also tend to report greater support for attacks than not only un- and under-employed citizens but than all citizens not in such favorable position.

To circumvent this concern, I retest the primary hypotheses, comparing unemployed citizens to adults currently outside the labor market: university students, housewives, and retirees. Although these individuals who do not work, they should not tend to exhibit the levels of despondence observed amongst the unemployed. Indeed, some studies in psychology assessing unemployment effects on psychological outcomes compare students with recent graduates who were and were not able to secure employment.
I replicate the three sets of statistical tests, including only the unemployed and individuals who have opted out of the work force. The primary explanatory variable is, therefore, replaced with an indicator for whether or not a given respondent is out of the work force. The results of this exercise are consistent with the primary model results (Tables 12, 13 and 14): Students, housewives, and retirees display significantly less pessimism than the unemployed; they show significantly greater levels of efficacy; and they are significantly more likely to support violent attacks on Coalition forces. The single exception relates to perceptions of police effectiveness. As expected, students, housewives, and retirees display greater confidence in Iraqi police forces; however, the coefficient is just shy of statistical significance.

5.4.3 Non-Winsorized Data

Finally, results are unchanged if data on reported employment are not winsorized (Figures 7 and 8).

6 Conclusion

Unemployment is widely believed to fuel conflict. Drawing from a large and well-established body of research in psychology, I argue that, because under-and unemployed citizens are likely to suffer disproportionately from depression and anxiety, in conflict zones these citizens are likely to make judgments and choices that diverge from those of other citizens. Drawing from novel Iraq war survey data, I show that consistent with expectation, this class of citizens, which often constitutes a very large segment of society in areas afflicted by violent conflict, is consistently more pessimistic about future conditions, less efficacious, and amongst the least likely to support the use of violence against combatants.

Although unemployment may affect the intensity and outcome of civil conflict by
influencing individuals’ affective states, and, in turn, their behaviors, unemployment may affect patterns of conflict through other, possibly competing channels as well. To assess the magnitude of unemployment’s effect on observed conflict through its effects on cognition, future research might seek to link unemployment to particular wartime behaviors such as informing to counterinsurgents.

References


C-SPAN. Employment and security in Iraq; interview with Michael o’hanlon, 2006.


Marie Harf. Interview with marie harf on “hardball”, 2015.


7 Appendix

7.1 Threats to Inference

The survey consists of direct response questions. Research shows that questions of this sort, especially on sensitive topics, can lead respondents to provide false answers or refuse to respond. Despite such possibility, response rates for this survey were very high. Although the rate varied across surveys, it typically fell between eighty and ninety percent. This is a very different outcome than has been observed with direct question polling in Afghanistan, where refusal rates have exceeded fifty percent (Blair et al. 2014). The greater danger is that gainfully employed individuals, students, housewives, and retirees simply tended to answer more or less truthfully than underemployed citizens.

A second threat to inference is a product of the physical dangers enumerators faced while working in Baghdad. In some cases, the perceived threat to their lives posed by militant organizations operating in particular blocks was great enough that enumerators refused to enter such areas. The reported number of such blocks per survey, however, was quite small. For many survey waves, no such restrictions were reported. When they were, the number is quite small.

7.2 Survey Design

The following survey design description is reported in IIACSS’s monthly survey reports:

“Five stages have been sorted to draw the sample. First, number of interviews has been distributed among census districts (Qada) proportionally. Second, each Qada consist of number of census sub districts called (Nahia) which received its share of interviews proportionally, also. Third, nahias consist of many blocks. Blocks [are] regarded as the primary sampling units (PSU) in the urban areas, with 134 PSUs being selected using probability-proportional-to-size procedures. 30 interviews [are] conducted in each block. [Surveys are] [d]istributed among 6 streets (Zukak according to census wording). These streets [are] selected by using simple random method (fourth stage). Due to [the fact] that some of Baghdad blocks are considered as commercials areas... [the] sample designer had to drop out these blocks from the sample frame work.”

7.3 Question Wording

The following are the translations of the actual questions asked the survey:

Expectations:

“How do you believe the conditions of the following are likely to change in the next 3 months?”
• Overall conditions in Baghdad
• Overall conditions for your family
• Effectiveness of the government
• Availability of jobs
• Availability of electricity
• Security
• The ability of IPs and ING to provide security

Past Perceptions:

“How do you feel the conditions of the following have changed in the past 3 months?”

• Overall conditions in Baghdad
• Overall conditions for your family
• Effectiveness of the government
• Availability of jobs
• Availability of electricity
• Security
• The ability of IPs and ING to provide security

Crime Reporting:

“If you are aware of criminal activity, how likely are you to report it to the Police?”

Iraqi police effectiveness:

“How do you agree with the following statement: the Iraqi Police can adequately enforce the rule of law in Baghdad without help or assistance from the Iraqi Army?”

Voting:

“Do you plan on voting in the upcoming elections?”

Support for the Coalition’s Presence:

“How much do you support or oppose presence of Coalition Forces / MNF in Iraq?”

Support for Attacks on Coalition Forces:

“Do you support attacks against: Multi-National Forces?”
Figure 7: Predicted Probabilities of Pessimistic Future Assessments and Employment Level, with 95% Confidence Intervals; Non-Winsorized Data

Table 1: Pessimistic Assessments of Future Conditions on Hours Worked, Linear Probability Model

<table>
<thead>
<tr>
<th>Question Subject</th>
<th>(Baghdad)</th>
<th>(Family)</th>
<th>(Gov’t)</th>
<th>(Jobs)</th>
<th>(Electricity)</th>
<th>(Security)</th>
<th>(Police)</th>
<th>(Principal Component)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours Worked</td>
<td>-0.018***</td>
<td>-0.018***</td>
<td>-0.015***</td>
<td>-0.022***</td>
<td>-0.015***</td>
<td>-0.018***</td>
<td>-0.018***</td>
<td>-0.055***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.008)</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Sectarian Violence</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Demographics</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Survey-Date FEs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Block FEs</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
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<td>38,152</td>
<td>37,706</td>
<td>37,958</td>
<td>38,172</td>
<td>38,097</td>
<td>36,365</td>
<td>35,226</td>
</tr>
<tr>
<td>R²</td>
<td>0.409</td>
<td>0.351</td>
<td>0.396</td>
<td>0.316</td>
<td>0.341</td>
<td>0.411</td>
<td>0.438</td>
<td>0.339</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.397</td>
<td>0.338</td>
<td>0.383</td>
<td>0.302</td>
<td>0.327</td>
<td>0.399</td>
<td>0.426</td>
<td>0.324</td>
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</tbody>
</table>

* p<0.1 ** p<0.05 *** p<0.01
Standard errors clustered by survey block
Figure 8: Predicted Probabilities of Self-Reported: Intention to Report Crime (upper left) and Vote (lower left); Perceptions of Local Police Effectiveness (upper right); and Past Voting (lower right) as Function of Employment Level, with 95% Confidence Intervals; Non-Winsorized Data

Table 2: Past Perceptions on Hours Worked, Linear Probability Model

<table>
<thead>
<tr>
<th>Question Subject</th>
<th>(Baghdad)</th>
<th>(Family)</th>
<th>(Gov’t)</th>
<th>(Jobs)</th>
<th>(Electricity)</th>
<th>(Security)</th>
<th>(Police)</th>
<th>(Principal Component)</th>
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<tr>
<td>Hours Worked</td>
<td>0.004</td>
<td>0.001</td>
<td>0.002</td>
<td>-0.005</td>
<td>0.003</td>
<td>-0.0004</td>
<td>-0.002</td>
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<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Sectarian Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Block FE s</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Observations</td>
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<td>37,958</td>
<td>38,172</td>
<td>38,097</td>
<td>36,365</td>
<td>37,909</td>
</tr>
<tr>
<td>R²</td>
<td>0.361</td>
<td>0.279</td>
<td>0.339</td>
<td>0.212</td>
<td>0.257</td>
<td>0.363</td>
<td>0.389</td>
<td>0.271</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.348</td>
<td>0.264</td>
<td>0.325</td>
<td>0.196</td>
<td>0.241</td>
<td>0.350</td>
<td>0.376</td>
<td>0.256</td>
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*p<0.1  **p<0.05  ***p<0.01

Standard errors clustered by survey block
Figure 9: Predicted Probability of Support for Attacks on Coalition Forces and Employment Level, with 95% Confidence Intervals; Monotonic, Non-Monotonic, and Generalized Additive Model Results Compared
Table 3: Reported Willingness to Report Crime on Hours Worked, Linear Probability (LPM) and Ordered Logistic Regression (LRM) Models

<table>
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<tr>
<th></th>
<th>(LPM 1)</th>
<th>(LPM 2)</th>
<th>(LPM 3)</th>
<th>(LPM 4)</th>
<th>(LRM 1)</th>
<th>(LRM 2)</th>
<th>(LRM 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours Worked</td>
<td>0.039***</td>
<td>0.052***</td>
<td>0.051***</td>
<td>0.032***</td>
<td>0.064***</td>
<td>0.091***</td>
<td>0.094***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.005)</td>
<td>(0.006)</td>
<td>(0.007)</td>
<td>(0.007)</td>
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<td>Sectarian Violence</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Insurgent Violence</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Demographics</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Previous Security Perceptions</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey Date FEs</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey Block FEs</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Observations</td>
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<td>32,139</td>
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<td>( R^2 )</td>
<td>0.005</td>
<td>0.050</td>
<td>0.096</td>
<td>0.277</td>
<td>0.004</td>
<td>0.050</td>
<td>0.107</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.005</td>
<td>0.049</td>
<td>0.091</td>
<td>0.257</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* \( p < 0.1 \)  ** \( p < 0.05 \)  *** \( p < 0.01 \)

Standard errors clustered by survey block in linear probability models
Survey Date-Block LRM result excluded because of model convergence failure.

Table 4: Perceptions of Local Police Effectiveness on Hours Worked, Linear Probability (LPM) and Ordered Logistic Regression (LRM) Models

<table>
<thead>
<tr>
<th></th>
<th>(LPM 1)</th>
<th>(LPM 2)</th>
<th>(LPM 3)</th>
<th>(LPM 4)</th>
<th>(LRM 1)</th>
<th>(LRM 2)</th>
<th>(LRM 3)</th>
<th>(LRM 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours Worked</td>
<td>0.036***</td>
<td>0.047***</td>
<td>0.044***</td>
<td>0.029***</td>
<td>0.049***</td>
<td>0.069***</td>
<td>0.066***</td>
<td>0.047***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.008)</td>
<td>(0.006)</td>
<td>(0.007)</td>
<td>(0.007)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Sectarian Violence</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>Demographics</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Previous Security Perceptions</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Survey Date FEs</td>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey Block FEs</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
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<td>22,885</td>
<td>28,078</td>
<td>22,885</td>
<td>22,885</td>
<td>22,885</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.002</td>
<td>0.027</td>
<td>0.056</td>
<td>0.164</td>
<td>0.003</td>
<td>0.031</td>
<td>0.064</td>
<td>0.177</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.002</td>
<td>0.026</td>
<td>0.050</td>
<td>0.138</td>
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* \( p < 0.1 \)  ** \( p < 0.05 \)  *** \( p < 0.01 \)

Standard errors clustered by survey block in linear probability models
Table 5: Reported Plans to Vote on Hours Worked, Linear Probability (LPM) and Logistic Regression (Logit) Models

<table>
<thead>
<tr>
<th>Hours Worked</th>
<th>(LPM 1)</th>
<th>(LPM 2)</th>
<th>(LPM 3)</th>
<th>(LPM 4)</th>
<th>(Logit 1)</th>
<th>(Logit 2)</th>
<th>(Logit 3)</th>
<th>(Logit 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.009**</td>
<td>0.008*</td>
<td>0.009*</td>
<td>0.011**</td>
<td>0.043***</td>
<td>0.038**</td>
<td>0.045**</td>
<td>0.066***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.017)</td>
<td>(0.017)</td>
<td>(0.018)</td>
<td>(0.021)</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Demographics</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Previous Security Perceptions</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Survey Date FEs</td>
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<td>No</td>
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<tr>
<td>Survey Block FEs</td>
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<td>No</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
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<td>5,726</td>
<td>5,749</td>
<td>5,726</td>
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<tr>
<td>R²</td>
<td>0.001</td>
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<td>0.035</td>
<td>0.195</td>
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<td></td>
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</tr>
<tr>
<td>Adjusted R²</td>
<td>0.001</td>
<td>0.010</td>
<td>0.027</td>
<td>0.129</td>
<td></td>
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<td></td>
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</tr>
</tbody>
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*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block in linear probability models

Table 6: Support for the Presence of Coalition Forces on Hours Worked, Public and Private Sector Employees Compared, Linear Probability Model

<table>
<thead>
<tr>
<th>Hours Worked</th>
<th>(Public Sector Employees)</th>
<th>(Unemployed and Private Sector Employees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>−0.028**</td>
<td>−0.003</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Sectarian Violence</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Demographics</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Date FEs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Block FEs</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Observations</td>
<td>4,352</td>
<td>7,013</td>
</tr>
<tr>
<td>R²</td>
<td>0.177</td>
<td>0.162</td>
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<tr>
<td>Adjusted R²</td>
<td>0.080</td>
<td>0.103</td>
</tr>
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</table>

*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block
Table 7: Support for Attacks on Coalition Forces on Hours Worked, Linear Probability Model

<table>
<thead>
<tr>
<th></th>
<th>(LPM 1)</th>
<th>(LPM 2)</th>
<th>(LPM 3)</th>
<th>(LPM 4)</th>
<th>(LPM 5)</th>
<th>(LPM 6)</th>
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</thead>
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<td>Hours Worked</td>
<td>0.017***</td>
<td>0.048***</td>
<td>0.044***</td>
<td>0.031***</td>
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<td>0.080***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.006)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Hours Worked (Squared)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
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<td>Yes</td>
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<td>Yes</td>
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<td>Survey-Block FEs</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Observations</td>
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<td>11,946</td>
<td>11,946</td>
<td>7,100</td>
<td>11,946</td>
</tr>
<tr>
<td>R²</td>
<td>0.006</td>
<td>0.051</td>
<td>0.087</td>
<td>0.219</td>
<td>0.216</td>
<td>0.220</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.006</td>
<td>0.050</td>
<td>0.075</td>
<td>0.172</td>
<td>0.162</td>
<td>0.173</td>
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*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block

Table 8: Support for Attacks on Coalition Forces on Hours Worked, Logistic Regression Model

<table>
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<th></th>
<th>(Logit 1)</th>
<th>(Logit 2)</th>
<th>(Logit 3)</th>
<th>(Logit 4)</th>
<th>(Logit 5)</th>
<th>(Logit 6)</th>
</tr>
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<tbody>
<tr>
<td>Hours Worked</td>
<td>0.070***</td>
<td>0.220***</td>
<td>0.209***</td>
<td>0.171***</td>
<td>0.052**</td>
<td>0.401***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.018)</td>
<td>(0.019)</td>
<td>(0.021)</td>
<td>(0.026)</td>
<td>(0.075)</td>
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<tr>
<td>Hours Worked (Squared)</td>
<td>−0.025***</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sectarian Violence</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>No</td>
<td>No</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Demographics</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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<td>Survey-Date FEs</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>11,946</td>
<td>11,946</td>
<td>7,100</td>
<td>11,946</td>
</tr>
<tr>
<td>R²</td>
<td>0.006</td>
<td>0.051</td>
<td>0.087</td>
<td>0.219</td>
<td>0.216</td>
<td>0.220</td>
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<tr>
<td>Adjusted R²</td>
<td>0.006</td>
<td>0.050</td>
<td>0.075</td>
<td>0.172</td>
<td>0.162</td>
<td>0.173</td>
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*p<0.1 **p<0.05 ***p<0.01
### Table 9: Robustness: Individual Neighborhood Exclusions – I

<table>
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<th>Neighborhood Exclusions</th>
<th>Hours Worked</th>
<th>Sectarian Violence</th>
<th>Insurgent Violence</th>
<th>Support for Militias</th>
<th>Demographics</th>
<th>Education Controls</th>
<th>Survey-Date FEs</th>
<th>Survey-Block FEs</th>
<th>Observations</th>
<th>R²</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>(~ Rusafa)</td>
<td>0.016***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>11,600</td>
<td>0.217</td>
<td>0.171</td>
</tr>
<tr>
<td>(~ Karkh)</td>
<td>0.017***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>11,560</td>
<td>0.215</td>
<td>0.168</td>
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<tr>
<td>(~ Adhamiyah)</td>
<td>0.014***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>10,213</td>
<td>0.223</td>
<td>0.174</td>
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<tr>
<td>(~ Kadhimy whole)</td>
<td>0.020***</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>10,992</td>
<td>0.226</td>
<td>0.180</td>
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<tr>
<td>(~ Sadr City)</td>
<td>0.019***</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>9,117</td>
<td>0.231</td>
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Standard errors clustered by survey block

### Table 10: Robustness: Individual Neighborhood Exclusions – II

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<th>Neighborhood Exclusions</th>
<th>Hours Worked</th>
<th>Sectarian Violence</th>
<th>Insurgent Violence</th>
<th>Support for Militias</th>
<th>Demographics</th>
<th>Education Controls</th>
<th>Survey-Date FEs</th>
<th>Survey-Block FEs</th>
<th>Observations</th>
<th>R²</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>(~ Mansour)</td>
<td>0.017***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>11,129</td>
<td>0.224</td>
<td>0.179</td>
</tr>
<tr>
<td>(~ New Baghdad)</td>
<td>0.018***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>11,247</td>
<td>0.217</td>
<td>0.172</td>
</tr>
<tr>
<td>(~ Rashid)</td>
<td>0.017***</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>10,348</td>
<td>0.229</td>
<td>0.182</td>
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<tr>
<td>(~ Karadah)</td>
<td>0.017***</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>11,533</td>
<td>0.217</td>
<td>0.171</td>
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<td>(~ Rural)</td>
<td>0.013***</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>9,775</td>
<td>0.201</td>
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Standard errors clustered by survey block
Table 11: Robustness: Support for Coalition Attacks: Primary, Cook’s Distance, and Overtime Worker Exclusion Results, Linear Probability Model

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<tr>
<th></th>
<th>(Full Model)</th>
<th>(Full Model)</th>
<th>(Outlier Exclusion)</th>
<th>(Outlier Exclusion)</th>
<th>(≤ 40 Hours)</th>
<th>(≤ 40 Hours)</th>
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<td>Hours Worked</td>
<td>0.031***</td>
<td>0.080***</td>
<td>0.034***</td>
<td>0.078***</td>
<td>0.025**</td>
<td>0.126**</td>
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<td>(0.017)</td>
<td>(0.005)</td>
<td>(0.017)</td>
<td>(0.011)</td>
<td>(0.059)</td>
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<td>Hours Worked</td>
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<td>0.005***</td>
<td>0.018*</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(Squared)</td>
<td>(0.002)</td>
<td>(0.002)</td>
<td></td>
<td></td>
<td></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Insurgent Violence</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support for Militias</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Demographics Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
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<td>Survey Block Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Survey Date Fixed Effects</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>11,946</td>
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<td>11,451</td>
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<td>8,730</td>
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<td>$R^2$</td>
<td>0.219</td>
<td>0.220</td>
<td>0.281</td>
<td>0.281</td>
<td>0.250</td>
<td>0.250</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.172</td>
<td>0.173</td>
<td>0.239</td>
<td>0.240</td>
<td>0.188</td>
<td>0.189</td>
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*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block

Table 12: Robustness: Pessimism – Unemployed and Students/Housewives/Retirees Compared

<table>
<thead>
<tr>
<th>Question Subject</th>
<th>(Baghdad)</th>
<th>(Family)</th>
<th>(Gov’t)</th>
<th>(Jobs)</th>
<th>(Electricity)</th>
<th>(Security)</th>
<th>(Police)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>0.060***</td>
<td>0.059***</td>
<td>0.056***</td>
<td>0.086***</td>
<td>0.080***</td>
<td>0.059***</td>
<td>0.057***</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
<td>(0.013)</td>
<td>(0.014)</td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.015)</td>
<td>(0.015)</td>
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<tr>
<td>Past Perceptions</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sectarian Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Demographics Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Date FE's</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Block FE's</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
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<td>53,708</td>
<td>52,756</td>
<td>52,952</td>
<td>53,663</td>
<td>53,537</td>
<td>50,801</td>
</tr>
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<td>$R^2$</td>
<td>0.391</td>
<td>0.338</td>
<td>0.374</td>
<td>0.310</td>
<td>0.326</td>
<td>0.386</td>
<td>0.411</td>
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<td>Adjusted $R^2$</td>
<td>0.382</td>
<td>0.328</td>
<td>0.364</td>
<td>0.300</td>
<td>0.317</td>
<td>0.377</td>
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*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block

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### Table 13: Robustness: Past Perceptions – Unemployed and Students/Housewives/Retirees Compared

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<th>(Gov’t)</th>
<th>(Jobs)</th>
<th>(Electricity)</th>
<th>(Security)</th>
<th>(Police)</th>
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<tbody>
<tr>
<td>Unemployed</td>
<td>-0.012</td>
<td>0.030**</td>
<td>0.017</td>
<td>0.052***</td>
<td>0.020</td>
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<td>0.008</td>
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<td></td>
<td>(0.016)</td>
<td>(0.014)</td>
<td>(0.017)</td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.018)</td>
<td>(0.018)</td>
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<tr>
<td>Past Perceptions</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sectarian Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Demographics</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Date FEs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Survey-Block FEs</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
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<td>52,756</td>
<td>52,952</td>
<td>53,663</td>
<td>53,537</td>
<td>50,801</td>
</tr>
<tr>
<td>R²</td>
<td>0.325</td>
<td>0.253</td>
<td>0.311</td>
<td>0.204</td>
<td>0.232</td>
<td>0.334</td>
<td>0.362</td>
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<td>Adjusted R²</td>
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<td>0.242</td>
<td>0.301</td>
<td>0.192</td>
<td>0.220</td>
<td>0.324</td>
<td>0.352</td>
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*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block

### Table 14: Robustness: Attitudes Toward Crime Reporting, Police Efficacy, Voting, and the Use of Violence – Unemployed and Students/Housewives/Retirees Compared

<table>
<thead>
<tr>
<th>Question Subject</th>
<th>(Reporting)</th>
<th>(Police)</th>
<th>(Voting)</th>
<th>(Violence Support)</th>
<th>(Violence Support (Logit))</th>
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</thead>
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<tr>
<td>Unemployed</td>
<td>-0.051**</td>
<td>-0.043</td>
<td>-0.049**</td>
<td>-0.021*</td>
<td>-0.106**</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.031)</td>
<td>(0.021)</td>
<td>(0.012)</td>
<td>(0.050)</td>
</tr>
<tr>
<td>Sectarian Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Insurgent Violence</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support for Militias</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Demographics</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Previous Security Perceptions</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Date FEs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey-Block FEs</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
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<td>28,631</td>
<td>7,135</td>
<td>28,085</td>
<td>28,085</td>
</tr>
<tr>
<td>R²</td>
<td>0.265</td>
<td>0.174</td>
<td>0.203</td>
<td>0.173</td>
<td></td>
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<tr>
<td>Adjusted R²</td>
<td>0.249</td>
<td>0.154</td>
<td>0.152</td>
<td>0.152</td>
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*p<0.1 **p<0.05 ***p<0.01
Standard errors clustered by survey block in linear probability models
<table>
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<th>Statistic</th>
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<th>Mean</th>
<th>St. Dev.</th>
<th>Min</th>
<th>Max</th>
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<td>Baghdad Conditions Expectations</td>
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<td>3.037</td>
<td>1.077</td>
<td>1</td>
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<td>Family Conditions Expectations</td>
<td>101,972</td>
<td>2.926</td>
<td>0.953</td>
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Chapter 3

1

The relationship between sub-state conflict and information and communication technologies (ICT) is the focus of much recent scholarly work Pierskalla and Hollenbach, 2013, Shapiro and Weidmann, 2015, Howard et al., 2011, Manacorda and Tesei, 2016, Shapiro and Siegel, 2015, Steinert-Threlkeld, 2016, Dafoe and Lyall, 2015, Weidmann, 2015. As Dafoe & Lyall 2015, p. 401 observe, “[w]e appear... to be standing at the threshold of an ICT-driven transformation of [political conflict] that will rival the introduction of earlier technologies such as the telegraph, newspaper, radio, and television.” Researchers have focused primarily on ICT’s role in facilitating the mobilization of violent political actors. Pierskalla & Hollenbach 2013, p. 220 find that the spread of cellular telephones has increased conflict likelihood on the African continent by providing a path for collective action, enhancing rebels’ capacity to “communicate and monitor ingroup behavior [and coordinate] across geographically distant locations.” Instrumenting for cellular telephone coverage with lightening strikes, Manacorda & Tesei 2016, p. 1 show that over the past decade, across Africa “mobile phones [have been] instrumental to mass mobilization during economic downturns, when reasons for grievance emerge and the cost of participation falls.”

Yet, information and communication technologies’ effects on conflict processes once underway are much less well understood, and recent research provides evidence that once conflict is initiated, available ICT may favor the state. Specifically, Shapiro & Weidmann (2015) find the spread of ICT in Iraq effected reductions in insurgent violence perpetrated against multinational and state government forces and hypothesize two non-exclusive mechanisms of action. Whereas ICT appears on balance to favor relative weak sub-state actors seeking to mobilize against a state, once conflict is initiated, its benefits might accrue to the state. They may provide civilians
the means of discreetly supplying information to counterinsurgents (for instance, by allowing them to call an anonymous “tips” hotline). Insurgents’ use of ICT might also create “opportunities for signals intelligence collection” Shapiro and Weidmann, 2015, p. 249. Nevertheless, the mechanism(s) of action responsible for potential reductions in the intensity of ongoing conflict are both theoretically underdeveloped and empirically unsubstantiated.

In this study, I focus specifically on the relationship between ICT, wartime informing by civilians, and insurgent violence. Using newly declassified data on calls placed to a “tips” telephone hotline operated by British forces in the southern provinces of Iraq during the recent Iraq war, I seek to assess both the overall and heterogenous effects of informing through ICT channels on insurgents’ production of violence. I supplement this quantitative analysis with insights gleaned from a series of wartime documents, many of which were recently declassified by the U.S. and British governments, as well as a series of interviews conducted with present and former U.S. and Iraqi government employees involved with the “tips” hotlines operations during the Iraq war.

On the surface, the results appear to be inconsistent with findings by Shapiro and Weidmann 2015. Specifically, I find that positive changes in information received through the tips hotline studied in this project are associated with subsequent increases in overall insurgent violence. However, analyzing potential heterogeneity in treatment effects suggests otherwise. Despite considerable efforts by insurgents to overwhelm ICT tipping platforms, ICT-based information flow appears to have reduced both highly planned attacks (including car bombings, suicide bombings, and assassinations) as well as attacks using improvised explosive devices, rockets, and mortars. In contrast, increases in tips are associated with increases in direct fire attacks. Such findings are consistent with an explanation that tips served to affect insurgent violence by both disrupting principal-agent coordination and exposing
weapons caches, which forced insurgent foot soldiers to substitute attacks over which they exercised greater individual discretion.

2 The Role of Information in Insurgency

Counterinsurgency theorists and practitioners have long held that information is central to the outcome of insurgency contests Galula, 2006, Lyall et al., 2015, Berman et al., 2011b, Lyall and Wilson, 2009, Shaver et al., forthcoming, Leites and Wolf Jr, 1970, Shapiro and Siegel, 2015. While state forces are often militarily superior to the insurgents they fight, the former often lack information about the insurgency – the identities of its members, the locations of its safe houses and weapons caches, “how [it] operates, when it is likely to attack, in units of what size...” Leites and Wolf Jr, 1970, p. 136. Thus, although a power asymmetry tends to favor counterinsurgents, this advantage is offset to a greater or lesser extent by an information asymmetry favoring insurgents. Kalyvas 2006, p. 89 described this dynamic at work during the Soviet occupation of Afghanistan, where better equipped “Soviet soldiers... referred to their Afghan adversaries as dukhi, the Russian word for ghosts... and summarized the problem they faced as follows: ‘You see me, but I don’t see you.’”

Galula 2006, p. 50 observed more than five decades ago that “[i]ntelligence is the principal source of information on guerrillas, and intelligence has to come from the population...” Citizens’ decision to provide or withhold information is, therefore, thought to play a central role in insurgency contests. Although few citizens may have substantial knowledge about an insurgency in any given conflict, their collective observations may be pooled to paint a comprehensive picture of an insurgency and its operations. For this reason, Berman et al. 2011b, p. 773 argued that “the silence of the population, or a substantial portion thereof, is critical for insurgent success.” Civilian informers threaten to erode the informational barriers that limit
counterinsurgents’ ability to engage insurgents in direct military confrontations. This dynamic renders information “a central resource in civil wars: counter-insurgents seek it, insurgents safeguard it, and civilians often trade it” Lyall et al., 2015, p. 833.

The recent Iraq and Afghanistan wars illustrate that information asymmetries can offset even the greatest power imbalance between opposing combatants. In those conflicts, the world’s military superpower led a coalition of allied nations in a fight against insurgents who had access to little more than small arms, low quality mortars, and improvised explosive devices.\footnote{The complete sets of data on insurgent attacks carried out against Coalition forces during the Iraq and Afghanistan war as recorded by the U.S. military Shaver and Bollfrass, 2016, Shaver and Wright, 2016, show that the vast majority of attacks carried out by insurgents involved the use of direct fire weaponry (typically small arms) and improvised explosive devices.} Despite the overwhelming power imbalance, insurgents in both countries persisted in carrying out hundreds of thousands of attacks against multi-national and state government forces in the near decade-long conflict in Iraq and for much longer in Afghanistan, now the United States’ longest running war.

3 ICT, Information Flow, and Political Violence

3.1 ICT Tipping Platforms in Recent History

With the development and diffusion of information and communication technologies, embattled governments have produced a number of platforms to facilitate the flow of information from the public. One of the earliest examples of the use of such technologies comes from the Irish Troubles. During that conflict, the Royal Ulster Constabulary established and advertised landline telephone numbers that Northern Irish citizens could call to inform on the activities of the Irish National Liberation Army and other militant organizations Acheson, 1996.

A number of countries have since followed suit. Following the spread of the Islamic
State of Iraq and the Sham (ISIS) into Iraq, that country’s government reestablished tips hotlines originally established in cooperation with American and British forces that residents of affected areas of the country could use to report on the terrorist organization Shaver et al., forthcoming. Meanwhile, as Iraq’s central government worked to reestablish a supply of information from the public, ISIS, in a reported effort to stop “local residents [from] phoning in tips that [are] used by U.S. and Iraqi commanders to select airstrike targets”, suspended cellular telephone service in the city of Mosul Prothero and George, 2014.

In 2010, the Philippines National Bureau of Investigation established a terrorism hotline to collect “tips from concerned citizens so we can respond to any incident quickly” GMA News Online, 2010. During the recent period of revolutionary unrest in Egypt, that country’s government established a series of hotlines through which citizens could report members of the Muslim Brotherhood and terrorist organizations. Pakistan’s central government also recently established a series of lines that citizens can call to report “suspicious activity about terrorism” Pakistan Hotline, 2014. Even more recently, Turkey’s central government, which, for years, has been locked in violent conflict with Kurdish separatists and has recently been targeted in terrorist attacks carried out by ISIS, has established an emergency hotline to collect information on “the identity or the location of a ‘terrorist’; a plot by terrorist groups or locations of ammunition” Daily Sabah, 2015. Advertisements for several of these programs are displayed in Figure 1.3

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2 At the time of this writing, the advertisement remains live on the Egyptian Government’s official police Facebook page: https://www.facebook.com/Egyptian.Police0

3 Countries’ use of ICT platforms for national security purposes has not been limited to counterinsurgency. For instance, to reduce the number (or freedom of operation) of foreign spies operating within its territory, China recently established a “spy hotline” for “[c]itizens concerned that they have encountered a spy... to report [the] potential snooper” Macauley, 2015. Seeking assistance in locating high ranking drug cartel officials, the United States’ Drug Enforcement Agency has established and advertised anonymous hotlines along the country’s border with Mexico to solicit information from Mexican citizens Epstein, 2016. In efforts to track nationals who have traveled to Syria to fight in its ongoing civil war, the French and Russian governments have both established independent telephone hotlines. In France, “[p]eople are encouraged to call the number if they suspect a friend or family member is considering travelling to the country or is in danger of becoming
3.2 ICT and Counterinsurgency Effectiveness

In this section I consider two related but distinct questions. When employed during insurgencies, do ICT-based tipping platforms on net benefit counterinsurgents? What explains variation in the vulnerability of insurgent violence to tips?

To be effective, it is necessary but not sufficient for these platforms to generate a flow of credible intelligence on which counterinsurgent forces may act. At issue are the very characteristics that make these platforms attractive to potential informants – their ease of use and the potential anonymity they provide users. These characteristics may serve an insurgency’s interest by also allowing its agents to both interfere with the platforms’s operations and supply their own information. Below, I describe this dichotomy, and develop a basic theory of insurgent exploitation.

At the broadest level, the existence of ICT-based tipping platforms may facili-
tate the flow of information that is both helpful and harmful to counterinsurgency efforts. Information that benefits counterinsurgent efforts (hereafter, “beneficial information”) includes actionable intelligence as well as more general details that are not immediately actionable but “useful in developing intelligence and further research” Multi-National Corps – Iraq, 2008, p. 3. Harmful information is produced directly by insurgencies and their agents as they endeavor to exploit these platforms. This information includes both generally irrelevant (hereafter, “spurious”) and false (hereafter, “false”) information supplied by an insurgency. Information of this type taxes counterinsurgency resources and may improve an insurgency’s position vis-à-vis countersmall arms.

Both spurious and false information threaten to reduce the value of beneficial information. Specifically, beneficial information is often time sensitive – as when it relates to impending attacks or the temporary whereabouts of high value targets – and useful only if acted on rapidly. Insurgents (or individuals recruited for such purpose) who make repeated calls to tips hotlines, for instance, may reduce the amount of credible information received by the call-center operators by both tying up telephone lines and diverting operator attention with irrelevant details. Insurgent callers might also offer false information that appears credible – for instance, claiming that an improvised explosive device has been emplaced along a particular roadway when no such device exists. Unless counterinsurgents can efficiently discard of such information, the flow of false information threatens to render time-sensitive information irrelevant by diverting their resources and ultimately slowing their response times on beneficial information. Finally, false information may also directly benefit an insurgency. Insurgents may supply false information that succeeds, for instance, in luring responding counterinsurgents into ambushes or, more simply, diverting them so that

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4Although sophisticated governments may in theory partially overcome these problems with particular technological fixes, as a review of the evidence will later show, even governments with access to the world’s most sophisticated technologies appear beholden to at least some of these insurgent tactics.
insurgents can carry out attacks in areas left relatively more susceptible as a result.

The ultimate effect of ICT-facilitated informing is likely to depend upon the aggregate effect of both types of information on insurgency-counterinsurgency interactions. Although seemingly unlikely, if insurgents were to ambush or divert counterinsurgents with false information more frequently than counterinsurgents acted effectively on legitimate tips, counterinsurgents’ use of such platforms might leave them worse off than if they had never adopted the platforms.

Yet, even in restricting focus to the flow of beneficial information, its effects on insurgents’ production of violence are not immediately discernible. Although a large body of work has focused on the general importance of informing during insurgency, little attention has been paid to how specifically informing affects insurgent operations, particularly as related to ICT-facilitated informing. A second important question then is: what explains variation in the vulnerability of insurgent violence to tips? Below, I describe two factors likely to influence the ways in which beneficial information affects an insurgency. In doing so, I describe why heterogeneous treatment effects of informing might produce outcomes that appear to favor an insurgency but actually improve the position of counterinsurgents.

**Organizational Planning.** Insurgencies tend to benefit when the violence they produce is directed and overseen by their principals, as, for instance, “when making strategic decisions that require integrating many sources of information, such as what types of targets should be hit” Shapiro, 2013, p. 27.\(^5\)

\(^5\)I focus specifically on insurgents’ production of violence rather than other potentially relevant outcomes following a large body of existing quantitatively oriented counterinsurgency research, whose authors have consistently adopted such outcome Berman et al., 2011b, Hirose et al., 2017, Berman et al., 2011a, Condra and Shapiro, 2012, Biddle et al., 2012. Other outcomes including the removal of an insurgency’s leadership Johnston, 2012, the disruption of its weapons and financial flows, and changes in its recruitment rate, are potentially relevant as well.

\(^6\)There are exceptions, of course. For instance, Shapiro 2013 describes cases in which delegation of responsibility results in efficiency gains for the violent political organization.
“[O]peratives rarely have the same understanding of political impact as leaders... [Principals] are likely to be better informed than their agents about the mapping from actions to political outcomes because the exigencies of avoiding government forces often means agents have to live relatively isolated lives, making them ill-informed about the political impact of their own actions.”

Yet, violent political organizations incur costs when principals actively manage their agents. Direct and regular coordination between these groups “reduces leaders’ security because it requires additional communications and creates links between leaders and those most likely to be identified and captured by the government...” Shapiro, 2013, p. 31.

Tips directly threaten insurgencies, in part, by undermining principal-agent coordination. Whether they are specific – relating, for instance, to individual insurgents’ identities – or more general – for instance, concerned with suspicious activity observed by a civilian – beneficial tips threaten to expose links between leaders and foot soldiers. One likely effect of beneficial tips is the disruption of insurgent attacks that require the greatest levels of planning and coordination. Conversely, from the perspective of principal-agent dynamics, beneficial tips may increase other types of violence by forcing organizational substitution into other, less coordinated means of violence. Specifically, agents who experience disrupted communication with their principals may substitute into the production of violence over which they exercise the greatest discretion.

**Organizational Weapons-Use Constraints.** Organizations face constraints imposed by the nature of employing different weaponry during combat. Specifically, there are (at least) two basic characteristics associated with the use of modern insurgency weaponry that affect its vulnerability to informing. First, some weapons are particularly likely to be drawn from caches immediately before their use and, as such, are vulnerable in the short-to-medium term to changes in cache availability. Such weapons include those that are single use and difficult to travel with (for instance, on account of their weight or because they are difficult to conceal). Improvised explosive
devices, rockets, and mortars are three notable examples. Beneficial tips that result in some positive increase in counterinsurgent cache discoveries are, therefore, likely to limit the number of attacks that insurgents can carry out using affected weaponry.

In contrast, weapons including small arms (rifles and pistols) that can be employed repeatedly by insurgents and whose ammunition is lightweight and easily concealable can more easily be dispersed across an insurgency’s area of operation (for instance, across individual insurgents’ homes) and are, thus, not nearly as vulnerable to cache discoveries (again, during the short-to-medium term).\(^7\)

Second, the use of particular weapons tends to involve relatively long lead times between attack setup and execution. Longer lead times render such attacks relatively more vulnerable to beneficial tipping because there is some likelihood that resulting counterinsurgency measures interfere with some aspect of the planned attack. For instance, once roadside bombs have been emplaced by insurgents or their civilian supporters, they are unlikely to be detonated until a suitable (typically police or military) target is proximate. During this period, there is some non-trivial probability that bypassing civilians will spot and report the suspicious devices, which can then be cleared by explosive ordnance disposal teams. Similarly, an ambush team that lays in wait for a particular target is susceptible to civilian spotting. On the other hand, attacks that can be executed quickly and with little or no advanced planning are less likely to be observed by civilians and, even if so, are less likely to be thwarted by information shared about them by civilians given the rapidity of such attacks. For instance, from setup to attack, rockets and mortars can be rapidly directed against

\(^7\)Although the use of particular weaponry may be more vulnerable to cache discoveries, there is still good reason for insurgencies to use such weapons. Data from the Afghanistan War, for instance, shows that attacks with improvised explosive devices, for instance, have tended to be far deadlier than those involving small arms and other direct fire weaponry. For instance, between the years 2010 and 2014, the period during which casualty outcomes were consistently tracked by the U.S. military (and which covers approximately 74 percent of all significant incidents reported throughout Operation Enduring Freedom), attacks using improvised explosive devices were nearly twice as likely to result in multi-national force casualties than those involving direct fire. The statistic is the same whether calculated to include only cases in which these forces were 1) wounded, 2) killed, or 3) both.
fixed targets by small teams. Even if mortar teams are observed by civilians, they are likely to have dispersed long before any counterinsurgent action could be undertaken in response.

3.3 Observable Implications in Modern Insurgency

In this section, I consider implications of the wartime dynamics described above on insurgency outcomes. The list that I identify is not exhaustive but provides the basis for hypotheses and subsequent empirical testing. I first consider likely effects of insurgent exploitation before describing those associated with the flow of beneficial information following organizational planning and weapons-use constraints considerations.

By slowing counterinsurgent response times and obstructing the flow of beneficial information, spurious information is likely to (weakly) attenuate the counterinsurgent benefits of tips. For instance, if tips affect the most organizationally planned violence, as theorized above, spurious information would mitigate any such effects. When effective, false information should produce increases in particular types of insurgent violence. When used to lure responding counterinsurgents into surprise attacks, unidentifiably false tips should be associated with an increase in the number of ambushes. For instance, when false information is used to divert counterinsurgent forces, increased violence is more likely; however, there are no obvious limits on the particular types of violence that are likely to be affected.

The effects of organizational planning and weapons-use constraints on insurgents’ production of violence give rise to their own observable effects. Disruptions to organizational planning might be observed both in attack and, separately, target type. Attacks using certain types of weapons tend to involve high levels of organizational planning. These include attacks using vehicle-borne explosives and suicide vests. Similarly, assassinations, although not entirely dependent on a particular weapon, tend
to require advanced planning. Greater levels of organizational planning are likely to be associated with attacks on particular targets. For instance, attacks against military installations with direct fire weapons are likely to have involved greater levels of planning. Such attacks require insurgents to position themselves within proximity to the target and, thus, involve increased risk of spotting and counter-fire by government forces (manning observation posts, for instance). Perhaps more importantly, such targets are significantly less vulnerable to direct fire attack than virtually all others wartime targets. For base attacks involving direct-fire weaponry to have any meaningful effect, they are, therefore, likely to involve pre-coordination. Weapons-use constraints give rise to their own expected shifts in insurgent violence. Following this logic, attacks using weapons that are relatively cache dependent should experience greater decreases to beneficial tips received. Similarly, attacks with weapons that have longer lead times should be more susceptible to beneficial information.

One complicating factor in mapping theoretical expectations to observed patterns of violence concerns fighting amongst combatants that occurs as counterinsurgents respond to beneficial information received. For instance, counterinsurgents acting on tips concerning the location of known insurgents or weapons caches may draw fire during the raids they conduct. Such incidental violence is not necessarily detrimental to counterinsurgent efforts but instead reflects the accepted cost associated with acting on beneficial information.

How do these various predicted effects collectively manifest? Whatever the extent of each effect, spurious information should serve to attenuate them all. In reducing operator response times and obstructing information flow, spurious information threatens to render both beneficial and false information irrelevant.

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8Note that I distinguish such attacks from those on military installations using rockets and mortars. This latter class of weapon can often be directed against bases without advanced planning.
Hypothesis 1. *If spurious information effects dominate, information flow will tend to be unassociated with insurgent violence.*

Next, note that (weak) increases in attacks over which foot soldiers exercise the greatest discretion are expected in the presence of most of the described effects. Resulting substitution into such attacks is one possible response insurgents might adopt in the presence of organizational planning effects. To see why this is the case in the presence of organizational weapons-use constraints, recall that attacks using small arms are one of the least likely attack types to be affected by cache discoveries. If insurgents substitute into attacks using available weapons following cache discoveries, then small arms attacks are likely to increase. Because small arms are mobile and can be rapidly fired by a single user against a variety of targets, they are amongst the most easily used by insurgents operating independently and at their own discretion. Finally, incidental violence generated as counterinsurgents act on beneficial information are likely to involve small arms. Unlike other weapons commonly used by insurgencies including improvised explosive devices and rockets and mortars, such weapons can be quickly fired in close quarters against intruding counterinsurgent forces.9

Hypothesis 2. *Information flow will be associated with increases in the least organizationally constrained violence.*

The aggregate effect of ICT-based informing on other patterns of violence are more ambiguous. Successful ambushes and diversions resulting from false information may generate increases in violence involving higher levels of organizational planning and/or weapons that are cache-dependent and have longer lead times. For instance, roadside bomb attacks using improvised explosive devices might be used in ambushes and are likely to be both vulnerable to cache discovery and to have relatively long lead times.

9Lead-time effects do not predict an increase in small-arms attacks. However, because many attacks with small arms are likely to involve very short lead times, attacks using these weapons are amongst the least likely to be affected.
If, however, organizational planning and/or weapons-use constraints effects dominate, then reductions in particular types of insurgent violence should result nonetheless.

If organizational planning effects dominate:

**Hypothesis 3.** *Information flow will be associated with decreases in organizationally planned attacks.*

If organizational weapons-use effects dominate:

**Hypothesis 4.** *Information flow will be associated with decreases in attacks using weapons that are cache dependent and/or with long lead times.*

**Hypothesis 5.** *Information flow will be associated with increases in cache discoveries that precede or are contemporaneous with reductions in attacks using cache-dependent weaponry.*

4 Qualitative Evidence from the Iraq War

A review of qualitative evidence from the Iraq War paints a mixed picture of the effects of ICT-based tips platforms on insurgent violence. During that conflict, American and British forces and their host-nation partners established a variety of ICT-based platforms to collect information from the public on insurgents.

4.1 A Brief History of the Development of ICT-Based Platforms

The earliest use of tips hotlines during the Iraq war centered not on collecting information on insurgents but on securing details related to the whereabouts of deposed Baathist leader Sadaam Hussein and on instances of “police or judicial corruption” (see figure 2). Bernard Kerik, a former New York City police commissioner who
served as Iraq’s interim Minister of Justice before the Coalition Provisional Authority transferred affairs to the Iraqi central government, explains that, in consultation with various Iraqi military officers, he came up with the initial idea for a tips hotline based on his experience having run a tips hotline in New York City. The Coalition Provisional Authority “gave us a satellite phone [and the] idea was for us to put up posters [and for the calls to] be taken by the Iraqi officers... Everyone [the Iraqi military officers] refused! They were deathly afraid of someone recognizing their voices. So, no one would take the phone: ‘They’ll kill me and my family.’” Kerik, 2014. However, after finding someone willing to answer the calls, “we put up the posters all over Baghdad... Then, within about three days, we had our first call about a kidnapping” Kerik, 2014.

As the Iraqi insurgency began to intensify, American and British forces worked
with Iraq’s Ministry of Interior to establish the national “130 tips hotline,” “an anonymous tip-off telephone hotline for reporting terrorist related activity” U.S. Central Command, U.S. Department of Defense, 2007. British forces operating in the country’s south managed a separate regional “130” line that serviced the greater Basra area. In addition to these lines, “between 30 and 60” regional hotlines were established U.S. Central Command, U.S. Department of Defense, 2007. American forces established e-mail accounts with Gmail and Yahoo! (for instance, eyesoniraq130 [at] gmail.com, baghdadtipshotline [at] yahoo.com, and tipstallafar [at] yahoo.com) to which information could be e-mailed Task Force Baghdad PAO, 2005, BBC, 2005. For its part, the Central Intelligence Agency developed an online Arabic-language submission platform through which “brave individuals willing to provide information leading to the arrest of terrorists and the leaders of the extremist organizations...”10 could supply tips.11

These platforms were advertised to Iraqi citizens in a wide variety of ways ranging from “billboard advertisements [to] television commercials, leaflets, business cards, posters, stickers, and even cigarette lighters...” Shaver et al., forthcoming, p. 13. Examples from Iraq (and Afghanistan) are depicted in Figure 3.

4.2 The Effects of Tips and Insurgent Exploitation

U.S. Defense Department press releases and public reports (and popular media stories based on information supplied by the Department) relating to the war describe numerous counterinsurgency successes resulting from tips secured from local citizens. One tip, for instance, supplied “from inside Sadr City led Iraqi and coalition forces to a cache inside Sadr City of more than 450 deadly anti-tank mines” Garamone, 2007. Another tip is credited with leading “U.S. troops to five separate buildings

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10 Author’s translation.
Figure 3: Beginning with the top left image and moving clockwise: Image 1 depicts U.S. and Afghan soldiers distributing fliers containing tip-line information (source: DVIDS (U.S. Military)). Image 2 shows leaflets containing tip-line numbers being dropped from helicopter in Afghanistan (source: DVIDS (U.S. Military)). Image 3 shows posters with tip-line information in Afghanistan (source: DVIDS (U.S. Military)). In image 4, an Iraqi citizen takes cigarette lighter engraved with tip-line number (source: DVIDS (U.S. Military)). Image 5 is of an Iraqi citizen holding U.S. military issued business card containing tip-line number (source: DVIDS (U.S. Military)). The final image shows a soldier affixing a sticker containing tip-line number in public space (source: DVIDS (U.S. Military)).
near Fallujah... where they found the munitions containing chemicals, three vehicle
bombs being assembled, including a truck bomb, about 65 propane tanks and ‘all
kinds of ordinary chemicals’” Smith, 2007. Yet another is described as leading to the
discovery of “five separate weapons caches west of Tarmiyah, containing a total of
41,000 pounds of explosives as well as 35 projectiles, one of the largest caches found

However, such stories are of limited value in assessing the effects of the ICT
platforms. It is unclear from these accounts whether the tips that resulted in such
successes were secured through ICT platforms or through traditional channels (e.g.
in-person communications). Furthermore, the Department’s strategic intentions in
highlighting such stories are not fully known. For instance, for every such success
story, it is unknown what number of cases occurred, if any, (but were not publicly
reported) in which insurgents successfully baited Coalition or Iraqi forces by planting
false tips.

A more credible body of information is contained within a series of internal doc-
uments recently released by U.S. Central Command and by the UK’s Ministry of
Defence. When written, these materials were not intended for public consumption.
Indeed, a number of them were classified before being approved for public release,
indicating that the authors expected the documents to remain sequestered when they
were written. In them, government officials generally describe the national 130 tips
hotline as a success. According to an internal “point paper” describing the pro-
gram, “IEDs are VBIEDs [vehicle-borne improvised explosive devices] are reported
and cleared, terrorists are captured, and weapons caches are seized...” U.S. Central
Command, U.S. Department of Defense, 2007. In addition, “[t]he tips program has an
excellent history of reporting both Shia and Sunni terrorist activity...” U.S. Central

More specifically, this same document notes that “OCF-I [American special forces]
and SCID [the Strategic Counterintelligence Directorate] describe the [130 tips hotline] program as very successful. This program provides SCID with 80% of its [human intelligence] sourcing and 100% of its operations within the past year” U.S. Central Command, U.S. Department of Defense, 2007. Another of these documents describes the national 130 hotline as of such great value that the U.S. President, Vice-President, and Secretary of Defense “all requested historical data for the tips program” Multi-National Corps – Iraq, 2008.

Yet, the internal documents also describe concerted and reasonably successful efforts of insurgents to overwhelm the hotlines. As one document describes, “[t]he most pressing problem to solve is inbound call filtering / blocking of harassment and denial of service calls from insurgent groups” Army Sustainment Command, U.S. Department of the Army, 2010. Another document attempts to quantify the problem: “Three out of four phone calls are harassment or death threats” U.S. Central Command, U.S. Department of Defense, 2007. In an e-mail exchange that was included amongst the released documents, a representative of the Military Information Support Team – Iraq, the organization that managed the database of tips data received, informally describes conditions similarly: “[T]here are 15 phone lines in the call center manned by 5-6 Iraqi Police officers 24 hours a day. The phones literally ring off the hook constantly...” U.S. Central Command, U.S. Department of Defense, 2006.

The result of these insurgent efforts was to limit the number of calls operators could answer, potentially resulting in missed information from legitimate callers: “[a]pproximately 5000 calls are received on a daily basis; this does not take into account a large number of call that hit a busy signal. Iraqi Operators are only able to answer an estimated one out of five, or roughly 1000 calls a day” U.S. Central Command, U.S. Department of Defense, 2007.

UK Ministry of Defense documents describe similar call patterns into the regional hotline British forces managed. For instance, one document notes that for the period
between July 12 and 18 of 2007, “[t]here were a total of 4774 calls to the Tips Hotline... of these calls, 2991 were malicious/nuisance calls, and 1702 were hang ups. Tips, wrong numbers or other enquiries made up the remainder” (81 calls) UK Ministry of Defence, 2007a.

The documents also suggest that relatively few counterinsurgent responses result from tips – even amongst those with legitimate information: of the estimated 5000 calls received per day, “[a]pproximately 120 reports are drafted each day which are actionable or have some intelligence value. All reports are sent up, yet most reports do not generate a response” U.S. Central Command, U.S. Department of Defense, 2007.

Other qualitative evidence suggests that insurgents took the tips programs quite seriously. Militants in Iraq actively sought to limit their use. In Baghdad, for instance, billboards were used to “promote the [130 national] hotline as a way for the Iraqi people to ‘fight the war in secret’ without fear of reprisal”; “the hotline and its success have ‘hit a nerve with the insurgents’ who regularly vandalize billboards promoting the campaign” Miles, 2004.12

In an interview, the first tips line operator in Iraq describes having to maintain absolute secrecy about working as an operator to avoid being targeted by insurgents tips line operator, 2014. Similarly, Sue Coates, a former Iraqi Reconstruction Management Office employee who was associated with the central Baghdad tips hotline observes that the identities of at least some of the operators became known to the insurgents during the war Coates, 2014. The dangers operators faced commuting to and from the Green Zone tips call center (a small, single room trailer in the Adnan Palace area) were reportedly so great that they ultimately ended up living in the

12In Afghanistan, a number of regional hotlines were also established. More recently, the Afghanistan government established a national Emergency Service Call Center, to which citizens can supply information on insurgents.13 Similar observations have been made in that country. For instance, Shapiro & Weidmann 2015, p. 248 note that “[i]n an attempt to prevent villagers from calling in tips to the military forces, [the Taliban] issued decrees ordering all cellphone towers to be turned off at night and they attacked and destroyed cellphone towers for the same purpose.”
call center itself. Her account is consistent with one of the recently released Defense Department documents, which indicates that “[t]he Iraqi operators are sleeping on the floor under their desks” U.S. Central Command, U.S. Department of Defense, 2007.

Living in such tight quarters for an extended period of time proved to be psychologically stressful. More disturbing, however, were the continuous phone calls to which the operators had to respond. According to Ms. Coates and consistent with Defense Department reports, the center’s telephones rang near incessantly and throughout the night, making it difficult for the confined operators to get any form of regular rest. By her account, in an attempt to shut the hotline down, insurgents were not only jamming the lines but terrorizing the operators.

Operator fear of insurgent retaliation also apparently complicated U.S. efforts to transition the national 130 hotline’s physical location to Iraq’s Ministry of Interior. Multi-National Security Transition Command – Iraq (MNSTC-I) “is working to move the Tips program to MOI-HQ in order to be co-located with the NCC. MOI-HQ is heavily infiltrated by Shia militia. Over 80% of the current Tips operators have stated clearly that they will not move to the NCC location due to fear of death for reporting on JAM/militia activities” U.S. Central Command, U.S. Department of Defense, 2007.

There is considerably less evidence, however, that insurgents succeeded in using the tips hotlines to ensnare counterinsurgent forces. Neither the U.S. Defense Department nor the UK Ministry of Defence documents contain any reference to efforts by insurgents to use the tips lines to either distract or ambush counterinsurgent forces with the calls they placed. I have come across only one exception. The Times describes a case in which a “tip led police to a booby-trapped body abandoned near a coffee shop in Baghdad, which exploded when they approached, injuring two” Haynes, 2007.
5 Empirical Analysis

Efforts to study the effects of wartime informing have long been limited by the highly secretive and restricted nature of information provided by civilians about a given insurgency. As Lyall et al., 2015, p. 834 have observed previously, “[t]win obstacles—the classified nature of informant data and ethical considerations in tracking such risky wartime behavior” limit scholarly inquiry. Following several extraordinary and very recent decisions by the U.S. and UK governments to release data on wartime informing, this dynamic has begun to change.¹⁴

In this section, I describe my strategy for testing the hypotheses presented above in the case insurgency in southern Iraq. I first describe data recently released by United Kingdom’s Ministry of Defense (MoD) on information received through a tips hotline operated by UK forces as well as data on wartime outcomes taken from four supplementary datasets. Finally, I describe a series of statistical tests using that data that are designed to identify the effects of information flow on insurgent activities.

5.1 Data

In late 2015, the United Kingdom’s Ministry of Defense released data on calls placed to the 130 regional hotline, in addition to a series of supporting documents describing the initiative. British forces were responsible for Multi-National Division – South East, which comprised Iraq’s Barsa, Muthanna, Dhi Qar, and Maysan provinces, and calls made within that area to the number 130 were directed to a call center run by British forces.

The call records dataset consists of the number of daily calls made to the hotline, categorized by type: a) “tips”, b) “malicious”; c) “erroneous”; d) “nuisance”; and

¹⁴Shaver et al. forthcoming use data secured from the U.S. Defense Department on weekly province-level data on the number of credible tips received by American forces (through both ICT and non-ICT (in-person contact, for instance) channels) for a sixty-week period of the Iraq war. Wright et al. 2017 study the effects of civilian casualties on intelligence flow during the ongoing Afghanistan war.
e) “other”. The data cover two separate time periods, which collectively provide approximately one year’s worth of daily data. The first time series covers all days in the period covering June 06, 2006 through February 11, 2007. The second spans all days between January 01, 2009 and February 28, 2009.

The classification of calls was determined at the time they were received by the Iraqi police officer operators, sometimes in consultation with British advisers and linguists who would translate the tips from Arabic to English, following a grading system honed by British forces during The Troubles. As the director of the tips program explained, “[w]e did our own grading [of the calls received]... But there was barrier [between us and the] military system [so] we could not get any good feedback [on the outcome of tips that were acted on]” 130 Hotline Director, 2016. As a result, the data classifications reflect \textit{ex ante} judgments of the credibility of tips rather than \textit{ex post} evaluations informed by the results of any counterinsurgency activities undertaken pursuant to information received. This is a very important feature of the data: calls assessed as tips reflect best estimates and were not retroactively recoded. Was such recoding applied to the data, a mechanical correlation in tips and counterinsurgent successes would likely result by virtue of the recoding process itself and would fail to capture any relationship between insurgent successes (for instance, in ambushing or diverting counterinsurgent forces) resulting from false tips planted by the insurgents (because any such “tips” would no longer be categorized as such). 15\textsuperscript{16}

According to the MoD documents, once a tip was received, the organization to which the information was passed would depend upon the nature of the tip itself.

\textsuperscript{15}For simplicity, I hereafter refer to calls judged to contain legitimate information as tips. Such reference is not intended to suggest that information received through these calls was in fact legitimate but is made to simplify the writing.

\textsuperscript{16}Such \textit{ex ante} classifications do not appear to apply to other “tips” datasets maintained by Coalition forces in Iraq. For instance, MoD and U.S. Central Command records indicate that tip quality determinations were made after retrospective analysis of the outcome from each tip UK Ministry of Defence, 2016, Multi-National Force – Iraq, 2007. For instance, tips were considered “[a]ctioned” if an “immediate on-the-ground response occurred”; others were classified as “[p]ositive” if they led “to successful capture of [anti-Iraqi forces], arms or equipment, IED found and cleared, or attack prevented” Multi-National Force – Iraq, 2007.
The large majority of tips were passed to Basra’s Provincial Joint Coordination Center (PJCC) and to the Provincial Joint Operations Centres (PJOCs) serving the Muthanna, Dhi Qar, and Maysan provinces. Other organizations to which information was disseminated included (but are not limited to) the National Information and Investigation Agency (NIIA Intel), Basra’s Criminal Identification Division (CID), and the Multi-National Force – Iraq Directorate of Intelligence (J2) UK Ministry of Defence, 2007b. In the rare instances in which a tip supplied in the Basra region regarded activity in Baghdad, information was passed to the national 130 hotline center where additional determinations on dissemination could be made.

A time series plot of tips calls received for the first period of coverage appears in Figure 4. An average of 4.18 tips were received per day during the period. Consistent with the qualitative evidence, the data strongly support the proposition that insurgents were engaged in intensive efforts to overwhelm tips lines by tying them up. This figure shows that during this period, erroneous, nuisance, and malicious calls vastly exceeded tips received. This pattern can be seen even more starkly in the plot in which an aggregate spurious calls variable – the summation of erroneous, nuisance, and, malicious calls – are plotted against tips. At their peak on October 10, 2006, 2122 false calls were received compared with nine tips that same day. Over this period, the average percentage of calls received that were tips was 1.052%.
Figure 4: This figure depicts the tips hotline data for the primary period of coverage from June 06, 2006 through February 11, 2007. The image on the left plots levels of calls by type. Moving from top to bottom, the column on the right depicts: 1) tips calls alone; 2) tips calls compared with total spurious calls; 3) tips calls expressed as a percentage of all calls received; and 4) tips calls compared with total spurious calls using weekly records covering a longer period of time.

A second pattern is also apparent from the data. Although false calls persistently outnumbered tips, significant changes in the number of false calls received occurred throughout the war. From the data contained in the released British document, a weekly time series covering an even larger range of dates can be constructed. Additional such fluctuations are apparent in this time series and are also plotted in Figure 4.

In 2009, these patterns change significantly. Although significantly fewer tips calls were received during this period (0.73 per day on average), the number of malicious, erroneous, and nuisance calls experienced much more significant declines relative to their previous levels (Figure 5). The resulting gap between the two classes of calls was, therefore, greatly reduced relative to the 2006-07 period. It is possible that by this
point, British forces had developed the technical capabilities to limit the volume of spurious calls. Yet, this explanation does not account for the concurrent drop in tips calls. The more plausible explanation is that there were fewer calls of all types because the insurgency had, by this point in the war period, largely died out in this region. In the spring of 2008, Iraqi security forces supported by multi-national forces conducted Operation *Saulat al-Fursan* (Charge of the Knights), which focused primarily on expelling Shia militants from Basra City. The operation produced significant lasting reductions in insurgent violence, which can be seen in Figure 6.

![Graph of calls by type](image)

**Figure 5:** This figure depicts the tips hotline data for the second more limited period of coverage between January 01, 2009 and February 28, 2009. During this period a smaller number of tips were received on average than during the primary period of call data coverage. In addition, during this period the gap between tips and spurious calls was significantly smaller.
Figure 6: This figure plots total weekly insurgent attacks carried out between January 2005 and the end of December 2011 in Basra, Missan, Muthanna, and Thi-Qar Provinces, which comprised the area of British military security responsibility. The insurgent attack time series show that by 2009, violence against British and Iraqi forces in those areas had declined significantly.

I supplement these call records with data on insurgent and counterinsurgent activity, including incidents of insurgent violence, recorded by multi-national and Iraqi forces during the Iraq war. These data come from two separate Significant Activities (SIGACTs) datasets released by the U.S. Department of Defense (DoD). The first dataset was released by Berman et al. 2011b and was declassified by the DoD for use in academic research while the Iraq War was ongoing (hereafter, Release I). The second dataset (hereafter, Release II) was declassified and released in 2014 by the DoD and was prepared and released by Shaver and Bollfrass 2016.

Both datasets include the precise, geo-referenced locations of all recorded activities and specify the date on which they occurred. However, these datasets differ in two key respects. Release I covers a five year period of the war and includes precise details on the specific weapons type used in recorded attacks. For instance, within the general
class of “direct fire attacks,” these data distinguish between attacks involving small arms, rocket-propelled grenades, and hand grenades. These specific sub-category of information is unfortunately not present in Release II. Release II, however, is more comprehensive in its coverage of events than Release I. Specifically, comparing the period of mutual temporal coverage, Release II includes a significantly greater number of insurgent attacks.\footnote{Release I was declassified by the DoD while the Iraq War was ongoing. I suspect that Release II’s more comprehensive coverage resulted from retrospective updates applied by the DoD later in the war or after it had concluded.} Furthermore, Release II includes details on the target of attack, whereas Release I does not.

Finally, I supplement these datasets with data on 1) all recorded Iraq War weapons cache discoveries by multi-national and Iraqi forces, which were also declassified by the DoD and prepared and released by Shaver and Tenorio 2015 and 2) civilian casualties, which was released by Condra and Shapiro 2012.

5.2 General Model

In this section, I first describe the general estimating equation I use to associate tips calls and insurgent violence. Later, I describe specific tests using particular sub-types of insurgent violence and other counterinsurgency outcomes – for instance, weapons cache discoveries – designed to test the hypotheses introduced previously.

The relationship between wartime informing and insurgent violence is complex. In levels, insurgent violence (and its various sub-types) and information are likely endogenous: although intelligence provided by civilians might result in reductions in insurgent violence, areas and/or periods of time in which relatively great amounts of insurgent violence were carried out might tend to be associated with greater information flow because there was simply more information available for citizens to report. Thus, the relationship between levels of tips and insurgent violence is ambiguous.

To generate associations between these variables, I use ordinary least squares re-
gression and adopt a lagged, first-differenced model with time fixed effects, following modern time-series practices that include deseasonalizing the tips call variable and accounting for possible autocorrelation in the standard errors. Because counterinsurgents are likely to act on the information they secure relatively quickly, I adopt the day as the unit of analysis. I express both sets of variables (calls – both tips and spurious – and insurgent violence) in differences to control for general trends.

Lag times associated with the receipt of tips and subsequent effects on the production of insurgent violence are likely to differ across violence types, and the theoretical underpinnings of this project do not map treatments to precise temporal outcomes. I, therefore, generate lags for all days during a two-week period. Doing so allows for simultaneous associations of outcomes of interest (for instance, changes in direct fire attacks) with daily changes in tips numbers over each of fourteen days following a given change in tips. Formally, this is given by the following estimating equation:

$$\Delta V_l^t = \zeta + \sum_{j=1}^{14} (\vartheta_j \Delta T_{t-j}) + \varepsilon_t$$  

where $V$ and $T$ denote a given type of insurgent violence $l$ and tips, respectively.

Changes in insurgent violence might nonetheless influence changes in tip giving through the former’s effect on civilian casualties. Specifically, Shaver et al. forthcoming show that civilians during the Iraq war tended to increase (decrease) the number of tips they supplied to Coalition forces following civilian deaths caused by insurgent (Coalition) forces. On days in which there are spikes in violence, the likelihood of civilian collateral damage may increase. Thus, I supplement the model by controlling for previous changes in civilians casualties, distinguishing between those for which Coalition forces were blamed and those for which insurgents bore responsibility:

$$\sum_{j=1}^{14} (\gamma_j \Delta C_{t-j} + \eta_j \Delta I_{t-j})$$

Because differences in insurgent violence are likely to correlate across time, I supplement this time-series model with previous values of insurgent violence. To control
for differences across the span of the conflict that might account for an observed relationship between the variables, I introduce week fixed effects. Because illegitimate calls placed by the insurgency to the tips hotline may correlate with both insurgent violence and tips calls, I include a matrix of past values of false calls (malicious, nuisance, and erroneous calls): \[ \sum_{j=1}^{14} \zeta_j \Delta F_{t-j}. \] Standard errors are heteroskedasticity and autocorrelation consistent.

The calls records reveal that near the end of 2006, one of the primary cellular telephone networks serving the south of Iraq experienced an ongoing “fault” that resulted in emergency numbers including the 130 tips hotline number not working for its users. This outage is reflected in the data, and, as a result, the number of tips and spurious calls falls significantly. I augment the model by controlling for this period of network outage. In addition, the UK records note that on a separate date that same year, British forces made a change to the way in which they were recording calls. I similarly include an indicator variable that distinguishes between the periods before and after this change. Finally, information flow and pattern of violence might be correlated with the day of week. For instance, on Fridays, civilians traveling to mosques for prayers might observe suspicious activities or devices that they otherwise would not. Similarly, insurgents might adjust the intensity or type of violence they produce on this day. I, therefore, add day-of-week fixed effects to the model as well.

5.2.1 Time-Series Considerations

Before introducing particular models, I first analyze, and modify as appropriate, the individual time series following basic time series considerations Shumway and Stoffer, 2010. Because the data are high frequency, I first test for non-stationarity and seasonality during the primary time series. Autocorrelation functions of the primary variables of interest (tips, insurgent violence (which can be subdivided by attack type), and counterinsurgency successes (the discoveries of weapons caches and
of improvised explosive devices (IED)) show that some of these variables are clearly non-stationary while others exhibit seasonality. However, when these variables are differenced all appear stationary, and, with the following exception, do not tend to display seasonality.\textsuperscript{18} $\Delta$ tips displays highly persistent three-day cyclicality. This trend persists even when the second- and third-order differences are applied.\textsuperscript{19} Therefore, I deseasonalize this variable using periodic regression, following Shumway and Stoffer 2006, p. 72, before differencing the regression residuals:

$$\Delta T_t = \alpha_0 + \alpha_1 \cos(2\pi w_1 t) + \beta_1 \sin(2\pi w_1 t) + \varepsilon_t$$

where the frequency $w_1$ is set to 1/3. As Table 1 shows, the $\cos(2\pi w_1 t)$ variable explains a significant portion of the variation in the differenced variable. The autocorrelation function of the deseasonalized, differenced variable, although not entirely free of statistically significant lagged values, appears much more reasonable. Thus, in the following discussion on model selection, a differenced deseasonalized tips variable is used in place of a differenced-only variable.

\textsuperscript{18}ACFs are also generated for the same primary variables for the more limited 2009 time series. However, for that time series, whether variables are expressed in levels or differences, no statistically significant trends are apparent.

\textsuperscript{19}A clue as to the possible source of this autocorrelation appears in the British records, which indicate that three separate “shifts” rotated across days (e.g. shift “A” was assigned to June 08, 2006, June 11, 2006, June 14, 2006...; shift “B” was assigned to June 09, 2006, June 12, 2006, June 15, 2006...; etc.). Some heterogeneity in either the number or classification of calls received appears to be attributable to the individual shifts. A similar three-day seasonal pattern is apparent in the spurious call variables as well.
Table 1: Periodic Regression Result

<table>
<thead>
<tr>
<th></th>
<th>ΔTips</th>
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<tbody>
<tr>
<td>$cos(2\pi \frac{1}{3}t)$</td>
<td>1.109***</td>
</tr>
<tr>
<td></td>
<td>(0.246)</td>
</tr>
<tr>
<td>$sin(2\pi \frac{1}{3}t)$</td>
<td>−0.007</td>
</tr>
<tr>
<td></td>
<td>(0.245)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.180***</td>
</tr>
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<td></td>
<td>(0.174)</td>
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<p>| | |</p>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>251</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.076</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.068</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001

5.3 Specific Models

To estimate a general association between insurgent violence and tips call, I regress the latter on total insurgent violence produced during the study period. This regression tests hypothesis 1, which predicts no association between these variables if the supply of spurious information was large enough to render the tips hotline irrelevant. Next, to probe the relationship between information supply and the production of specific types of insurgent violence, I replicate this analysis, substituting general insurgent violence with specific categories of insurgent and counterinsurgent activity.

To test the hypothesis that information flow is associated with increases in the least organizationally constrained violence, I set the dependent variable to changes in direct-fire attacks. According to the SIGACTs data, direct-fire attacks during the Iraq War consisted overwhelming of attacks using small arms. Although small arms can be (and indeed were) employed in planned operation, they are also the class of weaponry over which insurgents exercise the greatest discretion. If changes

20In all regressions in which I analyze specific sub-types of insurgent violence, I include lagged controls of both that violence type as well as of other major types. For instance, in the regression of tips on direct-fire attacks, I also control for indirect-fire and improvised-explosive-device attacks.
in information flow affect changes in the production of the least organizationally constrained violence, it should manifest through changes in this outcome variable.

The data also include a specific ambush variable. Although efforts to ensnare counterinsurgents might be associated with a variety of violent attacks, ambushes are one of the most likely. Thus, we can directly probe the relationship between changes in information and ambushes.

Next, to test the hypothesis that information flow is associated with decreases in organizationally planned attacks, I construct a variable that consists of only attacks that are likely to have involved some of the most significant organizational planning. This variable includes assassinations, vehicle-borne improvised explosive devices, suicide bombings, and infrastructure attacks.

To test the hypothesis that information flow is associated with decreases in attacks using weapons that are cache dependent and/or have long lead times, I first adopt an outcome variable that consists of aggregate attacks carried out using weaponry that is among the most likely to have been drawn from caches prior to use. These include indirect fire (rocket and mortar) attacks, improvised explosive device attacks, and unexploded ordnance attacks. As I describe next, a relationship between this variable and information flow might result, at least in part, from civilian spotting of unexploded improvised explosive devices. To isolate any effect of cache-dependence, I supplement this model with a lagged vector of differenced IED discoveries.

Of all weapons types with long lead times, improvised explosive devices are perhaps the most prominent. These weapons were used almost exclusively against moving targets during the war and, once emplaced, they would typically not be detonated until the intended target was in proximity. As a consequence, these weapons might sit for one or more days at a time before being detonated. Although insurgents and their civilian supporters enlisted for the purpose of planting IEDs would typically attempt

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21In the SIGACTs data, unexploded ordnances refer to cases of attacks in which explosive projectiles were directed against government forces but failed to explode.
to conceal these bombs, the need to position them on or immediately near roadways limited the extent to which they could be shrouded from public view. Thus, I repeat the analysis, adopting counterinsurgent IED discoveries as the outcome.

Finally, to test the hypothesis that information flow is associated with increases in cache discoveries that precede or are contemporaneous with reductions in attacks using cache-dependent weaponry, I regress changes in tips on changes in cache discoveries. In addition, I repeat the regression described above in which I regress changes in tips calls on cache-dependent weapons attacks, including a lagged vector of cache discoveries. If such attacks were affected by the discovery of weapons caches, then including the mediator in the regression should attenuate or altogether eliminate any relationship uncovered.

6 Results

Primary results are presented as coefficient plots in Figure 7. As this figure shows, changes in overall insurgent violence are positively correlated with past changes in tips, particularly in the days immediately following increases in tips. Even more pronounced is the change in the least organizationally constrained violence, measured in direct-fire attacks. In contrast, these results provide no evidence that tips were successfully used to draw British or Iraqi forces into ambushes. Thus, there is little evidence that the uptick in violence following the receipt of tips is driven by insurgent efforts to ensnare responding counterinsurgents. Instead, consistent with the results described below, such uptick is likely the result of substitution effects and/or gun fire incidentally drawn by counterinsurgent forces acting on beneficial tips.

In contrast, persistent reductions in highly planned insurgent violence are correlated with past changes in tips. Similarly, attacks with weaponry that is cache-dependent tend to decrease following positive changes in tips. Cache discoveries of
the same fourteen-day window tend to increase in parallel. Furthermore, when cache discoveries are included in the regression of tips on attacks with cache-dependent weaponry, the relationship diminishes significantly. Finally, IED discoveries are generally positively correlated with positive changes in tips. Both sets of results support the existence of both organizational planning and weapons-use constraints effects.

Are the results substantively significant? Considered in terms of changes, using the average coefficient value of all statistically significant lags, every ten beneficial tips received were associated with roughly: 1) five additional attacks using the least organizationally constrained weaponry; 2) two and a half fewer cache dependent attacks, and 3) half of one fewer attack using the most organizationally constrained weaponry. All three categories of attack, however, vary considerably in their frequency over the study period, and the results are perhaps better understood in terms of percentage changes. Each beneficial tip received is associated with an increase in attacks using the least organizationally constrained weaponry that is roughly fourteen percent of the average number of the daily attacks carried out using these same weapons during the study period. For attacks using weaponry that is the most cache dependent, the corresponding decrease following receipt of a beneficial tip is roughly seven percent of the daily average. Finally, for attacks using the most organizationally constrained weaponry, this decrease represents nearly ninety percent of the daily average.
These results may understate the role of the tips hotline in reducing insurgent violence for two reasons. First, not all quality tips received by counterinsurgent forces are likely to lead to immediate counterinsurgency successes. Consider, for instance, the description of credible tips received by British forces during the week of March 21st of 2007. Although just over half of these (56%) dealt either with “suspicious activity”
or “terrorist/insurgency [activity]”, those related to “general crime”, “murder”, and “dead bodies” made up most of the remaining. Although tips related to this latter class of activities might ultimately result in counterinsurgency successes (after, for instance, investigations into the murder reports and dead body sightings are carried out), they are unlikely to do so over the very short term.

Second, the results do not account for possible well-placed informants who were recruited after making initial calls to the hotline but were subsequently directed to use other means of communication to continue to supply intelligence. As one of the U.S. Defense Department describes, when a call came into the primary 130 hotline call center, “hand written reports [were] translated by local national linguists and entered into a database. The translated report [was] given to British contractors under Armor Group who are prior CT Officers from Northern Ireland and were tasked to train and mentor the operators. They have developed their own program for HUMINT sourcing that has Iraq NIIA leadership awareness, but currently no Iraqi involvement. Each caller is asked if they would agree to being called back. If they agree, Armor Group contractors analyze the report to see if they are interested in developing the caller as a source. The Armor Group Brits make initial re-contact and, following 2-3 source meetings will determine if the caller is useful – a vetting process. If so, they will hand off the source to either the Strategic Counter Intelligence Directorate (SCID) or Task Force (TF) 24” U.S. Central Command, U.S. Department of Defense, 2007.

6.1 Robustness

6.1.1 Sensitivity to Time Period

As Figure 6 shows, during the time period covered in the 2009 time series, the number of false calls (relative to tips) decreased significantly. By then, the highly organized insurgency was significantly less active. Were British forces simply more effective during this later period in responding to tips received, either because they
had far fewer false tips to sort through or because the insurgents who remained active
during this period were less formidable opponents? If they were more effective, are the
results of the primary model driven by observations from this later period? Rerunning
the same set of regressions using only data from the 2006-07 period shows that this is
generally not the case, with one exception. The results, which appear in Figure 8, are
largely unchanged. Levels of statistical significance attenuate across all of the tests;
however, this perhaps unsurprising given that this subsetted time series contains a
total of only 235 observations. IED discoveries in this analysis lose their general
association with tips.

![Figure 8: This figure depicts lagged changes in tips on changes in outcomes of interest
using data from only the first time series.]

There are 250 observations given by the number of days covered in this period; however, the
number of observations is reduced by the inclusion of lags.

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22 There are 250 observations given by the number of days covered in this period; however, the
number of observations is reduced by the inclusion of lags.
6.1.2 Placebo Test

If the relationship identified between tip flow and insurgent violence is the result of the theorized causal process, such relationship should not persist if the time series is randomized by day before changes in tips are lagged and regressed on changes in insurgent violence and IED and cache discoveries. As expected, the results of this placebo test fail to produce any observable relationship between lagged changes in tips values and present changes in insurgent violence, irrespective of type, and IED and cache discoveries.

7 Conclusion

Despite considerable effort by Iraqi insurgents to overwhelm the tips hotline managed by British forces in the country’s south, the limited but steady stream of credible information to call center operators appears to have provided British forces with sufficient information to disrupt insurgent attacks involving the greatest degree of organizational coordination, while also reducing attacks by insurgents that tended to be vulnerable to cache discoveries.

While informing through ICT channels during the Iraq war appears to have produced positive changes in overall insurgent violence, the evidence suggests that this finding is driven entirely by an increase in direct fire attacks and may have resulted from substitution effects. As the insurgency was forced to reduce attacks that involved greater levels of principal-agent coordination, its foot soldiers may have responded by engaging in more attacks over which they exercised significant discretion.

Further research might focus on the effects of tips induced substitution. Specifically, when insurgencies produce greater number of relatively unorganized attacks and fewer highly planned attacks, such as suicide and car bombings, following positive increases in tips, do they become less effective in inflicting costs on counterinsurgents?
For instance, do they grow more or less successful in their efforts to inflict casualties on government forces? Do they produce a greater number of civilian casualties?

While ICT platforms may tend to favor the efforts of non-state actors to mobilize against more powerful state targets, the results of this analysis suggest that once conflict is initiated, such technologies can benefit the state by upsetting the information asymmetry upon which rebels often rely. Furthermore, this piece offers the first direct quantitative evidence using actual “tips” data of the centuries-old proposition that information plays a central role during insurgency contests.

Can these results be generalized? The American and British militaries are amongst the most technologically sophisticated in the world. That these forces were apparently unable to counter repeated telephony denial of service attacks is informative. If these forces were unable to do so, barring any significant changes in available technologies, it is unclear that governments with access to even fewer technical capabilities would fare any better.

Nevertheless, British forces’ apparent success in using the credible information that they did receive may not be generalizable. As Shaver et al. forthcoming have noted previously, while it “is a common trope that most intrastate conflicts involve a dramatic discrepancy in military power... the scale of the discrepancy in Iraq during the study period was unusually large... [C]ounterinsurgents forces writ large were highly mobile... and benefited from levels of intelligence support, logistical capacity, and precision indirect fire power... that far exceeded what is available to most states fighting insurgencies. Those capacities enabled them to effectively target any position in space at nearly any time if they had actionable intelligence.” Less capable governments fighting their own insurgencies may find that their inability to limit insurgent efforts to overwhelm tips platforms, as well as to react with sufficient speed and force when credible information is received, ultimately limit the value of ICT platforms.
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